An Extended Research Agenda for the Management of Organizational Resilience using the Resilience-Phase-Model (RPM)

Manuela Varsani

Abstract— This article aims to encourage research into organizational resilience using the Resilience-Phase-Model (RPM). Using an interdisciplinary approach that draws from resilience theory in socio-ecology, this article develops several lines of inquiry. In this article the author addresses two questions. (1) How can be organizational resilience conceptualized to achieve a common understanding?" and (2) How can this concept be used for further research in resilience management. In a first step the origin understanding of resilience has been conceptualized with the Resilience-Phase-Model (RPM). The underlying understanding is that resilience is a latent process over three phases (Equilibrium-, Coping- and Recovery Phase) that the system has to go through to withstand crisis. As second, main resilience concepts on the organizational level have been identified and integrated into the RPM-Model. This approach sheds light in an original way on an integral understanding of organizational resilience. In doing so, the intent of this work was to contribute to the ongoing academic debate on how organizations can face unexpected events and to show which possibilities arise for the resilience-management. It also presents several research questions for further investigation of resilience in business and management studies.

Index Terms— Resilience-Phase-Model (RPM), organizational resilience, resilience management, integrative literature review

——————————— ◆ ———————————

1 INTRODUCTION

It is generally known that organizations are more than instruments for attaining defined goals; they are, social groups attempting to survive in their particular circumstances [1]. Organizations are confronted with crises in this dynamic and therefore increasingly complex world [2]. For them it is about adapting to the new environment and developing further despite adverse circumstances. This process can be described both as a quality and as an ability to develop organizational resilience [3]. But how can organizational resilience be created? While the resilience concept becomes increasingly important for organizations, the gap in the literature regarding the conceptualization, sources and outcomes of the term requires a need to synthesize the constantly growing and becoming more diffuse literature on organizational resilience [4]. This results in a general demand for a solid understanding of organizational resilience based on the original concept of resilience [5]. Furthermore resilience is understood as an organizational competence that can be nurtured, improved, and consolidated by management activities [6], [7]. This means all conceptualization of resilience at the organizational level have a strong influence on the Resilience Management literature. However, many existing organizational theories inadequately address how and why an organization can maintain its resilience in the face of unexpected events [8], [9].
Further, there is limited empirical work that examines organizational resilience and little consensus regarding how resilience may be achieved in practice [10]. In sum can be determined that literature lacks comprehensive theoretical models that concentrate on resilience in an organizational setting [4]. The proposed framework attempts to fill this gap by composing the origin understanding of resilience with the development of research in the organizational level in integrating the literature of resilience in its origin with the emerging studies on the organizational level. This is done within two steps. First, the actual construct of resilience from the research fields of positive psychology and social ecology was mapped by the author in a so-called Resilience-Phase-Model (RPM), [11]. This RPM-model provides a clear framework for a basic understanding of resilience. In a second step, selected concepts for organizational resilience are analyzed and assigned to the phases of the RPM-model. This conceptualization of organizational resilience by integrating the RPM-Model providing a platform for a better understanding the evolution of resilience and its relationship to organizational theories and management concepts. To answer the second question "how can this reconceptualization be used for further research" this paper outlines a few investigation of resilience in business and management studies.

2 DEVELOPMENT OF THE RESILIENCE-PHASE-MODEL (RPM)

How to survive in turbulent and unpredictable environments is increasingly recognized as a fundamental challenge. Over the last few years there has been considerable interest in the idea of resilience across all areas of scientific world [12]. Originate from the Latin root *resilire*, meaning to spring back, resilience was first used by physical scientists to describe the characteristics of a spring and to specify the stability of materials and their resistance to external shocks [13]. Then taken over in psychology and education and also found its way into other fields of research like economics and management [2, 14, 15]. In general theories about resilience exist a lot. Despite this, or perhaps because of it, adequate explanation or definition remains elusive [16]. In recent years, interest in identifying and

————————————————
- *Manuela Varsani is currently pursuing doctoral program in business and administration in University of Latvia, E-mail: mvarsani@posteo.de*

developing resilience characteristics has increased to foster viability. But the high variety of science perspective offer a different basis for understanding resilience. Overall, research has evolved into different strands and waves [14]. The need for a more general work on this topic has been identified. To fill this gap the author developed the so called Resilience-Phase-Model (RPM) which evolved after synthesizing scientific literature [17] regarding the topic resilience [11]. In this section the author presents shortly the RPM-Model developed with the aim to offer a platform for common understanding of resilience and the basis for future research.

At the beginning of the 1970s there were two research streams - Psychology and Evolutionary social-ecology - that were explicitly concerned with resilience. Within the science of psychology, resilience research is anchored in positive psychology [18]. The core issue is the individual within a "stressful" environment and the development of a suitable mechanism or individual characteristics to cope with the situation [19]. The longitudinal study on 698 children on the Hawaiian island of Kauai by the developmental psychologist Emmy Werner (1971), is considered the initial for the research field of positive psychology [20]. A central component of research in positive psychology is the question of what protective and preventive resources are available and what processes take place, which enable a person to deal with crises, adverse circumstances or stressors in an appropriate way to protect mental and physical health [19]. The introduction of the term resilience in systems theory comes from the system-ecological research field. A formative work here is the observation of the dynamic development of fish and insect populations. Holling (1973) found that a return to equilibrium occurs after drastic events. The understanding arose that resilience „… *determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist*" [21]. This definition concentrates on stability near an equilibrium state, where resistance to disturbance and speed of return to the equilibrium are used to measure the property.in two ways, one with the focus on the speed of return to equilibrium and another capturing the size of a disturbance needed to dislodge a system from its stability domain [22]. In the course of the further development of systemic resilience research, however, it was found that new states of equilibrium and higher-order stability are also a result of a resilient reaction of the system. These can take place through adaptation and, in a radical form, through transformation processes of the system. One of the most common definitions of system resilience in ecology today comes from Folke and colleagues [23] „*Resilience (…) is related to (i) the magnitude of shock that the system can absorb and remain within a given state; (ii) the degree to which the system is capable of self-organization; and (iii) the degree to which the system can build capacity for learning and adaptation.*" The resilience of a system is therefore positively correlated with its ability to absorb, adapt and transform. The theoretical elaboration of this resilience concept took place primarily within the framework of the models of complex adaptive systems. Made a major contribution to this from 24 with heir publication Panarchy [24]. Synthesizing the literature based within the context of resilience it

has been identified resilience as a complex system over three phases. These correlate to the elements of resilience as identified by [25] through literature review. These include: (1) Phase before crisis (Equilibrium), (2) Phase coping with crisis (absorbtion, adaption, transformation and (3) Phase after crisis (recovery). In order to now belong to system resilience, various attributes can be used, which are visualized and seen by the RPM model (Fig. 1).
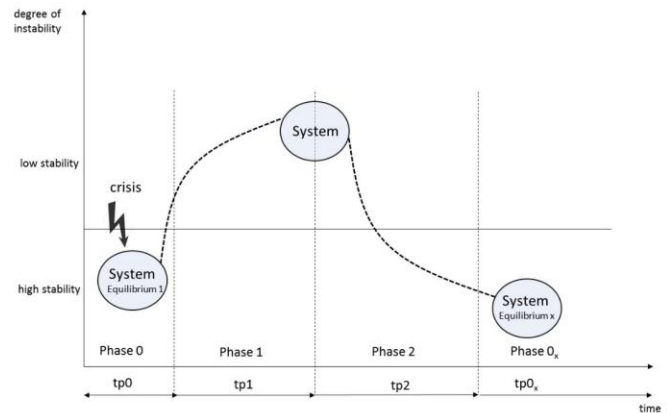

Fig. 1 Resilience-Phase-Model (own illustration)

Within the phase before crisis (Phase 0) the system is in a state of equilibrium, a state of stability also called Equilibrium (Eq) [24]. The expressiveness and the relationship of central building blocks to each other within the system determine the stability [2]. The Phases 1 and 2 are the systems instability phase caused by an event affecting the system **(crisis)**. This can be a disruptive change, which can be perceived as a threat, crisis or disaster [14, 26]. One can speak of a crisis when the stability of the system is endangered and is no longer able to stabilize for an indefinite period of time [27]. While in Phase 1 the focus is on coping with the crisis, in Phase 2 the focus is on recovery and recovery time. Within Phase 1 three coping strategies within the resilience research have been identified [11]. The first strategy can be called absorbtion. Here the system absorbs relevant shocks to remain robust and to protect itself from instability [19]. Some authors also define this as resistance (R). If the outcome after the crisis is resistance, it shows that the resources have effectively blocked the stressor and, accordingly, there is virtually no dysfunction, no matter how temporary. In this context resources need to be robust, redundant, or rapidly accessible [29]. So, robustness is seen as driver for resistence and denotes the degree to which a system is able to withstand an unexpected internal or external threat or change. Robustness can be seen as to the properties of a system that allow it to accommodate perturbations without additional adaptation [22]. Instead of absorbtion, a system can also cope with a crisis through expanded adaptation or transformation processes. his means that it tries to adapt to the system-changing variables through strategies such as self-organization or the ability to learn or even through self-change (dissolution of existing structures or processes) [30]. The interesting question in all three variants of coping with crisis is, how much disturbance it can take and remain within critical

thresholds (altitude a) [27]. An additional explanation would be the degree to which a system can be changed without losing the ability to recover from the shock [19]. Measures to reduce the altitude may have reactive, preventive or adaptive character [12]. Folke describes this as "the magnitude of shock that the system absorbs and remains within a given state; the degree to which the system is capable of self-organization; and the degree to which the system can build capacity for learning and adaptation" [23]. As this point of instability is approached, the system returns to equilibrium more slowly. Disturbances can be dampened less and less efficiently [31]. This means that the degree of instability can vary and have a different intensity (a) and duration (tp1) over time. The sensitivity of the system depends on the quality and quantity of the resources. Phase 2 often referred to as the recovery phase [21], [24] describes the return of the system to the equilibrium (stable status). The speed by which the system returns to equilibrium is the measure. The faster the system bounces back, the more resilient it is. The emphasis is on return time **(tp2)** on minimizing time to recovery, where critical functions are regained [29, 32]. These are important temporal dimensions of change that are theorized about in the resilience literature, yet

TABLE 1
RESILIENCE ATTRIBUTES

Attribute	
Phase 0 / before crisis / stable	
Equilibrium	Each system stays before disturbance and afterward in an equilibrium status (Eq0)
tp0	Time before crisis / Duration of no disruption
Phase 1 / coping with crisis / instable /	
Crisis (C)	Every unexpected event disrupts the Equilibrium status of the system. (shift from stable-instable)
Altitude (a)	Is the degree of instability a system can withstand – how much disturbance it can take – the degree to which a system can be changed without losing the ability – the degree of instability can very over time an in intensity
tp1	– how long it can remain within critical threshold and
Absorbtion	Resistance shows the capacity of a system to be robust and to protect itself from instability – quality of interrelated – no structural and procedural changes – static resilience – Eq1
Adaption	Adaptability means to adapt to the systems changing variables. – there are structural and procedural changes – dynamic resilience (passive) – Eq2
Transformation	Transformation means to adapt the systems changing variable as much that the dependencies can change – new structure and processes of the system – dynamic resilience (active) – consequence will be new Equilibrium (Eqx)
Phase 2 / after crisis / on the way to stability	
Recovery time (Tp2)	The speed of recovery can be a measure of resilience. Recovery activities can be long-term oriented but also short-term to become operational as soon as possible.
Equilibrium	Depending on the coping strategy using of the system, there is no or a structural change. (Eq0 ≠ Eqx)

the empirical body of work on this dimension is limited [33]. Depending on the coping strategy with which the system has now overcome the crisis, the target state is either the state of equilibrium before the crisis or a new state of equilibrium [21, 27]. The following table summarizes the identified resilience-attribute with its short explanation.

To sum up the findings developed through synthesizing the resilience literature the concept of Resilience can be seen as a *conceptual umbrella*. The umbrella metaphor supports a processual understanding of resilience. As mentioned before resilience is as complex process over three phases. Phase 0 before the crisis, phase 1 / coping the crisis and phase 2 / after the

crisis; Recovery phase. The process begins and ends with the system in a stable state. This can be the same or a changed state. In every phase there are factors that influence the resilience behavior of the system. Research into these factors should clarify which properties or dynamics promote the return of the system to a stable state. Systems research has identified three strategies for overcoming a crisis (Phase 1). The first strategy is to absorb shocks by withstanding them. There is no structural change in the system. The second strategy is that of adaptation. There are no to slight structural changes here. The third strategy is the most complex. The system meets the crisis through transformation, that is, with a strong change of its own. Phase 2 is about getting back to the same stability or to a new one.

3 MANAGEMENT CONCEPTS FOR EXPLAINING ORGANIZATIONAL RESILIENCE: A CONCEPTUAL INTEGRATION OF BODY OF KNOWLEDGE OF ORGANIZATIONAL RESILIENCE IN RPM MODEL

Accumulating and then synthesizing the literature is a critical first step to make knowledge available for interpretation and use. To ensure that the body of research to be included in this review was sufficiently broad, deep, and rigorous, the author followed established procedures of conducting systematic reviews [34]. This included systematic searches on relevant keywords (e.g., organizational resilience, resilient organization, strategic resilience) mainstream management and resilience management journals, which generated 164 articles. Further the author identified five literature reviews between the timeframe of 2011-2019 discussing the actual resilience research on the organizational level [25], [16], [5], [34], [29]. The author than manually explored additional research that may have fallen outside focusing on new aspects regarding organizational resilience. This body of literature was reviewed thoroughly with the primarily purpose to support the reconceptualization goals of the author. The focus was on reconceptualization organizational resilience, not the comprehensive review and critical analysis are emphasized throughout the work. By synthesizing the literature of organizational resilience core concepts from different disciplines have been identified. The concepts discussed are strongly related to special management research. The multitude of different and not selective concepts also lead to different understandings of the term resilience. It is not the aim of this work to finally propose such a definition. In the following, the aspects from the (scientific and management) literature are taken up which, without claiming to be exhaustive, give a clear picture of the current state of research on organizational resilience. In order to classify the different concepts of organizational resilience, the definition of the National Academy of Sciences [36] was considered particularly suitable. Resilience defined by the National Academies of Science (NAS) as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events" is emerging as one of the most widely used by various organizations and governance agencies [28, 36] Similar to the definition of the NAS, the Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, BuAA, [37] also developed a phase

model of organizational resilience, which offers a limitation and a framework for the systematization of the different concepts. The BuAA differentiates the various characteristics of organizational resilience according to the time phase in which they are relevant or activated for dealing with uncertainties and potential and actual crises [37]. The point of orientation is the point in time at which the crisis occurs or the period in which it unfolds. The phase before the critical event occurs is understood here as the anticipation phase. This includes all those characteristics and measures of organizational resilience that apply before the occurrence and with which, in the best case, the resulting disruptions can be proactively averted. Within the buffer phase, buffer features and measures become active immediately after the disruption occurs, i.e. before the full potential effects have also unfolded. They are intended to ensure that the system functionality is maintained despite the event. The adaptation phase is understood to be the management and adaptation of the system. It serves to ensure the system functionality at short notice. In the course of recovery, characteristics are mobilized and measures are implemented with which a (new) normal state can be restored in the aftermath of a crisis event. The final learning phase is used to derive conclusions after the crisis period. With the learning phase, the circle of anticipation, buffer and adaptation closes again [33]. The RPM model, which has emerged from general resilience research, was used as the uppermost framework for integrating the various concepts.
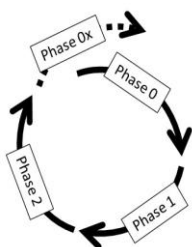
	Phase 0	Phase 1	Phase 2	Phase 0x
RPM	Equilibrium	Absorbtion, Adaption	Recover	Equilibrium x
NAS	Prepare and plan	Absorbtion, Adaption	Recover	Prepare and plan
BuAA	Learn and Anticipate	Buffer, Adaption	Recover	Learn and Anticipate

Fig. 2. Integration of Phases defined by NAS and BuAA in RPM-Model

This temporal differentiation allows the author to assign order and rationality to the different approaches discussed in the organizational resilience literature.

3.1 Organizational learning as metaphor for organizational resilience

As the environment grows in complexity and uncertainty, it requires significant learning efforts on organizations and this is seen as a determining factor in its ability to survive or adapt. Conceived as a principal means of achieving organizational survival and renewal, organizational learning has been widely identified as fundamental capability for organizational resilience [18]. First defined by [38] as a process of detection and correction of error, organizational learning is a way in which organizations develop organizational knowledge and routines around their activities and within their cultures. They also adapt and develop organizational capabilities. The focus is primarily on two aspects: behavior change (adaptation and

cognition) and knowledge creation. According to Argyris and Schön, organizational learning takes three forms: (a) single loop learning (correcting errors by using feedback), (b) double loop learning (questioning underlying assumptions and core beliefs), and (c) deutero learning (learning how to learn) [38]. Because organizational learning and organizational resilience are intrinsically linked, following concepts contain organizational learning processes before, during, and after crises. In other words, from a theoretical perspective, learning is a fundamental mechanism by which organizations, interact with their environment, process information, and adapt to changing external and internal conditions [39]. Since in principle all problem solutions used in the organization (technologies, products, methods, structures, etc.) can be viewed as the cumulative results of previous learning processes, the systemic ability to learn is particularly important for the future adaptability and innovation of the system [40]. Organizational learning is therefore more general, i.e. initially not necessarily targeted knowledge. The focus is on the development of general adaptive competence, which is not about creating a specific (and in its own way unique) state of adaptation in a single case, but rather about the ability to solve a universal problem. Organizational learning thus becomes a metaphor for organizational resilience. The decisive factor for the extent of organizational resilience is whether the learning takes place within existing, previously proven experience patterns (so-called single loop learning) or whether it breaks with existing thought patterns and, if necessary, also includes the previous foundations of knowledge generation in the resilience process (so-called Double loop learning). Only this form of learning makes it possible to learn to learn (so-called deutero-learning) and thus to develop universal resilience, which is ultimately a prerequisite for long-term survival in a turbulent, changing environment.

3.2 Concepts with focus on before crisis (phase 0) – prepare / awareness / anticipation

Based on the definition mentioned above, researchers and practioners have studied how to prepare and protect the organizations against disruptive events. These concepts are understood more in a static context. Within this research field the focus has been (1) Avoiding and minimizing disruptive events with Risk- or Crisis-Management. (2) Development of failure culture and (3) "to bounce back" in the meaning of shock-absorbtion and returning to the previous stable status. The academic interest on external events and their consequences grounded in Normal Accidents Theory. This theory gave rise into two directions: first a greater attention to operational safety and second the focus on reliability in organizational context. The sociologist [43] was the first to propose a framework for characterizing complex technological systems according to their riskiness. He contributed key concepts to a set of intellectual developments in the 1980s that revolutionized the. research of disaster and crisis situations [4]. He highlighted organizational and management factors as the main causes of failures when examining technological accidents. Anticipation encompasses all those characteristics and measures of organizational resilience that start before the occurrence of the critical event and with which, in the best case, the resulting dis-

ruptions can be proactively averted [26, 37]. An organization should therefore have a clear understanding of the environment in which it moves in order to recognize potential opportunities and crises and to identify the circumstances that could trigger a positive or negative event [8, 44]. In line with this view, preevent analysis and preparedness is central to the concept of resilience. Preparedness is sometimes understood from a resource-based perspective, it can also be understood as a social learning capacity [13]. In the literature, awareness (also self-awareness) is understood here as characteristics of organizational resilience [45]. The awareness of the use of internal and external resources in the event of a fault is also understood as an anticipative property. So it is important to acquire and accumulate not for the present, but for the potential they offer for the future. Gunderson and Wildavsky [24, 46] analyzed the considerable degree of safety that society had thus far achieved and concluded that two strategies were important in responding to the dangers introduced by technological progress: (1) anticipation (or stability) as a strategy for assessing vulnerability and avoiding potential dangers, and (2) resilience as the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back [46]. This definition suggested that resilience is a generalized capacity to learn and to act without knowing in advance the situation or event that needs to be acted upon, which was later seen as an important aspect of High Reliability Organizations. HRO is a research tradition established in US in the 80 s on the basis of empirical studies of high risk systems. On that time there was no conceptualization of these issues, apart from 'normal accident' thesis of Charles Perrow [47]. This research tradition is rooted in organizational theory and political sciences. HROs can be seen as role models for resilient organizations they are understood to rely not only on mitigation and prevention, but also to recognize uncertainty as an essential part of their activities. Research on these organizations has shown that they have developed organizational practices that help them deal with unexpected situations and deviate from prescribed plans (collective mind) [29]. These organizations have the ability to maintain or regain a dynamically stable state, which allows to continue operations after a major mishap and/or in the presence of continuous stress because of their clear idea of the minimum level of operational activities now and in the future [48]. The contribution by Karl E. Weick and Kathleen M. Sutcliff [49] is one of the best-known studies, which are also considered the guiding principle for organizational resilience. They researched the organizational structures of High Reliability Organizations (HRO). The HRO are organizations that operate in an unclear and changing crisis environment (such as the military or fire brigade) [4]. The authors developed the hypothesis that increases in heedful interrelating and mindful comprehension of unfolding events decrease the potential for organizational errors [49]. In other words, the authors suggested that high-reliability organizations enact aggregate mental processes (information processes, heedful action and mindful attention) that are more fully developed than those in organizations that are primarily concerned with efficiency [5], [18].

3.3 Concepts with focus on coping crisis (phase 1) – absorbtion / adaption (and transformation)

Another concept very similar to the concept of HRO is the Resilience engineering (RE). RE is a research tradition which has grown out of the activity of a network of authors who have contributed from the 80s onward to conceptualize the problem of human error performing human reliability assessment [47]. With the work of Hollnagel [50]., Resilience engineering has since 2004 attracted widespread interest from industry as well as academia. Practitioners from various fields, such as aviation and air traffic management, patient safety, off-shore exploration and production, have quickly realized the potential of resilience engineering and have become early adopters. The continued development of resilience engineering has focused on four abilities that are essential for resilience. One ability is to respond to what happens. Moreover, responding as an ability of knowing what to do and being able to do is one of the key capacities of resilient engineering [51]. The basic statement here is, that an organization can **absorb** or at least contain their effects if it has the appropriate resilience [52]. It helps to resist and to recover system states after incidents happen rather than prevent incidents from occurring. The abilities to monitor critical developments and to anticipate future threats and opportunities are close to the concepts identified above. As incident prevention is focused in studies of process safety areas (e.g., risk assessment) [50, 53]. Nevertheless the main assumption underlying resilience engineering is that is impossible to foresee and avoid all threats [51]. To learn from past experience - successes as well as failures are defined as fourth ability to provide a structured way of analyzing problems and issues, as well as of proposing practical solutions (concepts, tools, and methods). Competence and resources are both important for the system's ability to respond rationally [50]. However, the organization may also be very resilient due to its ability to resist change and maintain its current structure and processes. In this case the organization is able to tolerate disturbance and absorb shocks. These "buffer" features and measures are or will be active immediately after the occurrence of the disruption, i.e. before the full potential effects have also unfolded. They are intended to ensure that the system functionality is maintained despite the event [52].

To sum up, High Reliability Organization (HRO) and Resilience Engineering (RE) are two research traditions which have attracted a wide and diverse readership in the past decade. Both have reached the status of central contributions to the field of safety while sharing a similar orientation. As HRO is based on the body of knowledge developed in the social sciences, this research stream has gained strength and legitimacy from studying high-risk systems and organizations reliability from the social science perspective. Debating about principles producing in face of high complexity and the organizational phenomenon of "collective mindfulness". Whereas RE has gained strength and legitimacy analyzing empirically and theoretically the role of "human error" and complexity with view on safety/accidents. The focus of RE is more on models and methods underlying engineering and cognitive sciences. But resilience is not just about 'bouncing back from adversity' but is more broadly concerned with adaptive capacity or capabil-

ity of organizations [12] (instead of safety and reliability, as discussed above). This means when the organization reacts to disturbance by changing its structure, processes and functions in order to increase its ability to persist [54]. To find a state of equilibrium again after system crises, adaptive or transformative processes are necessary. The adaptability of a system is therefore a fundamental driver of resilience. It relates to the capacity of a system to learn, apply knowledge, adapt to endogenous and exogenous changes and not break through certain thresholds of instability. This goes hand in hand with the ability of the organization to react to processes of change and to initiate and shape a change in the system status itself. The extent of adaptability is therefore dependent on the ability to learn and on the ability to cope effectively with changes [19]. Organizational adaptation research has examined a variety of ways in which firms respond to environmental uncertainty, change, and surprise. In the resilience literature must be distinguished between two degrees of adaptability according to their degree of structural change [55]. It can be understood as the capacity of a unit to develop despite massive disturbances of the balance. This positive development can be attributed to efficient coping processes that can contain both adaptive and transformative elements [19]. Apparently it seems necessary for organizations to adapt to their environment, the extent of adaptation depending on the relevant context. The more complex the environment, the greater the number of possible couplings, the more the organization will endeavor to limit the selection and to adapt [56]. Organization concentrate on establishing a strong fit between the firm and a new reality. This perspective is rebound-oriented and has the focus on the ability to react with adaptive behavior [6]. Success factors for an effective adjustment mechanism of the organization are mechanisms that take effect within the old system functionality, or to achieve the state considered appropriate in a known system logic [53, 57]. Adaptability in the context of being able to rebound from adversity strengthened and more resourceful is observed in the literature of High Reliability Organizations (HRO). They have developed a lot of adaptive strategies such as decentralized decision making, well-developed situational awareness and pattern of organizational mindfulness. The challenge lies in transferring learning from the operational to the strategic level when dealing with larger-scale complex system management [53]. Adaptive management (AM), also known as adaptive resource management (ARM), is a structured, iterative process of robust decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously meets one or more resource management objectives and, either passively or actively, accrues information needed to improve future management. Adaptive management is a tool which should be used not only to change a system, but also to learn about the system. Adaptive management is based on the model of adaptive cycles emerged from experience with productive ecosystems by the Canadian ecologist Crawford S. Holling (1986), which was later extended by Gunderson and Holling (2002). It is a powerful and useful metaphor of system dynamics that includes four stages: growth (r), equilibrium (K), collapse (Ω), and reorientation (α) [58]. Starting with the

first assumption that resilience is often associated with a system's ability to recover from a disturbance, Holling and Gunderson here combine the resilience concept with the entire adaptive cycle to provide a comprehensive definition that applies to all stages of a system's dynamics till the explanation of transformational change in systems of humans which can be achieved with learning [24]. Fath et al. [59] take the approach that an organization is then resilient, when it is able to navigate successfully through each stage of the cycle. It adopts a new regime that shares important features of the previous regime, and continues to satisfy a set of goals as defined by members within that organization. In each stage special competences, resources, and culture are aiding the navigation through the adaptive cycle applied to business management. Because adaptive management is based on a learning process, it improves long-run management outcomes. The challenge in using the adaptive management approach lies in finding the correct balance between gaining knowledge to improve management in the future and achieving the short-term outcome based on current knowledge. This thesis leads to the concept of ambidexterity developed of [60]. O'Reilly C A and Tushman [61] have argued that ambidexterity is a dynamic capability, on the basis that "the ability of a firm to simultaneously explore and exploit enables a firm to adapt over time. The highly influential approach of dynamic capabilities, has been introduced first in 1997 by Teece and Pisano [62]. They figured out that success in a fast-moving environment requires dynamic capabilities. They define dynamic capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. As this view has gained increasing attention in the management literature in recent years, it addresses not only in the concept's original domain (strategic management) but also in many other areas within organizational theories. This process-oriented view can be broken down into clusters based on sensing, seizing, and reconfiguring [63], which is very similar to the process of adaptive management (mentioned before). In this context the concept of ambidexterity is a useful complement to the dynamic capabilities perspective because it clarifies the strengths and weaknesses of different organizational arrangements and seize opportunities and to reconfigure their internal activities. Ambidexterity suggests that superior performance is expected by organizations that are capable of simultaneously applying exploration and exploitation [53]. Organizational ambidexterity provides the framework and opportunity to generate a better understanding of resilience behaviors and sensemaking among individuals in organizational settings [64]. On basis of organizational learning the concept of ambidexterity is supporting the adaption strategy [65]. Organizations which are able to respond to the changing environments through ambidexterity achieve resilience [66]. They have developed dynamic capabilities to appropriate structures and processes that enable them to assess their internal and external environment and successfully innovate and adapt through a balance of exploitation of existing competencies and exploration of new capabilities [53]. In this concept organizations adjust their structures by the phase of adaption process: organic structures are employed to explore followed by mech-

anistic structures to exploit. This view of ambidexterity as temporal sequencing is evident in some of the current research on organizational adaptation [61]. While firms may be able to cope with low to moderate levels of disruptive events, their adaptive actions may become ineffective at higher levels of adversity. Organizations may thus reach an adaptation limit (see here altitude of RPM-Model), or a point at which available adaptation may no longer be sufficient to maintain their core business. Organizations may therefore need to undertake transformative change [30]. Ambidextrous firms may therefore have the ability to actively manage their adaptive cycles. They can anticipate approaching adaptation limits and initiate transformation before these are reached [55]. Through transformation, firms may enter a new exploitation phase using a new set of resources and capabilities without loosing performance. In other words, it is the organizations capability to turn threats into opportunity like organizational ability to re-invent itself where the ultimate goal is resilience itself. In this perspective organizations adapt proactively or anticipatorily reacting to future changes before they happen. An organization that adapts anticipatorily and repeatedly can be called resilient [56]. Such organizations may retain high resilience throughout their adaptive cycles. To summarize, the transformation can be in a reactive manner after adaptation limits are reached, or in a proactive manner e.g. in anticipation of approaching limits. Organizational transformation stands for qualitative and fundamental changes in an organization. It results because of an organization´s adaptive mechanism (internally and externally), based on learning processes in case of short-term or long-term changes in the environment. In the transformation process, new components, functions, structures and processes are created because the existing ones are no longer sustainable [30]. The investigation of such transformation processes is particularly useful in the field of transformation research. Transformation research deals with many social topics and brings together a large number of research directions, for example resilience and organizational research [67]. Various concepts can be found in the literature to control and coordinate transformation processes. At the organizational level (meso level), this action-oriented view can be found primarily in the research field of organizational change. Here there exists a broad category of approaches that aim to transform individuals or groups (mostly within a specific organization) or an entire organization (organizational change management) [67]. In the broadest sense, transformations can be viewed through interactions between technological, economic, ecological, socio-cultural, political and institutional developments. Following the system understanding of Giddens [68], that social system dynamics are based on the interaction of actors and structures and Leavitts identification of three dimensions – people, structure and process (technology) - of organizational change within the organization theories [69]. There are three basic dimensions to describe changes in a system: (1) acting actors, (2) powerful structures, including culture, institutions, infrastructures, that favor or hinder social practices and (3) processes or social practices that alter or reproduce structures. The process dimension connects actors with structures. The analysis of planned and unplanned

("spontaneous") changes in and of organizations has undoubtedly become a central concern of basic research in organizational resilience theory, although it has not yet led to a really integrative and broadly supported concept. On the contrary: The literature is so heterogeneous in terms of questions, reference unit, diction, methodology, degree of conceptualization and interest in knowledge that it is difficult to systematize the existing perspectives even approximately consistent [70]. But one characteristic or outcome of such transformation process is that the organization won´t get back into the previous stable status (Eq0) but achieve a new equilibrium state (Eqx).

3.4 Concepts with focus on coping crisis (phase 2) – recovery

In this section the focus is on understanding the meaning of recovery in context of organizational resilience. Resilience defined by the National Academies of Science (NAS) as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events" is emerging as one of the most widely used by various organizations and governance agencies [28, 32, 36]. Based on this definition, recovery is seen as a phase after a crisis has occurred. This phase is conceptually different from the coping phase (phase 1), it entails different tasks and requires organizations to use other capabilities and practices than those required to cope with a crisis [29]. In this recovery phase (phase 2), the system tries to return to a stable state from its unstable state. It is believed that the lower the instability, the easier for organizations to recover, and faster recoveries to the original or to a new more desirable state [37]. Only in this state is the organization protected from further damage [71]. As Wildavsky [46] argued that recovery is not only about "bouncing back" it is a phase also about proactive activities, about overcoming the status of crisis. Thus, resilience assessment starts with an assumption that the system is affected and functionality impaired, with emphasis placed on speed of system recovery [28]. It is assumed that quick recovery from shocks and stresses, minimizes potential loss of income, and reduce the risk of economic and environmental damage [72]. The term recovery therefore refers to actions that are intended to restore the functionality of an organization after it has been impaired by a disruption / fluctuation. At present, recovery activities are commonly understood as long-term-oriented. However, recovery also has short-term implications. From this perspective it is about immediate reaction to stop deterioration and to initiate the return to normalcy. Organizations need short-term-oriented recovery measures to become operational again [29]. Measures that can be assigned to the recovery phase concentrate on the ability of an organization to act as quickly as possible [37]. The focus on the recovery phase is the engineering resilience approach, in particular on the speed of return to equilibrium. But this measure of resilience does not consider the possibility of multiple stable states [32] neither answers questions like applying different time horizons to different types of crises and different types of organizations to a theoretical conceptualization.

A prominent concept to switch theory in practice is the Business Continuity Management (BCM) which features heavily in strategies that being generated from the organization's

governance stance. One prominent concept here is the Standard ISO 22301:2019 with the long title "Security and resilience – Business Continuity Management System - Requirements" has been developed. The ISO 22301: 2019 standard is mentioned as operational disciplines that should be integrated to support organizational resilience [73]. The standard was created by the Technical Committee ISO / TC 292 Security and resilience [74]. The focus of this standard is the description in structure and requirements on how to implement and maintain a Business Continuity Management System. It is based on the Plan-Do-Check-Act-Management Cycle and is therefore compatible to other Management-Systems (ISO 9001, ISO 14001 etc.). This international standard emphasizes the significance of comprehensions of the organization's need, implementing the controls, monitoring and continual improvement based on objective requirements. This guideline is primarily about the practical implementation of maintaining operational capability, such as how the safety of technical systems against the effects of malfunctions can be guaranteed, or how a stable production process is to be ensured under fluctuating flows of goods. This is why having a robust business continuity management system in place, such as ISO 22301, can be considered as a comprehensive approaches to organizational resilience [75]. While ISO 22301 concentrates on the development of concrete measures to maintain operability in the event of a crisis the concept BS 65000: 2014 "Guidance on organizational resilience" offers strategic concepts to help an organization to survive and prosper. Developed by BSI Standards Limited in the year 2014 the standard also contains a maturity model and a questionnaire for measuring one's own resilience in the company [76]. The standard explains that resilience is a strategic corporate goal. It enables companies to react appropriately and dynamically to unforeseen operational disruptions in order to maintain business operations [77]. It is essential to build resilience not only within the company, but also in cooperation with the entire company network. It helps large or small organizations to protect business, stay agile and resilient, and to minimize the impact of unexpected interruptions. The ability to respond quickly and effectively to the unexpected, but also to grow in the sense of organizational development (adapt and transform) is the key to the survival of any organization. Together with coherent management systems, the standard provides the basic framework and instructions for improving resilience in the company [78].

The above overview of selected concepts of organizational resilience does not contain a complete list of possible explanatory approaches, nor does it represent an exhaustive reproduction of the selected approaches. Rather, it is, in a consciously selected form, focused on those strategies that are able to make independent explanatory contributions to the phenomenon of organizational change. Findings from this review show that resilience research is fragmented across several research streams. One possible reason for this fragmentation is that resilience research has often been motivated by a particular set of circumstances. There are a number of common features of organizational resilience linked to the planning, absorbing, adapting and recovering. This paper has discussed these common features in the context of different application areas and related to the RPM- NAS and BuAA framework of temporal phases of resilience. The following table provides an overview of the individual concepts for organizational resilience integrated into the RPM model and thus serves as the basis for developing further research questions.

Coping with uncertainty and risks has produced numerous concepts from a wide variety of scientific fields. To sum up, all these approaches follow a similar argumentative pattern. Preevent measures as detailed preparation or fostering the awareness regarding the environment (in and outside) will strengthen an organization's resistance and thereby increase its resilience [29]. Clear gaps are particularly evident when it comes to operationalizing anticipation, awareness or preparedness or even to identify the processes that contribute to increased resilience in the company [79]. What differs the absorbtion process from other coping strategies (adaption and transformation) is that there will be no fundamental change in the system´s structure [50]. The main goal for this strategy is to overcome the crisis and bring the organization back to its original state [6]. Here resilience has been identified as an outcome after the crisis in the meaning that organizational resources have effectively blocked the stressor. [80] These resources need to be robust, redundant, or rapidly accessible. Norris et al. [80] describe social capital decision-making process and learning capacity as the important source that can strengthen resistance. One can confess that absorbtion strategy has its focus on defensive and reactive measures. The approaches identified are influenced by the engineering definition of robustness, recognizing a single stable state where the system can return after perturbation and are usually applied to improve systems efficiency. The focus of these approaches is in robustness, efficiency and recovery or return to equilibrium, rather than adaptive change. The investigation of adaption processes inclusive transformation is particularly useful in the field organizational change. The literature is so heterogeneous in terms of questions, reference unit, diction, methodology, degree of conceptualization and interest in knowledge that it is difficult to systematize the existing perspectives even approximately consistent [70]. But one characteristic or outcome of such transformation process is that the organization won´t get back into the previous stable status (Eq0) but achieve a new equilibrium state (Eqx). To summarize organizational resilience is commonly assumed to be the result of management action. So that resilience management can be understood to be developing an overall situation awareness, demystifying inherent threats and reducing risk and improving organizational efficacy with restoration plans. Further a resilient organization is able to cope disturbances and risk with an ability to adapt and reconfigure as quickly as appropriate, either to bring the organization to the previous optimal operational position, or to converge to a new optimal operating position.

So it seems therefore logical to employ Resilience Management in making sure that the organization can survive. However, many existing organizational theories inadequately address how and why an organization can maintain its resilience in the face of unexpected events. Further, there is limited empirical work that examines organizational resilience and

little consensus regarding how resilience may be achieved in practice [10]. By reconceptualization the understanding of organizational resilience some questions appeared to be answered.

4. AVENUES AND QUESTIONS FOR FURTHER RESEARCH

The meaning of equilibrium status in the presented concepts is different. There exists no common definition. It is assumed that that these are characteristics and activities of organizations in the phase of stability. What kind of organizational features and activities are responsible for keeping the organization in a stable status? In case of disturbance how will they change? Can be identified a certain pattern in their strength? Which one is more successful in facing disruptive events? Are there certain organizational characteristics which influences the different coping strategies? What type of equilibrium has the organization (punctuated equilibrium?)

According to the RPM-Model tp0, that's the time before the interruption occurs. This is the duration in which the organization stays in a stable status. Does the duration of such a stable status have an influence on coping with uncertain events? E.g. The shorter stable status the more flexible/agile is the organization in coping?

Crisis (C): Every unexpected event disrupts the equilibrium status of the system. Knowing of different degrees of such events, "What will be the influence on different coping strategies (absorbtion, adaption, transformation)?"

Altitude (a) is the degree of instability a system can withstand. This can be understood also as tipping point. What are the characteristics of this tipping point in the organizational resilience context? Are there different tipping points in the different phases of coping strategies? What impact has the overcoming of such tipping point in the organizational context?

According to the RPM-Model tp1 is the organizations coping time with unexpected event. What is the impact of the coping time on successfully managing the crisis? How can be the coping time be influenced?

As the first coping strategy has been identified absorbtion, in the way to buffer disruptive events with organizational resource. What characteristics or activities are therefore dominant? How are these characteristics related to the type of organization?

As second strategy is named the adaptability, what means to adapt to the systems changing variables. Is the adaption planned or emergent? What are the organizations characteristics and activities influencing the adaption process?

The third coping strategy for organizations is transformation. In the sense to adapt the systems changing variable as much that the dependencies can change How transformative change may be categorized. How is the relationship between adaptation and transformation? Is transformation mainly reactive after an adaptation limit is reached or can it also be undertaken in an anticipatory manner before an approaching limit? What are the conditions under which organizations may undertake transformation? Is there a

relationships between the equilibrium status before and after transformation?

The speed of recovery can be a measure of resilience. Recovery activities can be long-term oriented but also short-term to become operational as soon as possible. What influences recovery time? Has the duration of recovery time an impact on the organizational resilience? Exists a pattern for recovery activities?

If the Resilience-Phase-Model is to be a useful theoretical concept it has to generate the research that will identify the particular characteristics and activities in each phase. The questions "how to conceptualize and formulate hypotheses about the relationships between operational systems and the demands of their environments? How to test hypotheses over the appropriate timeframe with an appropriate design?" still remain.

5 CONCLUSION:

This paper has shed light in an original way on organizational resilience. First, by developing the Resilience-Phase-Model based on the key understanding of resilience in its origins. In a second step, by identifying and integrating different concepts referring to organizational resilience. And third, by developing further research questions for this research field.

Organizational resilience is not an organizational concept that can be implemented in a short time. It should therefore be understood more as a strategic goal. With the help of the RPM model, many questions about organizational resilience can be answered. With the help of the insights gained from this, recommendations for action can be developed for management.

One question remains open in this overall rather theoretical and conceptually oriented reconceptualization is whether the recommendations on how companies should deal with unexpected events or how they can become resilient will also prove successful in the end.

REFERENCES

[1] Scott W R and Davis G F 2013 *Organizations and Organizing: Rational, Natural and Open Systems Perspectives* (PEARSON EDUCATION LIMITED)

[2] Mohr G J 2016 *Organisationsberat Superv Coach* 23 411–26

[3] Gaedke G 2013 *Resilienz: Widerstandsfähigkeit von Organisationen* (http://www.wissensdialoge.de/Resilienz: wissens.blitz)

[4] Kantur D and İşeri-Say A 2012 *Journal of Management & Organization* 18 762–73

[5] Linnenluecke M K 2017 *Int J Management Reviews* 19 4–30

[6] Lengnick-Hall C A, Beck T E and Lengnick-Hall M L 2011 *Human Resource Management Review* 21 243–55

[7] Boccardelli P, Annosi M C, Brunetta F and Magnusson M (eds) 2018 *Learning and Innovation in Hybrid Organizations: Strategic and Organizational Insights* 1st edn (Cham: Springer International Publishing)

[8] Vogus T J and Sutcliffe K M 2007 3418–22

[9] Bui H, Chau V S, Degl'Innocenti M, Leone L and Vicentini F 2019 *Applied Psychology* 68 1–37

[10] Say Yen T and Hossein S Z 2013 *Pacific Asia Conference on Information Systems* 1–13

[11] Varsani M 2019 *Grant Journal* 8 86–90

[12] Gibson C A and Tarrant M 2010 *The Australian Journal of Emergency*

Management 25 6–12

[13] Davoudi S 2012 *Planning Theory & Practice* 13 299–333

[14] Hoffmann G P 2017 *Organisationale Resilienz: Kernressource moderner Organisationen* (Berlin, Heidelberg: Springer Berlin Heidelberg)

[15] Geramanis O and Hermann K (eds) 2016 *Führen in ungewissen Zeiten: Impulse, Konzepte und Praxisbeispiele* (Wiesbaden: Springer Fachmedien Wiesbaden)

[16] Annarelli A and Nonino F 2016 *Omega* 62 1–18

[17] Torraco R J 2016 *International Journal of Adult Vocational Education and Technology* 7 62–70

[18] Rolfe M 2019 *Positive Psychologie und organisationale Resilienz: Stürmische Zeiten besser meistern (Positive Psychologie kompakt)* (Berlin, Heidelberg: Springer Berlin Heidelberg)

[19] Di Bella J and Woywode M J 2014 *Unternehmerische Resilienz: Protektive Faktoren für unternehmerischen Erfolg in risikoreichen Kontexten* (Mannheim: Universitätsbibliothek Mannheim)

[20] Werner E E, Bierman J M and French F E 1971 *The children of Kauai: A longitudinal study from the prenatal period to age ten* (Honolulu: University of Hawaii Press)

[21] Holling C S 1973 *Annu. Rev. Ecol. Syst.* 4 1–23

[22] Perrings C 2006 *Environment and Development Economics* 11 417–27

[23] Folke C, Carpenter S, Elmqvist T, Gunderson L, Holling C S and Walker B 2002 *Ambio* 31 437–40

[24] Gunderson L H and Holling C S 2002 *Panarchy: Understanding transformations in human and natural systems* (Washington, DC: Island Press)

[25] Bhamra R, Dani S and Burnard K 2011 *International Journal of Production Research* 49 5375–93

[26] Demmer W A, Vickery S K and Calantone R 2011 *International Journal of Production Research* 49 5395–413

[27] Walker B, Holling C S, Carpenter S R and Kinzig A P 2004 *E&S* 9 1–9

[28] Kott A and Linkov I 2019 *Cyber Resilience of Systems and Networks* (Cham: Springer International Publishing)

[29] Darkow P M 2019 *Journal of Contingencies & Crisis Management* 27 145–56

[30] Vogt M 2015 *Zauberwort Resilienz: Einführung zur Tagung „Zauberwort Resilienz. Was stärkt in Zeiten des radikalen Wandel?"* (Tutzing: Ludwig-Maximilians-Universität)

[31] Weik E and Lang R 2003 *Moderne Organisationstheorien 2: Strukturorientierte Ansätze* (Wiesbaden: Gabler Verlag)

[32] Connelly E B, Allen C R, Hatfield K, Palma-Oliveira J M, Woods D D and Linkov I 2017 *Environ Syst Decis* 37 46–50

[33] Downes B J, Miller F, Barnett J, Glaister A and Ellemor H 2013 *How do we know about resilience?: An analysis of empirical research on resilience, and implications for interdisciplinary praxis* (accessed 7th december 2019)

[34] Creswell J W 2005 *Research design: Qualitative, quantitative, and mixed method approaches* 2nd edn (Thousand Oaks Calif. u.a: Sage)

[35] Ruiz-Martin C, Lopez-Paredes A and Wainer G 2018 *Int. J. Prod. Manag. Eng.* 6 11

[36] National Research Council 2012 *Disaster resilience: a national imperative* (Washington: The National Academies Press)

[37] Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Hartwig M, Kirchhoff B, Lafrenz B and Barth A 2016 *Psychische Gesundheit in der Arbeitswelt - Organisationale Resilienz: Forschung Projekt F 2353* (Dortmund/Berlin/Dresden: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin)

[38] Argyris C and Schön D A 1978 *Organizational learning: A theory of action perspective* (Reading Mass. u.a.: Addison-Wesley)

[39] Wang J 2008 *Advances in Developing Human Resources* 10 425–45

[40] Cyert R M and March J G 1963 *A behavioral theory of the firm (Prentice-Hall international series in management)* (Englewood Cliffs NJ: Prentice-Hall)

[41] Argyris C 1964 *Integrating the individual and the organization* (New York NY u.a.: Wiley)

[42] Williams T A, Gruber D A, Sutcliffe K M, Shepherd D A and Zhao E Y 2017 *ANNALS* 11 733–69

[43] Perrow C 1984 *Normal accidents: Living with high-risk technologies* 1st edn (New York: Basic Books)

[44] Bond A, Morrison-Saunders A, Gunn J A E, Pope J and Retief F 2015 *Journal of Environmental Management* 151 97–104

[45] Cutler R M and Lingen A von 2019 *K* 48 685–95

[46] Wildavsky A B 1988 *Searching for safety (Studies in social philosophy & policy)* (New Brunswick [u.a.]: Transaction Books)

[47] Le Coze J C 2019 *Safety Science* 117 469–78

[48] Weick K E 2007 *Managing the unexpected: Resilient performance in an age of uncertainty* 2nd edn (San Francisco, Calif.: Jossey-Bass)

[49] Weick K E, Sutcliffe K M and Obstfeld D 1999 *Research in Organizational Behavior* 21 81–124

[50] Hollnagel E, Woods D D and Leveson N (eds) 2012 *Resilience engineering: Concepts and precepts* (Farnham: Ashgate)

[51] Dinh L, Pasman H, Gao X and Mannan M 2012 *Journal of Loss Prevention in the Process Industries* 25 233–41

[52] Flüter-Hoffmann C, Hammermann A and Stettes O 2018 *Individuelle und organisationale Resilienz: Theoretische Konzeption und empirische Analyse auf Basis eines kombinierten Beschäftigten-Betriebsdatensatzes (IW-Analysen 127)* (Köln: Institut der Deutschen Wirtschaft)

[53] Mamouni Limnios E A, Mazzarol T, Ghadouani A and Schilizzi S GM 2014 *European Management Journal* 32 104–16

[54] Kupke S 2009 *Allianzfähigkeit von Unternehmen: Konzept und Fallstudie (Gabler Research)* 1st edn (Wiesbaden: Gabler)

[55] Clément V and Rivera J 2016 *Organization & Environment* 30 346–65

[56] Teixeira E d O and Werther W B 2013 *Business Horizons* 56 333–42

[57] Carayannis E G 2013 *Encyclopedia of Creativity, Invention, Innovation and Entrepreneurship* (New York, NY: Springer New York; Imprint: Springer)

[58] Holling C S 1986 *Cambridge University Press* 292–317

[59] Fath B D, Dean C A and Katzmair H 2015 *E&S* 20 1–10

[60] March J G 1991 *Organization Science* 2 71–87

[61] O'Reilly C A and Tushman M L 2008 *Research in Organizational Behavior* 28 185–206

[62] Teece D J, PISANO G and Shuen A 1997 *Strat Mgmt J* 18 509–33

[63] Birkinshaw J, Zimmermann A and Raisch S 2016 *CALIFORNIA MANAGEMENT REVIEW* 58 36–58

[64] Stokes P, Smith S, Wall T, Moore N, Rowland C, Ward T and Cronshaw S 2016 *The International Journal of Human Resource Management* 30 1287–322

[65] Raisch S, Birkinshaw J, Probst G J B and Tushman M L 2009 *Organization science : a journal of the Institute for Operations Research and the Management Sciences : bridging disciplines to advance knowledge of organizations* 20 685–95

[66] Iborra M, Safón V and Dolz C 2019 *Long Range Planning* 101947

[67] Julia Wittmayer K H 2017 *Transformationsforschung – Definitionen, Ansätze, Methoden (*103*)* (Umweltbundesamt)

[68] Giddens A 1979 *Central problems in social theory: Action, structure and contradiction in social analysis* (London: Macmillan)

[69] Leavitt H J 1972 *Managerial psychology: An introduction to individuals, pairs and groups in organizations* 3rd edn (Chicago, Ill: The Univ. of Chicago Press)

[70] Oelsnitz D 1999 *Marktorientierter Unternehmenswandel: Managementtheoretische Perspektiven der Marketingimplementierung (Neue betriebswirtschaftliche forschung (nbf)* vol 258) (Wiesbaden: Deutscher Universitätsverlag; Imprint)

[71] DesJardine M, Bansal P and Yang Y 2017 *Journal of Management* 45

1434–60

[72] Jones P and Comfort D 2018 *J Public Affairs* 18 e1689

[73] Weick K E and Sutcliffe K M 2015 *Managing the unexpected: Sustained performance in a complex world* 3rd edn (Hoboken NJ u.a.: Wiley)

[74] DIN-Normenausschuss Organisationsprozesse 2020 *DIN EN ISO 22301: Sicherheit und Resilienz - Business Continuity Management System Anforderungen (ISO 22301:2019)* (DIN-Normenausschuss Organisationsprozesse)

[75] BSI Group 2018 *ISO 22301 Business Continuity Management: Your implementation guide* (BSI Group)

[76] British Standards Institution 2012 *Societal security, business continuity management systems: Requirements* ([London]: BSI Standards Ltd)

[77] Hersyah M H and Derisma 2018 A Literature Review on Business Continuity Based on ISO 22301, Six Sigma and Customer Satisfaction Evaluation *2018 International Conference on Information Technology Systems and Innovation (ICITSI): Proceedings : October 22-25, 2018, Bandung - Padang, Indonesia 2018 International Conference on Information Technology Systems and Innovation (ICITSI) (Bandung - Padang, Indonesia)* (Piscataway, NJ: IEEE) pp 392–7

[78] Rosenberg M 2015 *Wirtsch Inform Manag* 7 80

[79] Köhler I and Schulze B W 2016 *Jahrbuch für Wirtschaftsgeschichte / Economic History Yearbook* 57 455–91

[80] Norris F H, Stevens S P, Pfefferbaum B, Wyche K F and Pfefferbaum R L 2008 *American journal of community psychology* 41 127–50

[81] Aldrich D P and Meyer M A 2014 *American Behavioral Scientist* 59 254–69