

# Chapter 5

## The Application of the Viable System Model to Enhance Organizational Resilience

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**Abstract** The interest in how to build resilient organizations is increasing in the last two decades. However, there is no formal and accepted framework yet. In this paper, we argue that the application of the principles of the Viable System Model (VSM) improves organizational resilience. We also argue that the VSM constitutes a valid framework to design resilient organizations.

**Keywords** Organizational resilience · Viable system model · Organization design

### 1 Introduction

The study of resilience is gaining attention in the research agenda. A recent search in Scopus shows that there are more than 71.000 documents talking about resilience, resilient or resiliency. More than 62.000 of them published since the year 2.000. The number of papers related to resilience is increasing every year.

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Resilience is studied in different research fields, including ecology, psychology, disaster management, organization management, sociology, engineering, etc. This is probably why there is no common and widely accepted and unified definition of resilience. Even within the same area, different definitions coexist (Bergström et al. 2015). Despite those areas seem to be isolated and independent from each other, they are not.

Rose (2004) focuses on economic resilience and proposes that resilience takes place at three different levels: microeconomic, mesoeconomic and macroeconomic. At microeconomic level, we care about the resilience of the individual behaviour of firms, households and organizations. At mesoeconomic level, we focus on the resilience of an economic sector, individual market or cooperative group. Finally, at the macroeconomic level, we combine all individual units and markets. At macroeconomic level, the whole is not just the sum of the parts due to interactive effects of economy. Following the perspective presented in Rose (2004), we suggest that the different research areas studying resilience can be linked together. All of them study resilience at one of the above-mentioned levels. For example, to have a resilient organization we need to have resilient individuals (Mallak 1998b), among other requisites.

Our study focuses on resilience at the microeconomic level, specifically at the level of organizations. At this level, several works have proposed principles that we should follow to develop resilient organizations and the characteristics a resilient organization should have.

For example, Mallak (1998a, b) propose seven principles to create a resilient organization: perceive experiences constructively, perform positive adaptive behaviors, ensure adequate external resources, expand decision-making boundaries, practice bricolage, develop tolerance for uncertainty and build virtual role systems.

Similarly, Coutu (2002) states that a resilient organization has to face down reality, search for meaning and continually improvise. Dervitsiotis (2004) proposes that a resilient organization has the characteristics of living systems: receptivity from early warning systems, flexibility and capacity of creativity and innovation. We have reviewed over 200 papers and we have found that these approaches lack a formal framework to create resilient organizations.

The Viable System Model, here after VSM, (Beer 1981) is a scientific framework based on organizational cybernetics applied to the design and study of organizations and its processes (Pérez Ríos 2012). In the management field, the application of VSM is taking more attention.

A Viable System is a system organized in a way that it is able to survive despite changes in its environment. Preis (2014) has already proposed a framework for resilient management based on the principles of organizational cybernetics. However, he only takes into account one of the principles of the VSM: the recursive character.

Considering the definition of viable system and the aim of resilience (aligned with Dervitsiotis op.cit) we propose that the application of the VSM principles to organizations improves its resilience.

The rest of the paper is organized as followed. In Sect. 2, we explain the application of the VSM to organizations. In Sect. 3, we briefly review the concept of organizational resilience, the factors that contribute to organizational resilience and how it is measured. In Sect. 4, we explain how the VSM is a valid and an appropriated framework to design resilient organizations. Finally, in Sect. 5, we present the conclusions of this work.

## 2 The Viable System Model. Application to Organizations

The challenge that leaders and managers in organizations face in the current turbulent environment is formidable. The complex environment in which they act demands that managers have access to decision-making tools commensurate with the complexity which they must face (Schwaninger and Pérez Ríos 2008). In relation to this issue of the capacity for handling complexity, it has been pointed out that the quality of decisions made by managers is limited by the quality of the models they use for the systems they try to govern. If we are concerned with the viability of an organization [understood as system—see Beer (1989)], meaning with this term the capacity of a system to maintain a separate existence, (i.e. to survive regardless of changes in its environment), then we can apply an organizational cybernetic approach, in particular the Beer's Viable System Model (VSM). According to the VSM a viable organization must have the capacities of self-regulation, learning, adaptation, and evolution.

In his Viable System Model (VSM), Beer (1981, 1985) establishes the necessary and sufficient conditions for the viability of an organization. These are related to the existence of a set of functional systems (Beer identified them as System 1, 2, 3/3\*, 4 and 5) in an organization and a set of relationships among these functional systems and the environment. These systems and the relations among them are represented in Fig. 1.

According to Beer, all viable systems contain viable systems and are themselves contained in viable systems. The most important aspect of this recursive conception of viable systems is that, no matter which place they occupy within the chain of systems, they must always contain the five functional systems that determine viability, in order to be viable.

*System 1* is responsible for producing and delivering the goods or services which the organization produce. In the example shown in Fig. 1, System 1 is made up of three elemental operational units (Op. Unit 1, 2 and 3) which can be divisions of a company, suborganizations, etc. The main role of *System 2* is to guarantee a harmonic functioning of the organizational units, which compose system 1. *System 3* is responsible for optimizing the functioning of the whole set of system 1, made up of the different operational units. We can say that it is responsible for the “here and now” of the organization. The main responsibility of *System 4* is to monitor the

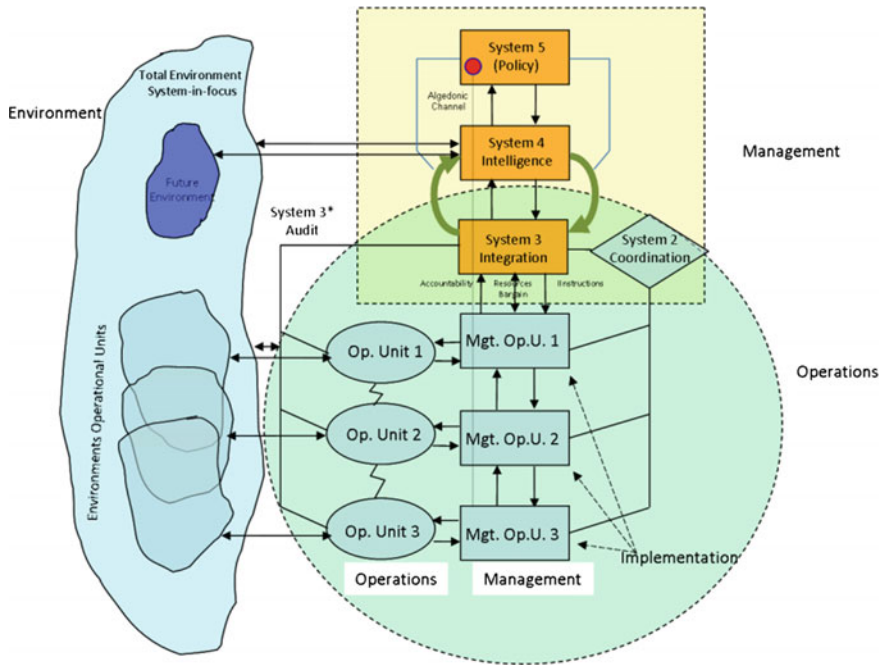


Fig. 1 Viable system model, adapted from Beer (1981) (Pérez Ríos 2012)

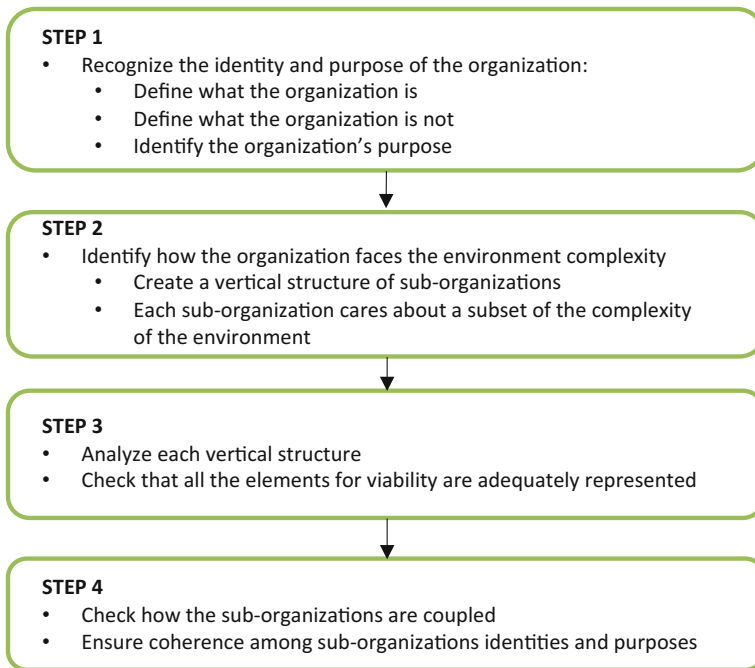
environment of the organization. It takes care of the “outside and then” of the organization, with the aim of maintaining it always prepared to change. *System 5* takes care of the normative decisions and is responsible for defining the ethos, the vision and the identity of the organization.

Based on Organizational Cybernetics (OC) and, in particular, the VSM’s conceptual elements, Pérez Ríos (2010) introduced a systemic methodological framework to help design or diagnose systems in view of their viability. The process to apply it is structured in four main steps as we show in Fig. 2.

The *first step* is to identify the identity and the purpose of the organization. In this process, we will try to assess what the organization is (and also, what the organization is not) and what it is, or should be, its purpose.

In a *second step*, we see how the organization faces the total environment complexity (variety) by means of creating a vertical structure made up of sub-organizations where each of them will be in charge of the different sub-environments in which the total environment is also divided.

In a *third step*, we should go through each of those vertical levels and get into them to check that all the necessary and sufficient elements for viability, which OC and the VSM identifies are adequately represented in all the organizations, sub-organizations, sub-sub-organizations, etc. in which we have unfolded the initial organization.



**Fig. 2** Framework to help design and diagnose systems in view of their viability

The *fourth* and last step would be to check the degree of coupling of all organizations, sub-organizations etc. at all recursion levels, from the point of view of the coherence among their respective identities and purposes.

We want to highlight that any shortage in any of these five systems or functions due to absence, to malfunction or to deficient design of the communication channels that connect them carries pathologies in the organization. These pathologies cause that the organization does not work properly or even disappear, at least as an independent entity.

The variety of pathologies which most frequently appear in organizations have been analysed and classified comprehensively by Pérez Ríos (2012) into three main groups:

- a. Structural Pathologies are related to the organization structural design and how it copes with the total environmental complexity and creates the necessary sub-organizations.
- b. Functional Pathologies are those related to the adequacy of organizations (at all recursion levels) to the prescription made by the VSM about functions and subsystems and their relationships.
- c. Information pathologies are related to information systems and communication channels.

Both a comprehensive definition of the VSM and the pathologies that organizations face can be found in (Beer 1989; Schwaninger 2009; Hetzler 2008; Pérez Ríos 2008, 2012).

### 3 Organizational Resilience. A Briefly Review

Reviewing over 50 definitions, we have found that most of the authors understand organizational resilience as an **ability** such as (Mallak 1998a), **capacity** such as (Manyena 2006) or **capability** such as (Annarelli and Nonino 2016) to deal with internal or external changes, risks or jolts. For example, Mallak (1998a) define resilience as *“the ability of an individual or organization to expeditiously design and implement effective strategies and actions matched to the immediate situation, while enduring minimal stress”*. Manyena (2006) define disaster resilience as an *“intrinsic capacity of a system, community or society predisposed to a shock or stress to adapt and survive by changing its non-essential attributes and rebuilding itself”*.

Based on a recent literature review, Annarelli and Nonino (2016) provides a more integrative definition of organizational resilience. They define organizational resilience as *“the organization’s capability to face disruptions and unexpected events in advance, thanks to the strategic awareness and a linked operational management of internal and external shocks. The resilience is static, when founded on preparedness and preventive measures to minimize threats probability and to reduce any impact that may occur. And it is dynamic, when founded on the ability of managing disruptions and unexpected events to shorten unfavorable aftermaths and maximize the organization’s speed of recovery to the original or to a new more desirable state”*. This definition captures some key concepts of the definitions provided in the literature such as the capability to face disruptions, being prepared for disruptions, prevent them and shortening the recovery time and the consequences to achieve the original state or a more desirable one. However, this definition does not explicitly take into account that changes and disruptions can be opportunities (Bhamidipaty et al. 2007; Ates and Bititci 2011), the learning process in organizations (Stewart and O’Donnell 2007; Chand and Loosemore 2012), the importance of social interactions (Powley 2009), and the capacity to innovate (Robb 2000; Reinmoeller and Van Baardwijk 2005) and reinvent (Hamel and Valikangas 2003; Mafabi et al. 2015).

The factors or characteristics that contribute to create resilient organizations have also been largely studied based on both theoretical and empirical works. We have found a great variety among the factors and mechanisms that contribute to enhance organizational resilience. For example, Riolli and Savicki (2003) propose that organizational resilience is based on resilient individuals. However, they also acknowledge that having resilient individuals do not guarantee organizational resilience.

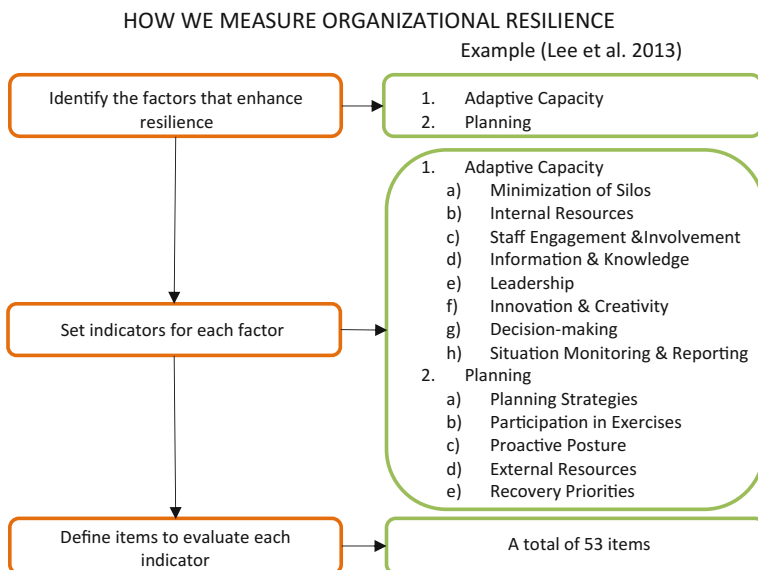
Fiksel (2003) propose that resilient systems, such as enterprises, have the following characteristics: diversity, efficiency, adaptability and cohesion. Jackson (2007) considers the following properties: adaptability, agility and robustness. McManus et al. (2008) propose to enhance resilience improving situation awareness, the management of keystone vulnerabilities and the adaptive capacity. Van Trijp et al. (2012) add taking into account quality to the previous factors. Berliet (2009) suggests three pillars to enhance resilience: enterprise risk management, value-based management and management by objectives. Burnard and Bhamra (2011) remark the importance of enhance monitoring, adaptive capacity, self-assessment of vulnerabilities, flexibility and organizational learning. Sanchis and Poler (2013) identify vulnerability, adaptive capacity and recover ability as the components of resilience.

Other authors performed empirical studies to identify the factors that contribute to resilience. For example, Crichton et al. (2009) found common lessons learned to improve resilience through the study of different incidents in the UK. Powley (2009), through the study of an university shooting, found three mechanisms that activate resilience: liminal suspension, compassionate witnessing and relational redundancy. Beermann (2011) concluded that the combination of mitigation and adaptation strategies helps to create more robust and resilient strategies after studying different organizations in the German food industry. We want to acknowledge that not all the factors or characteristics identified in these empirical works may be applicable to all types of organizations or business sectors.

However, though a literature review, we found some common and repeated characteristics or factors to take into account to enhance resilience. These factors include building situation awareness (Coutu 2002; McManus et al. 2008), managing organization's vulnerabilities (Erol et al. 2010), having resources (Orchiston et al. 2016; Mallak 1998b), having improvisation capacity (Kendra and Wachtendorf 2002; Coutu 2002; Mallak 1997), being able to anticipate to events (Hardy 2014; Apneseth et al. 2013), being agile (Gibson and Tarrant 2010; Thomas et al. 2016), having learning capacity (Burnard and Bhamra 2011; Robb 2000), collaboration (Andrés and Poler 2013; Winston 2014), having resilient individuals (Mallak 1997; Riolli and Savicki 2003) and being flexible (Kendra and Wachtendorf 2002; Proper and Pienaar 2011) and redundant (Chopra and Khanna 2014; Winston 2014).

The number of authors that have investigated how to measure organizational resilience is lower than the ones that have identified factors that contribute to enhance resilience. Many authors have proposed to assess resilience evaluating how the organization performs in the different factors or characteristics that contribute to resilience (Horne and Orr 1998; Bhamidipaty et al. 2007; Somers 2009; Sanchis and Poler 2013; Lee et al. 2013; Seville 2009; Whitman et al. 2013). However, they have not reached an agreement. This lack of agreement is mainly based on the lack of agreement about the factors or characteristics that contributes to resilience.

For example, Seville (2009) proposes 23 indicators with a description to evaluate the factors that contribute to resilience: resilience ethos, situation awareness,



**Fig. 3** Example of how to measure resilience following Lee et al. (2013)

management of key stone vulnerabilities and adaptive capacity. These indicators include commitment to resilience, network perspective, informed decision-making or recovery priorities.

Lee et al. (2013) propose a two-factor model to assess organizational resilience (see Fig. 3). They suggest that these factors are adaptive capacity and planning. They evaluate the factors measuring 13 indicators (such as minimization of silos, internal resources or planning strategies) based on 53 items.

For example, they propose to measure the capability and capacity of internal resources based on 3 items. These items are:

- Enough resources to successfully operate during business-as-usual
- The resources during business as usual are manage in a way that can absorb small amounts of unexpected change
- There is less paperwork to have the internal resource available when there is a problem in the organization.

Based on the 53-item resilience assessment tool developed by Lee et al. (2013), Whitman et al. (2013) propose a shorter version of the tool with 13 items of the 53 using just one item for each indicator. The results they obtained with the shorter version are correlated with the ones they got with the 53-item scale. The advantage is that it carries less time to assess resilience, as there are fewer items to be evaluated.



This brief review points out that future research lines should aim at identifying a framework of core enabling factors or characteristics that contribute to enhance resilience and allow evaluating it.

## 4 The Application of the Viable System Model to Design Resilient Organizations

Organizational Cybernetics applies “communication and control” cybernetic principles to the organizations (Pérez Ríos 2010). We have already explored the VSM and we have identified the concepts that link VSM and organizational resilience.

A review of several definitions of resilience have pointed out that, among other characteristics, resilient organizations have to recover from challenges or disruptive events (i.e. survive) (Sheffi and Rice 2005; Fiksel 2006; Manyena 2006; Stewart and O’Donnell 2007; Hollnagel 2010; Annarelli and Nonino 2016). Therefore, a resilient organization has to be a viable one.

The VSM establishes the necessary and sufficient conditions for the viability of an organization (Beer 1979, 1981, 1985, 1989). Viability is the capacity of an organism to maintain its separate existence (i.e. ability to survive despite changes in the environment). The viability of the organization is related to the existence of a set of systems or functions inside the organization and a set of relations among them and the environment as explained in the previous section. Moreover, according to the VSM a viable organization must have the capacities of self-regulation, learning, adaptation, and evolution.

These capacities, among others, are within the set of factors that contribute to enhance organizational resilience or, within the set of characteristics and properties a resilient organization should have. For example, McManus et al. (2008); Van Trijp et al. (2012) or Jackson (2007) consider adaptability as an attribute that a resilient organization should have.

Learning (Stewart and O’Donnell 2007; Robb 2000; Zhang and Van Luttervelt 2011; Hilton et al. 2012; Alexiou 2014) and evolution (Demmer et al. 2011) are also included among the factors and characteristics of resilient organizations. Other authors (Fiksel 2006; Proper and Pienaar 2011) do not explicitly talk about evolution, but they include grow (which can be understood as evolution) among the characteristics of resilient organizations. Self-regulation, understood as absorbing environment variability, is also included among the characteristics of resilient organizations (Linnenluecke and Griffiths 2010; Jaaron and Backhouse 2014). This explanation is summarized in Fig. 4.

Following this analysis, we conclude that resilient organizations fit the VSM principles. Therefore, the systemic methodological framework introduced by Pérez Ríos (2010) is a valid and appropriate framework to design a resilient organization.

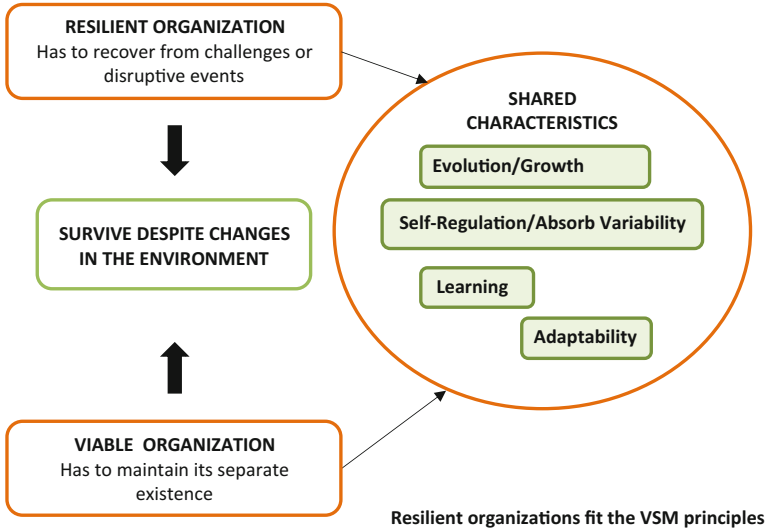


Fig. 4 Shared characteristics between resilient and viable organizations

## 5 Conclusions

In this work, we have presented the VSM as a framework to design resilient organizations. For this purpose, we have reviewed the principles of the VSM and the framework proposed by Pérez Ríos (2010) to design viable organizations based on the VSM and Organizational Cybernetics. We have also reviewed the concept of organizational resilience. We have reviewed several definitions, the factors that contribute to enhance organizational resilience and how to measure it. We have concluded that despite it is difficult to reach a consensus among the factors that contribute to enhance organizational resilience and how to measure it. Future research lines should tackle this problem.

The VSM establishes the necessary and sufficient conditions for the viability of an organization. The viability of an organization is its ability to survive despite changes in the environment. Taking into account this definition, a resilient organization has to be a viable one. Moreover, according to the VSM, a viable organization must have the capacities of self-regulation, learning, adaptation, and evolution. These capacities are also stated among the factor or characteristics that resilient organizations should have. Therefore, the VSM provides a valid formal framework to design resilient organizations. More specifically, the systemic methodological framework introduced by Pérez Ríos (2010) is a valid and appropriate framework to design a resilient organization.

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