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# **ORGANISATIONAL RESILIENCE: BUILDING BUSINESS VALUE IN A CHANGING WORLD**

JEL classification: M10, M19

### ***Abstract***

*As an indication of development ecological, economic and social frame conditions change due to global adjustments. More competition, open markets, changes in political frameworks, structural changes etc. form the challenges for economies as a whole, organisations and employees. On the whole, however, the discussion about challenges often forgets the consequences for 'organisational' resilience, i.e. an organisation's capacity to anticipate disturbance, adapt to events, and create lasting value and thrive in a changing world. The notion of a resilient organisation is an emerging concept to clarify and cope with the modern day pace of change. By linking resilience theory with the sustainable transition process of organisations, this contribution has attempted to explore opportunities for and barriers to the diffusion, institutionalisation and implementation of resilience concepts from an integrative perspective. Furthermore, this contribution works toward a unified theory of resilience to help embrace and manage organisational change effectively when considering the concept of a sustainable future. Recommendations are provided for continued research to achieve progress in the modelling of organisational resilience.*

***Key words: organisational resilience, theory of resilience, building resilience***

## 1. INTRODUCTION

*“That which does not kill us, makes us stronger.”*

*Friedrich Nietzsche*

Looking at today's world there are increasing economic, social and environmental challenges, turbulences and uncertainties which cause disturbances and discontinuities for organisations (Burnard, Bhamra 2011). Organisations struggle and continuously adapt in order to flourish despite these disturbances, be they man-made or natural (cf. Stephenson et al. 2010).

Those organisations which are capable of surviving over time in the face of current and future challenges are referred to as “resilient organisations”. The concept of resilience within organisations may offer a potential framework to overcome breakdowns, disturbances and discontinuities and allow for organisational development. Resilient organisations are essential as they contribute towards the on-going viability of the economy and the wider community: a crucial step towards creating a society which is resilient itself (cf. McManus 2008) In fact it can be argued that resilient organisations and communities or societies are two sides of the same coin (Stephenson et al. 2010).

The concept of ‘resilience’ as a formal paradigm of organisations is still relatively young, but continues to gain momentum in academia. In responding to any potential barriers such as expense, engagement or cultural change, it is important to note that the various elements of a resilient organisation are all fundamental to an effective and efficient business that is cognisant of risk, crisis management, business continuity planning, organisational leadership and contingency based management (Stephenson et al. 2010). Moreover, a resilient organisation's objectives and strategies will not conflict with its overall business goals but will complement them. This makes resilience a multifaceted and multidimensional as well as very insightful concept (Ponomarov, Holcomb 2009).

As all organisations face unique risk landscapes, resilience is seen as both an outcome and a fundamental part of the governance of an organisation. The resilience of an organisation is, therefore, made up of the contribution of a wide range of different principles. Moreover, organisational resilience is not a one off program or a management system that can be developed and then reviewed annually or as required. It is an approach that takes time to develop and as indicated in this paper, is not ‘one size fits all’, but can be outlined in a process model.

The overall aim of this paper is to assist practitioners in understanding organisational resilience as well as to identify research gaps in this domain. This paper works toward a unified process model of resilience to help embrace and manage organisational change effectively when considering the concept of a sustainable future. In this paper we attempt to integrate findings from research in socio-ecological systems and organisations in order to conceptualize

organisational resilience and to contribute to a better understanding of the evolution of resilience and its relationship to organisational structure, processes and strategy.

## 2. ORGANISATIONAL RESILIENCE

*“It is not the biggest, the brightest, the best that will survive, but those that adapt the quickest.”*

Charles Darwin

The new buzzword or the new imperative in organisation board rooms these days is ‘resilience’ (Nelson, 2010). Although there is growing recognition of the concept within academic publications, the concepts and features of organisational resilience have so far remained largely undefined and ambiguous.

Currently resilience is an enormous, multifaceted and multidimensional concept (Ponomarov, Holcomb 2009), that is a contemporary issue in various scientific fields. We do not intend to make this into a historical overview, but the following are worth mentioning in connection with resilience: ecology (Holling 1996; Walker, Salt 2006), psychology (Masten 2001), socio-technical studies (Hollnagel et al. 2006), disaster research (Norris et al. 2008) and a broad range of organisational studies (Lengnick-Hall, Beck 2005; McCann, Selsky 2012; Sheffi 2007); additionally see also Alexander’s (2013) etymological journey, Kolar’s (2011) overview of the historical development and Norris et al.’s (2008).

In this paper we look at resilience from the organisational point of view. Organisations have to deal with situations in which discontinuities and disturbances occur due to turbulent operating environments (McManus, 2008; Burnard, Bhamra, 2011) within the given strategic environment (cf. figure 1). The operation and survival of an organisation may be severely compromised by such disturbances thereby subjecting an organisation to high levels of risk and an unpredictable future (Burnard, Bhamra, 2011). Resilience is seen for the moment as a potential answer going beyond survival to actually thrive, while still achieving one’s core objectives, even in the face of adversity by prospering in the face of current and future challenges or even past ones.

### 2.1 Concept

The concept of organisational resilience has become an important topic for discussion. Traditionally, resilience refers to the ability of an organisation to carry out its functions and return to a stable state after major disturbance or stress by considering the before and the during (Cumming et al. 2005; Gunderson 2000; Hearnshaw, Wilson 2013). In other words, resilience is about ensuring that an organisation is still able to achieve its core objectives in the face of adversity, before and after. Resilience suggests concepts of awareness, detection,

communication, reaction (and if possible avoidance), recovery and the willingness and capacity to adapt to changing contexts (McAslan 2010). A resilient organisation should be able to absorb disturbances or stresses through resistance or adaptation; maintain its basic services during a disturbance and; ‘bounce back’ after such a disturbance (Practical Action 2010). Resilience is not only about building back better, but also about transformation thereby requiring both innovation and creativity (Maguire, Cartwright 2008). Within this view, resilience involves a rejection of the status quo; a return to the pre-event situation would leave the organisation equally vulnerable to the next disturbance. The transformation view of resilience is concerned with concepts of renewal, regeneration and re-organisation (Folke 2006). According to Hamel, Valikanga (2003, p3) “*resilience is the ability to dynamically reinvent business models and strategies as circumstances change*”. This is seconded by Andrew Zolli; “*resilience is certainly a good goal for any organizations, however, it will never be achieved if an organization is — fragmented, silo, disconnected... organizations require a new way of thinking, there must be more coherence*”; as defined in complexity theory and system theory (cf. Dalziell, McManus 2004; Horne 1997; Riolli, Saviki 2003).

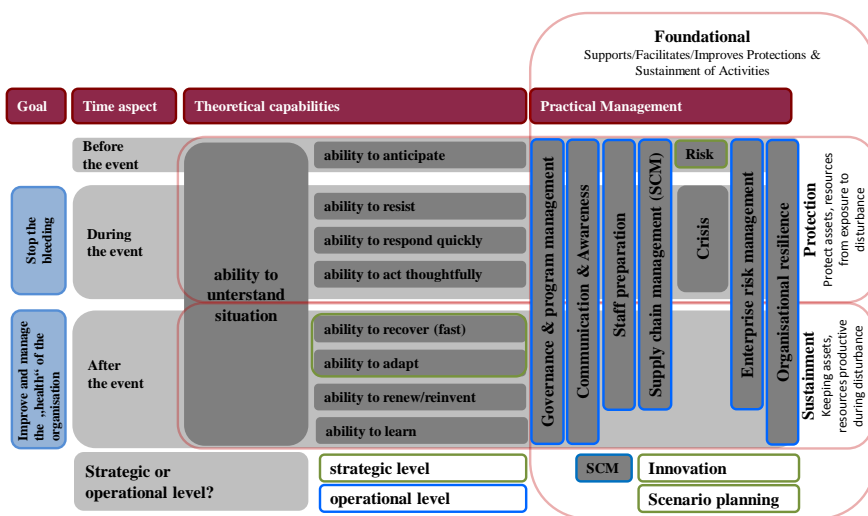


Figure 1 Diagram of interactions of all the operational resilience-management practices and the strategic ones

Source: adopted from Allen, Curtis, Mehravari 2014; Hillmann 2013

Resilience building is driven by a combination of competition, new technologies and the need to meet legislative requirements, management and production standards etc. Increasing organisational resilience also assists an organisation to identify its “keystone vulnerabilities”, “multiple capabilities” and to set priorities when realising business continuity and emergency management

planning (McManus, 2008). The advantages of becoming a resilient organisation are many. Resilience not only increases awareness of an organisation's operating environment but it also provides an organisation with the ability to act upon threats and challenges (McManus, 2008) and aim for a better future.

Furthermore, resilience, like sustainability or sustainable development (SD) before it, is an idea with potentially transformative power. The concept of resilience provides a fresh and useful perspective on SD – the notion that organisations and industrial development today must not jeopardize the vitality and prosperity of future generations. Resilience is a step change from SD; it is about the capability of an organisation to re-invent itself as circumstances change. It is heavily dependent on judgement at the highest levels in organisations as well as on employee attitudes as to the future and its implications. Improving the performance based on monitoring in a more sophisticated way, better comparisons and the use of forward-looking indicators is a start. It is critical to look beyond yesterday's measures of success and focus more upon the organisation's ability to adapt to what will make it successful in the future. But this is not enough. Monitoring must provide the information on sustainability – the ability of the organisation to sustain its current business model – and ensure that it is resilient (figure 1). Note that the word resilience goes much further than the more limited sense of being able to bounce back from events such as natural disasters or market adversity. Resilience is the organisation's capability to dynamically reinvent its business model as circumstances change. (PARC 2007, p14). This allows us to focus on resilience as a process which in turn draws our attention to the notion of resilient systems. Resilience is not a state but a dynamic set of conditions, as embodied within a system. Therefore, the concept of organisational resilience is only visible when considered under system theory. A general systems approach to looking at organisations has been suggested by a number of authors as a way to assess and measure resilience on an organisational level (cf. Dalziell, McManus 2004; Horne 1997; Riolli, Saviki 2003).

## 2.2 Gaps and limitations

So far research on organisational resilience has failed to reach a common definition on what resilience is, what it means for organisations and, more importantly, how organisations might achieve greater resilience (McManus et al. 2007, p.ii). To date organisational resilience seems to be viewed and operationalised very differently according to who is conducting the research and what is being researched (cf. Carmeli et al. 2013; Horne 1997; Lengnick-Hall, Beck, 2005; McAslan 2010; McManus 2008; McManus et al. 2007; Miller, Xiao 2007; Paltrinieri et al. 2012; Riolli, Savicki 2003; Sheffi 2007; Stephenson et al. 2010). The lack of an agreed conceptual framework is problematic as there is a varied use of the key terms such as 'protective factors' (Luthar, Cicchetti 2000; Luthar et al. 2000) and 'risk factors' used to evaluate the resilience process

(Windle 1999). Moreover, the considerable differences in the objectives and outcomes of interventions make it difficult to consider results collectively.

An apparent weakness in resilience literature has been its lack of attention to the social/cultural contexts in which disadvantaged individuals and groups work and live. Research on resilience and adaptation could, therefore, be strengthened by having greater space for the consideration of the situational influences that shape responses to adversity, together with increased opportunities for identifying and targeting risk and protective factors. Minority groups are reported to have been underrepresented in research on resilience, and it is also suggested that research on resilience has focused too much on individual factors and has not paid enough attention to situational influences on behaviours and adaptations. (Luthar, Cicchetti 2000; Miller 1999; Ryff et al. 1998)

In general, there seems to be a dearth of research on organisational resilience. Much of the research into organisational resilience that does exist examines resilience in the context of reactions to disaster events or periods of dramatic change. It could be argued that this may not capture resilience completely and findings could be showing how resilience overlaps with other constructs in these specific situations rather than showing how resilience impacts on specific organisational outcomes or bottom-line performance. Furthermore, there is no distinction in current studies made between the sizes of organisations or their respective sector (e.g. private, public or third sector). There is also little attention paid to culture in terms of whether the organisation is based in an Eastern or Western culture, which would potentially have quite considerable impact on beliefs, values and practices. This lack of distinction may confuse results as all of these factors may influence findings and make it difficult to suggest practical recommendations that apply to organisations 'across the board'.

### **3. A DIVERSITY OF KEY PRINCIPLES**

*"In order to form an immaculate member of a flock of sheep one must, above all, be a sheep."*

Albert Einstein

Organisations maintain our economy; they provide jobs, goods, services and a sense of community. The increasingly globalised nature of the modern world has led to organisations facing causes and impacts of disturbances at different levels. Regarding preparation it is not enough to look only at the economic aspects of a disturbance. SD means that the latter are multidimensional. The different aspects of resilience in a system can be shown as a diversity of key principles (figure 2) as discussed below.

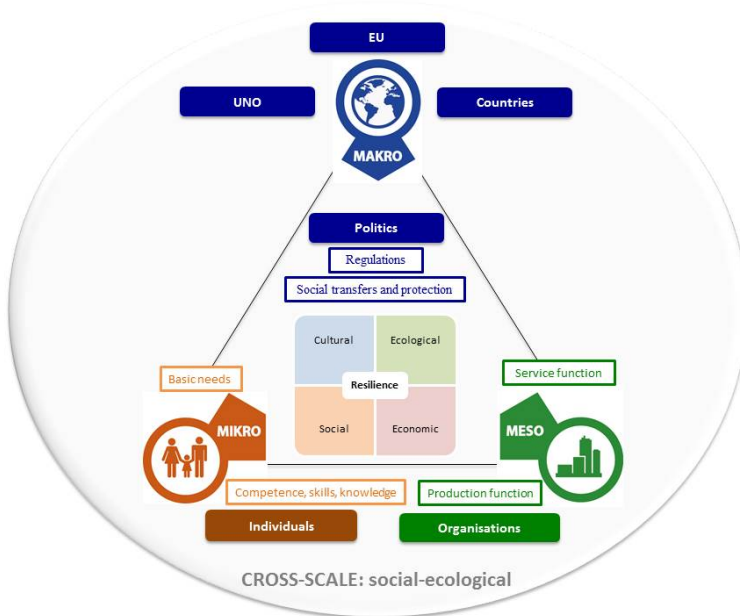


Figure 2 Key principles at a glance

Source: adopted from Gabriel, Pfeifer 2013

### 3.1. The principle to multi-dimensionality

We can overcome many of the barriers to SD by using a new language that is relevant to organisational interests, rather than relying on stakeholder pressures and moral arguments. Resilience, as outlined above, offers an intuitively satisfying motivation for organisations both to achieve sustainable shareholder value and contribute to global SD. This requires viewing the organisation as a system that is closely coupled with a variety of social, environmental, economic and cultural systems. The key to the SD of these systems is resilience, the ability to resist disorder.

Thus, an organisation can focus on being 'sustainable' by enhancing its own resilience relative to the systems in which it operates. Indeed, the 'triple bottom line' supplemented by the cultural aspect can be seen as one way to a multi-dimensional assessment of resilience in the transition for a sustainable future:

- **Economic resilience:** Reflects the financial strength and stability of the organisation, including the economic vitality and diversity of the communities in which it operates, the supply chain that it rests on, and the markets that it serves. According to Briguglio et al. (2008, p5) it can also be referred to as the ability to

recover from or adjust to the negative impacts of external economic shocks – maybe also internal shortcomings.

- **Social resilience:** Reflects the “human capital” of the organisation, including the capability, teamwork, and loyalty of its workforce, the strength of its relationships and alliances, and the political and cultural cohesion of its host societies.

- **Environmental resilience:** Reflects the operational efficiency and effectiveness of the organisation in terms of resource utilisation and waste minimisation, as well as its ability to protect and nurture the natural ecosystems in which it operates.

- **Cultural resilience:** Reflects how humans understand and appreciate natural resources and each other. It requires the recognition of local cultural values, equal rights and the cultural logic of the respective communities and the provision of support for participatory approaches.

In this sense, enhancing resilience will not only improve financial performance, but will also strengthen many of the intangibles that are recognised by shareholders, such as reputation, employee motivation, and process excellence. In short, an organisation that contributes to resilience from a multi-dimensional perspective enhances its own viability and prosperity as a business. Furthermore resilience can provide a common language for measuring organisation fitness, social vitality, and environmental health and safety.

### **3.2. The principle of openness**

Just like general systems theory, complexity theory suggests that any attempt to draw a boundary around a complex system will represent an analytical sacrifice made by the one drawing it. Complex systems typically interact with their environment, and pressures from the surroundings affect the local adaptive strategies used by the system’s actors and the stakeholders of an organisation.

In Cilliers’ words (2005, p258), “*because complex systems are open systems, we need to understand the system’s complete environment before we can understand the system, and, of course, the environment is complex in itself. There is no human way of doing this*”. Particularly at the organisational level, this complexity is inherent in the normal day-to-day operation of the system, “*there are no special error producing processes that magically begin to work when an accident is going to happen but which otherwise lie dormant. On the contrary, there are no fundamental differences between performance that leads to failures and performance that leads to successes*” (Hollnagel 2008, pxxxv).

The organisation is an open system that interacts with its socio-ecological environment. This big picture needs to be understood. It is a nested system within a wider network of organisational stakeholders, which can include



individuals, institutions, social networks and natural systems (the latter also referred to as silent stakeholders). System desirability is therefore dependent upon the perspectives of internal actors (such as employees, management and shareholders), as well as external actors that operate in the market, the technical-economic and the scientific sub-environments (Lawrence, Lorsch 1967). The network of external stakeholders could therefore include customers, suppliers, competitors, financiers, government and community agents, all of which directly or indirectly influence the organisation.

According to this, the organisational system becomes the primary unit of analysis, defined as a network of interrelated systems which are systematically arranged and managed to pursue a set of activities with the collective goal of supplying a product or service. To be operationally resilient, organisations must address operational risk on many dimensions simultaneously, including people, technology, information, facilities, supply-chain, management, cyber and physical dimensions. By this definition, the boundaries of organisational systems will not always coincide with their legal boundaries. Some large corporations for example may have subdivisions that pursue diverse strategic goals, thus encompassing a number of further organisations by our definition. On the other hand, franchise, co-operative, and horizontally or vertically integrated business structures (such as the Japanese keiretsu), can be classified as single organisational systems. This requires careful planning, coordination, and training across many interdependent domains as well as understanding how the organisation's capabilities along these dimensions contribute to mission success.

### **3.3. The principle of emergence and individuals**

The principle of emergence implies that the macro behaviour of the system emerges from meso and micro behaviour. The principle is based on the central tenet of general systems theory, which states that the behaviour of the whole is not reducible to the behaviour of the constituent components or actors (cf. von Bertalanffy 1950; Heylighen et al. 2007). With regard to the analysis of the emergent behaviour of the whole, complexity theory needs to turn its focus toward interactions and relationships, i.e., the 'individual' interactions, which influence the behaviour of the whole. This leads us to the individual principle.

The individual principle implies that all actions in a complex system are local. What each individual as an employee in the complex system does makes sense under the local conditions in which the employee operates, but the actor is unable to know the full effects of his or her actions. Employees respond locally to local information regarding locally changing conditions by adapting their coping strategies within an inherently uncertain environment. There is no single employee with knowledge of the entire complexity of the whole system, because that would imply the paradox of that employee needing to be as complex as the system itself (Cilliers 1998, Dekker 2011). The individual principle implies that

each employee in a complex system controls little, but influences everything. No single employee guarantees the emergent resilience of the whole organisation, but all employees influence the resilience of the whole organisation through their local actions, relations, and interactions.

### 3.4. The principle of levels

Before coming to the roadmap for resilience, it should be repeated that any resilient system requires a disturbance, i.e., a surprise, stressor, danger, threat or crisis. In fact, it seems impossible to define anything as resilient without something disturbing its existence, functioning, or survival, at whatever level of intensity. The impact of a disturbance not only depends on the physical characteristics of the event or its direct impacts in terms of lives, assets or money lost. Impacts also depend on the ability of the employees, organisation, sector or economy as well as the society as a whole to cope, recover, and reconstruct and therefore to minimize aggregate production losses and resource shortages. This ability can be looked at on different levels which also leads to different levels of resilience, i.e. the,

- micro or individual resilience at the employees level (cf. Alexander 2013; Aranda et al. 2012; Kolar 2011; Ungar 2005),
- meso resilience at the organisational level (cf. Carmeli et al. 2013; Hollnagel 2006, 2008; Hollnagel et al. 2006b, Lengnick-Hall, Beck, 2005; McManus et al. 2007; Miller, , Xiao 2007; Paltrinieri et al. 2012; Riolli, Savicki 2003; Sheffi 2007; Miller and Xiao 2007; Paltrinieri et al. 2012; Stephenson et al. 2010; Woods, Wrethall 2008),
- macro resilience mainly based on the sectoral, economy and policy level (cf. Becker et al. 2011; Cimellaro et al. 2013; Gibbs et al. 2013; Hamiel et al. 2013; McDaniels et al. 2008; O'Sullivan et al. 2013; Walker, Cooper 2011) and
- cross-scale resilience (cf. Almedom, Glandon 2007; Berkes 2006; Jerneck, Olsson 2008; Kulig et al. 2008; Wilson 2012).

The above principles imply that whether we target the analysis of resilience on the individuals, the organisation, the sector, policy or cross scale level, drawing boundaries around the system will always be an analytical sacrifice. They are all open systems. The answer to the question of 'where' resilience emerges should then be that it is a matter of where the boundaries are drawn.

#### 4. THE ROADMAP: FROM THEORY TO REALITY

*“Projects we have completed demonstrate what we know – future projects decide what we will learn.”*

Moshin Tiwana

The use of analytical tools is a promising approach to understanding organisational performance in situations when the organisation is stretched to the limits of its capability. Interest in how the ability to adapt to unexpected and escalating situations varies with different levels of experience in both the domain of continued functionality and that of crisis management.

It is worth noting that the current organisational performance is not positively and negatively symmetrical, because of the uncertainty and risk attached to any future-related organisational development. For example, a dominant market position is no guarantee that a position is sustainable, while weak strategic positioning in key markets is an indication of vulnerability. Similarly, strong finances are not necessarily sustainable, while stretched finances will be an immediate cause for concern.

##### 4.1 Elements and characteristics of a defined process

Becoming more resilient involves the deliberate application of a range of tools, strategies and business paradigms that many organisations will already be familiar with. A number of indicators, models or frameworks (cf. figure 1, chapter 3.4) to carry out an organisational performance assessment, benchmarking and management systems already exist. The choice of which framework (or combination of frameworks) to use depends (i) on the nature of the organisation, (ii) on the purpose of the assessment, (iii) the data and instruments available and (iv) on the context in which the assessed organisation operates.

The creation of performance architecture for organisational resilience requires a systemic and integral approach. A systemic approach means that the organisation and intervention concentrate on developing the people, the culture and business processes as well as driving for an external stakeholder outcome. An integral approach means that the organisation and intervention focus on the whole organisation in the system by considering different aspects and levels (cf. chapter 3.4).

The approach to future success and measurement thereof must be based on the business strategy and its long-term commitment. Therefore, one size clearly will not fit all, because there are different ‘time bound’ elements. Nor will the use of today’s key indicators suffice. Key indicators extrapolate today’s metrics and context into the future. In other words they tend to indicate the ability of an enterprise to continue along the current trajectory. They take insufficient account of the underlying ability to survive and thrive in changed market or

technological conditions. They are unlikely to fully embrace the implications of new global markets and the actions of market leaders.

There is a need for a new frame of reference as an approach to the metrics of tomorrow's success based on SD and resilience. SD is about doing things which will underpin and continue the success we enjoy today. It requires a significant improvement in the quality and relevance of current measures, and greater freedom to move beyond the current historic financial measures. Resilience is a step change from sustainability; it is about the capability of an organisation to re-invent itself as circumstances change (for a transition into a sustainable future). It is heavily dependent on judgement at the highest levels in the organisation as to the future and its implications.

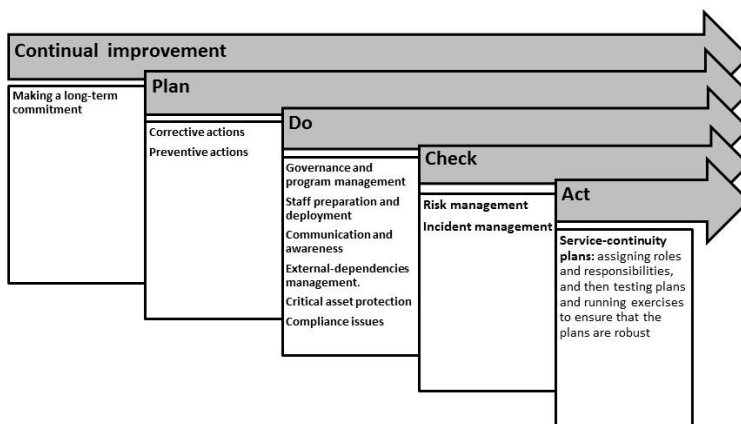


Figure 3 Organisational resilience process model

Source: adopted from ISO 22313:2012, Allen, Curtis, Mehravari 2014

PARC (2007, p15f) highlights the fact that there are problems with the assessment of SD and resilience, measurement must not be confused with quantification, and even quantifiable key indicators need interpretation. Although, quantitative scales tend to be used more than qualitative measures (Luthar, Cichetti 2000; Masten et al. 2006; Rutter 1993; Tusaie, Dyer 2004), the focus will be indicative rather than quantitative. Quantitative measures are useful as guides, but can be dangerous if not accompanied by a commentary. So the aim is to start with the sustainability assessment and look at how to expand the methodology to include the aspects of resilience – as shown in figure 3.

This process model developed needs a systemic approach. This would lend itself to systemic thinking which, while not being prescriptive, could shed light on the interconnectedness between the different levels and how an organisation is affected thereby leading to new insights into the multidimensionality of resilience based on a business strategy. Furthermore, this

would raise awareness among all concerned and help define tangible spheres of activity and dialogue for resilient organisations.

## 4.2 Challenges

The process model developed provides a theoretical lens through which propositions and the dynamics of organisational resilience can be explored and tested. It allows for the characterisation of organisational resilience into key components. As reflected by the evidence of the literature review, resilience is a broad and complex issue that covers several areas. As such the key areas of resilience within the response of an organisation, such as detection and activation, can be identified and addressed individually.

Given that resilience is seen as a complex construct that is dynamic, not static, there need to be measures of resilience that can capture the complexities of resilience over time (Glantz, Sloboda 1999; Luthar et al. 2000; Rutter 1993; Windle 1999) by considering the internal and external factors of influence. Furthermore, it is important that measures are conceptually similar to the area of resilience they are studying. For example, if risk factors such as poor employee behaviour are being measured, a suitable measure to assess employee behaviour should be used rather than a general resilience measure (Garmezy 1993; Luthar, Cicchetti 2000; Masten et al 2006; Tusaie, Dyer 2004).

So far this paper is based on literature review. It is very challenging to build an applicable model which considers both the principles defined in chapter 3 and lessons learnt from studies about organisational resilience (e.g. Endler, Parker's 1990; cf. subsection 3.4) within the defined process in figure 3. The next step shall be to go into practise and look at organisational resilience in the form of appropriate case studies.

This could be a valuable input for the work within the International Organisation for Standardisation on an ISO 22316. 'Societal Security – Organisational Resilience – Principles and Guidelines. In this respect though, there still lies a problem in trying to reconcile more traditional business continuity operations with a contemporary understanding of resilience. That is, the recognition that organisations must not prepare simply to survive and continue in the face of crises, but learn from them and use them to improve and evolve. In our complex, networked 21st century world, adaptive capacity will define an organisation's success as much as its financial, human and cultural capital. ISO 22316 is set to be a good starting point for those seeking to grasp this opportunity. (ISO TC 223 n.d.)

## 5. CONCLUSIONS

*“We did not come to fear the future. We came here to shape it.”*

Barack Obama

The concept of organisational resilience offers a useful framework for addressing economic, social and environmental issues in a systemic way. Organisational resilience is important particularly as there is a clear interdependence between organisational resilience and community resilience (Dalziell, McManus 2004), society resilience or the sustainable future for our living planet.

Clearly organisations that survive through adverse events become more resilient and Friedrich Nietzsche's quote used at the beginning of this paper justly captures the essential nature of organisational resilience. Unfortunately, there is no 'silver bullet' for becoming more resilient; it is something that an organisation must continually work at. Nevertheless research (cf. chapter 2 and 3) has shown that because resilience is so intrinsically related to the day-to-day ethos of the organisation, it can also create significant payback in terms of helping to refocus on what is important to the organisation and creating a shared understanding of the roles people play in making these a reality.

The outcomes of this contribution lead to the following potential fields of further work

- We are beginning to understand the resilience of organisations, and to study their cyclic patterns of growth, collapse, and renewal. For organisations to invest in resilience there must be a proven way of measuring it, and of demonstrating changes and trends with this measurement over time. Management concepts and reporting systems are a starting point. Any serious assessment of resilient organisations should also bear in mind the future which results from current trends or how it is possible to include risks and limitations both currently and for the future. This will then enable organisations to make a business case for resilience and to show the value added by resilience management programs.

- Analysis of organisational resilience by industrial sector is also important for individual organisations. Organisations can identify whether they are more or less resilient than other similar organisations and can also identify the resilience strengths which set them apart from others. These strengths can then be translated into competitive advantage during and after industry wide crises or negative trends such as the rising costs of raw materials, agricultural disease outbreaks, or product recalls. Individual organisations can also use the tool to examine their resilience internally, allowing them to address gaps in awareness and silos between offices, departments and business units or organisational functions.

- To this end, further work also needs to be done to create applicable and well-functioning models of resilience; organisations need to have tangible and

achievable goals and need to know their thresholds in becoming more resilient in order to maintain their engagement with the process.

Organisations will face daunting challenges in the decades ahead: the population will grow to 9 billion people, with an increasing majority living in cities, and the pressures on natural resources will continue to mount. To sustain a growing, vibrant economy will require transformative innovations not merely in industrial technology and environmental policy. Organisations, government and people must become stronger partners, and better communication will be needed to help to understand the complexity of these challenges. In the 'new normal' of turbulent change, we must learn collectively to become more resilient in order to assure a safe, secure, and prosperous future for ourselves and future generations.

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