

Systemic Agility: A Gauge to Measure Companies' Adaptation to Their Volatile, Uncertain, Complex and Ambiguous Environment

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Abstract: In an always more Volatile, Uncertain, Complex and Ambiguous environment, companies must adapt to keep their context in check. The purpose of this paper is to share and discuss the Systemic Agility model, that explores the adaptation of an organization to its context. The model is rooted in the existing literatures and uses quantitative methods to investigate on organizations' adaptation. Inner organization's observations are used to position its culture in a continuum bounded by modern and postmodern perspectives. Outer observations are used to quantify the VUCA (Volatile, Uncertain, Complex and Ambiguous) characteristics of the environment. The association of all the observations reveals the fit level of an organization to its context; the unfit consequences may be associated with tensions and stress that may impede efficacy. The model and the questionnaire appear consistent under the lenses of the gathered observations analyzed with the Confirmatory Factor Analysis. This suggests that the Systemic Agility may be used to further explore the adaptation of an organization to its context, the creation of wellbeing and the reductions of inner tensions.

Key words: VUCA, adaptation, quantitative methods, confirmatory factor analysis, organizational culture, agile

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1. Introduction

Our environment is always more Volatile, Uncertain, Complex and Ambiguous (Bennis & Nanus, 1985); it requires constant adaptation for individuals and organization structures. Technology has played and continues to play an important role in the mutation of our environment (McMahon, 2001). Broadband internet's access combined with massive adoption of the smartphones enabled individuals to exchange and share information in real-time with potentially more than 4 billion other individuals through social networks (Johnson, 2021). The globalization phenomenon enables collaboration between remote bodies, and it is nowadays possible to buy goods and services around the world with nearly no restriction.

In this context, the infosphere made of all the available information is reshaping the human reality, who we are, and how we relate to each other are foundational markers of our civilization that are dramatically changing under the pressure of our environment (Floridi, 2014).

Our culture is tremendously influenced by this phenomenon, real-time exchange is shrinking the time and

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space value to zero. The time-space compression is a facet of contemporary life that emerges much more from programming than presence (Decron, 2001). This extreme contraction impacts business in general, individuals and companies strive to adapt to this new paradigm. To do so, organizations need to review and amend their structure, their strategy, their technology, and their culture; a systemic approach may be useful to manage priorities and critical path issues.

In that context and in absence of an existing proven model, the Systemic Agility (SA) model has been conceived as a gauge to measure the organization's adaptation to its context. Through an online questionnaire, a panel of respondents provides its perspectives based on personal experiences to quantify intrinsic variables that position the organization in a continuum bounded by a modern and postmodern boundaries' perspectives (Hatch, 2018). The quantification of extrinsic variables defines the VUCA character of the environment and the relations between the variables suggest the organization fit. The model has been designed to be used within all sectors of the economy, including the public sector.

The missing organization's fit with its environment may affect its outcome leading to tensions and stress that jeopardize its global performance. This paper introduces the model and its foundations on the literature prior to present and discuss the observations done within 26 companies. If the obtained results confirm the adequacy of the model with its initial intent, the analysis open the doors to further explorations on the association between performance and systemic agility, wellbeing at work, strategy. Those possible explorations are discussed in the conclusion.

2. The Systemic Agility Model

To illustrate the magnitude and the nature of the changes, SA model has been conceived as a continuum bounded by a modern and postmodern perspectives (Hatch, 2018). SA is an aggregate of 6 domains (Sense of purpose, management practices, organization practices, information flow, methods, and behaviors).

Table1 Systemic Agility domains' Description

Domains	Modern boundaries	Postmodern boundaries
Sense of Purpose (dP) The intention transmitted by the organization	Creates value for shareholders	Creates value for the stakeholders through sustainable practices
Management Practices (dM) The way organization makes things happening	The management provides orders and controls results, the management is the first line of defense for the organization	The management holds the space and enables its staff to take ownership, experiment and take responsibility for their work
Organization Practices (dO) The formal structure that governs the organization	Bureaucracy is predominant, process, procedure and hierarchy rule the business	The organization evolves as an adaptive system to better handle the complexity of the situations and fit with the context, creating emerging forms of collaboration and practices
Information flow (dI) How the knowledge circulates within the organization	Information is shared based on the need to know, owning information provides an advantage	Information is made available to all the stakeholders as soon as it is known, information is part of the commons
Methods (dMe) The meta processes used by the organization to pursue a continual objective	The methods serve the organization's machine that produces an output with the least waste of time, effort, and resources	Meta structures sustain the evolutionary purpose, growth and adaptation of the organization
Behaviors (dB) The attitudes that characterize the organization	The sense & response is guided by personal interests and the bureaucratic structure cements individual actions	The sense & response is adapted to the context leveraging individual responsibilities to create collective intelligence

dX variables are continuous and expressed on a scale that ranges from 0 to 5. 0 represents the full adherence to the modern marker and 5 represents the full adherence to the postmodern marker. 9 items per domain (8 for dB) in the questionnaire are used to establish each dX. SA value is the mean value of dX:

$$SA = \text{Mean}(dP, dM, dO, dI, dMe, dB)$$

SA is an absolute measure that indicates the position of an organization in the continuum between modern and postmodern boundaries.

Another independent variable, defined as VUCAness (V), quantifies the Volatile, Uncertain, Complex, and Ambiguous characteristics of the environment. It is established through 10 items in the questionnaire that allow to explore the perception of the respondent of on external forces (the competition, the market and the regulation) and on internal forces (frequency and the magnitude of changes in technology and organization, the political games); the respondents are asked to qualify and quantify 3 specific factors that contribute to the VUCAness (only the quantitative values are used to compute V). VUCAness is a neologism created by the author to better describe the variable.

As per the model assumption, the unfit of SA (independent variable) affects wellbeing of the staff and results in tensions and stress within the organization (dependent variables). We therefore use two indicators W and T: W captures the perception of wellbeing of the respondent as an item in the questionnaire and T is a compound of items that report the presence of tensions and stress markers.

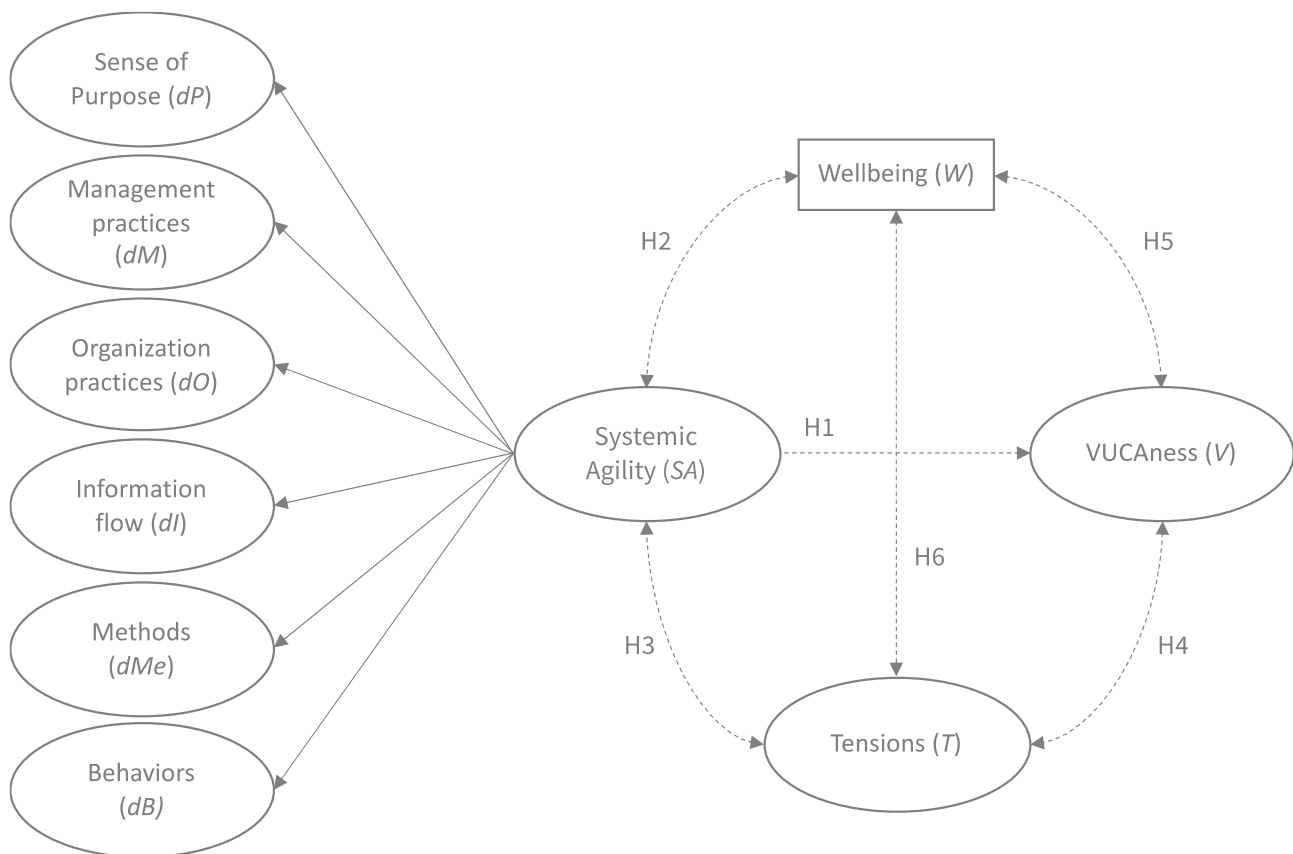


Figure 1 The Systemic Agility Model

SA is influenced by dX and is a response to the VUCAness of the environment (Bundtzen & Hinrichs, 2021) and is our first hypothesis (H1). SA influences positively the wellbeing of the organization's members (W) as second hypothesis (H2) and negatively the tensions within as third hypothesis (H3). An association between T and V is also suspected as fourth hypothesis (H4), between W e V as fifth hypothesis (H5) and finally between W and T as sixth hypothesis (H6).

3. Literature Review

The SA model has been developed factoring in several bodies of knowledge that range for the majors from Social Psychology, Evolutionary Psychology, Behavioral Psychology, Complexity Management, System Thinking and Organization Theory, including the seminal works performed around Agile practices. The elements described here have been used to design SA model and its questionnaire (Bronlet, 2021).

3.1 Modern, Symbolic and Postmodern Perspectives on Organization Theory

The organization may be observed from a modern, symbolic, or postmodern perspective (Hatch, 2018). She suggests the modern period in the 1960s and 1970s, the symbolic period in the 1980s and the postmodern from the 1990s. Everything before belongs to prehistory and is rooted in A. Smith's, F. Taylor's, and C. Barnard's theories. The postmodern perspective of the 1990s has been inspired by French philosophers like J. Derrida, M. Foucault, JF. Lyotard, J. Baudrillard.

Table 2 Modern, Symbolic and Postmodern Perspectives on Organization Theory (Hatch, 2018)

	Modern (60s-70s)	Symbolic (80s)	Postmodern (90s-)
Reality is	An independent unit	A social construct diversity	A plurality of simulacra or copies without original (Baudrillard, 1981)
Reality is defined by	Convergence	Coherence	Incoherence and fragmentation
Knowledge is	Universal	Particular	Provisional
Knowledge is developed through	Facts and information	Meaning interpretation	Decentering and deconstruction
Human relationship and identity are	Hierarchy and domination	Community and diversity	Reflexivity and Voice
Overarching goal is	Prediction and control	Understanding and tolerance	Appreciation and emancipation

Organizational changes, such as cultural changes take times (Greenfield, 2017) and the long-lasting wave that supports the change may be 10 to 30 years long. In other words, the theories do not depict the way most companies are operating but foresee models to keep the environment in check. Those perspectives have been used to set the boundaries of the continuum integrating on the modern and postmodern perspective to the poles and the symbolic in between.

3.2 McGregor Theory X and Theory Y

McGregor's ideas about Theory X and Theory Y were first articulated in his article, "The Human Side of Enterprise," (McGregor, 1957). McGregor referred to two different management styles and when he ideated those theories, his main purpose was to contribute to the motivation theories. We find a similar polarization between the modern and postmodern perspectives and the theory Y may be seen as a necessary condition to evolve in a destructed environment (McAvoy & Butler, 2009).

3.3 Spiral Dynamics

Spiral Dynamics is a model of the evolutionary development of individuals, organizations, and societies. It was initially developed by D. E. Beck and C. Cowan (1996) based on the emergent cyclical theory of C. W. Graves. The theory of Graves suggests that adult human development is constructed from experimental data and produce an open-ended number of levels, also called vMeme that apply to individual and groups (Graves, 1970). The polarization of the SA domains finds roots into the Spiral Dynamic theories, defining the modern era characteristics with mainly blue level (principle, norms, order) and orange (autonomy, progress and competition) levels specificities and postmodern with yellow (systemic, flows and integration) to turquoise (holistic, wholeness) characteristics (Don Beck & Cowan, 1996). The Spiral Dynamics theory defines the evolution as an adaptation to the context, the VUCAness of the environment may be seen as the trigger to organizations' evolution towards their next level. From a transformation standpoint, the observations reported by the authors highlight that those changes are settled on long lasting waves, the mastery of each level is necessary to accede to the upper one.

3.4 Cynefin Framework

In the Cynefin framework, D. Snowden (2000) has modelled a decision-making process based on the nature of the topic to be addressed that may be classified as simple, complicated, complex, or chaotic. Each type of problem calls for a specific type of response: simple problems are solved by best practices, complicated problems are solved with good practices that require analysis, complex problems are solved with emerging practices that require experimentation and chaotic issues require novel practice. The Cynefin theory associates the complexity management to empiricism, the relationship between cause and effect can only be perceived in retrospect and the results are unpredictable. Complex systems are dispositional and not causal. We may therefore see in the postmodern perspective the need to create the conditions for safe to fail experiments as key characteristic. As a further association, distinctions of knowability are less important than distinctions of interactions revealed through experimentation (Snowden & Kurtz, 2003) that corresponds to the provisional characteristic of knowledge as defined earlier.

3.5 Systems Thinking

Originated in 1956 when the Systems Dynamic Group was created by (Forrester, 1989) at the Sloan School of Management at MIT, the System Thinking utilizes computer simulations and different graphs and diagrams to illustrate and predict system behavior. Used by P. Senge to describe the catch all pillar of the learning organization (1990, Rev. 2006), the System Thinking provides a method to document and predict system behaviors. System Thinking's archetypes are available to support the diagnosing vexing long-term issues (Kim, 1992).

The design of the questionnaire's item has been made to reveal possible patterns (e.g., vicious circle or virtuous circle).

3.6 The Emergence of Agile:

Over the last 50 years, several continual improvement process methods have been developed as an ongoing effort to improve the processes and the quality of the produced goods and services. Toyota in Japan has pioneered in that field (Rother, 2009). The major methodologies used today are often designated as Kanban, Kaizen, Kata, SCRUM. To be effective, the agile methods require several conditions to be effective (Kropp & Meier, 2015). The SA questionnaire items have been designed to measure them.

3.7 The New Organizational Structures

New organizational paradigms have been developed over the last decade such as the Holacracy (Robertson,

2007). This paradigm leverage on the concept of holons that are autonomous and self-reliant, but also dependent on the greater whole of which they are part (Koestler, 1967). Holacracy is claimed to increase agility, efficiency, transparency, innovation and accountability within an organization (James, 2012). The approach encourages individual team members to take initiative and gives them a process in which their concerns or ideas can be addressed (Badal, 2008). The system of distributed authority reduces the burden on leaders to make every decision.

Sociocracy is another paradigm used to organize companies' activities. The concept has been coined by the French philosopher A. Comte in the 19th century (Comte & Martineau, 1893). Sociocracy evolved around the four principles published by G. Endenburg, all to emphasize that the process of selecting people for roles and responsibilities was likewise subject to the consent process (Endenburg, Lindenhovius, & Bowden, 1998). Sociocracy further evolves and the major instantiation of the paradigm is diffused under the name Sociocracy 3.0 or S3 defined by J. Priest and J. Cumps (Bockelbrink, Priest, & David, 2021).

Teal organization is an organizational paradigm that leverages on employees' self-management and is founded on 3 key principles that are self-management, wholeness, and evolutionary purpose (Laloux, 2014). The Teal Organization paradigm is rooted in the work of K. Wilber (Howard, 2005) and of the evolutionary psychologists C. Graves, D. Edward Beck, C. Cowan, and share several ideas present in the Spiral Dynamics (Wyrzykowska, 2019).

Those may be considered as the major organizational paradigms that emerge today. Their commonalities to rely on self-management practices to adapt to the changing complex environment have been integrated within SA model as postmodern characteristics. In other words, a company that fully adopt Holacracy, Sociocracy or Teal should obtain an elevated SA measurement.

4. Research Method

A survey method has been used to collect quantitative information with an online assessment questionnaire in which the respondents report their perceptions (Bronlet, 2021). A stratified sampling method has been used. First, the sampling method for including companies into the study is based on voluntary response sampling method, second a panel of respondents was composed using cluster sampling method. The size of the panel has been defined to reach an error margin of 10% over a confidence interval of 95%. In certain case, nearly all the staff members were part of the panel, leading to a low error margin.

A usability analysis has been carried forward leveraging the qualitative feedback received by the respondents and, a structural analysis has been done using factor analysis methods to explore the quality and the relationships within the model. An exploratory factor analysis led to the reduction of the variables used in the analysis and the confirmatory factor analysis has been used to confirm the fit of the model and the working hypotheses.

5. Analysis

5.1 Observations

The analysis is based on 1118 observations ($n = 1118$) from staff members working in 26 different companies in France, Switzerland, Italy, Germany, and Spain who operate in Banking, Insurance, Consulting, IT Services, Manufacturing and Health care sector who took part to the online assessment (Bronlet, 2021).

The company observations are obtained grouping the individual data by company using a mean function. When we speak about individual observations, we speak about a dataset of 1118 rows in which each row represents a respondent set of responses. The company observations result in a dataset of 26 rows in which each row corresponds

to a company set of means' responses.

5.2 Usability Analysis

The usability analysis is based on the experience made during the gathering of the observations used in the validation process. The design and the instructions provided to the respondents are satisfying as no respondent who took part in the assessment has provided negative feedback or has asked for assistance. The assessment questionnaire runs under all the major browsers for computers, tablets, and smartphones. The formulation of the items has been reviewed to resonate with the target audience. 5 formal feedbacks (0.4% of n) have been provided by respondents regarding their personal difficulties to understand one or more items. In the final comments of the assessment questionnaire, respondents are free to provide a feedback or comment on their experience. We've observed 206 feedbacks (18% of n) showing a relative satisfaction and/or commitment to the process. 5 respondents (0.4% of n) gave the feedback that completing to the questionnaire triggered in them new ways of seeing the organization and reported the experience as beneficial.

5.3 Structural Validity

The observations have been used to assess the robustness of the model from a structural standpoint and in particular the contribution of dX to SA , the adaptative relationships with V and the association with the wellbeing (W) and the tensions (T) variables to SA . An initial exploratory factor analysis helped to optimize the model reducing the number of relevant exogenous variables followed by a confirmatory factor analysis. Both operations done in R.

5.3.1 Results of the exploratory factor analysis:

The overall measure of sampling adequacy obtained through the Kaiser-Meyer-Olkin (KMO) test provides an excellent measure of 0.94 (Dziuban & Shirkey, 1974) that opens the door to the factor analysis procedure. The elaboration of the eigenvalues suggests to use 6 loading factors after a scree plot analysis (Cattell, 1966) and the maximum-likelihood factor analysis on a covariance data matrix led to reduce the number of extrinsic variables choosing the key ones (Costello & Osborne, July 2005).

5.3.2 Results of confirmatory factor analysis:

The confirmatory analysis has been executed taking into consideration the SA model associated with the retained extrinsic variable after the exploratory factor analysis that provides the following result as shown in Figure 2.

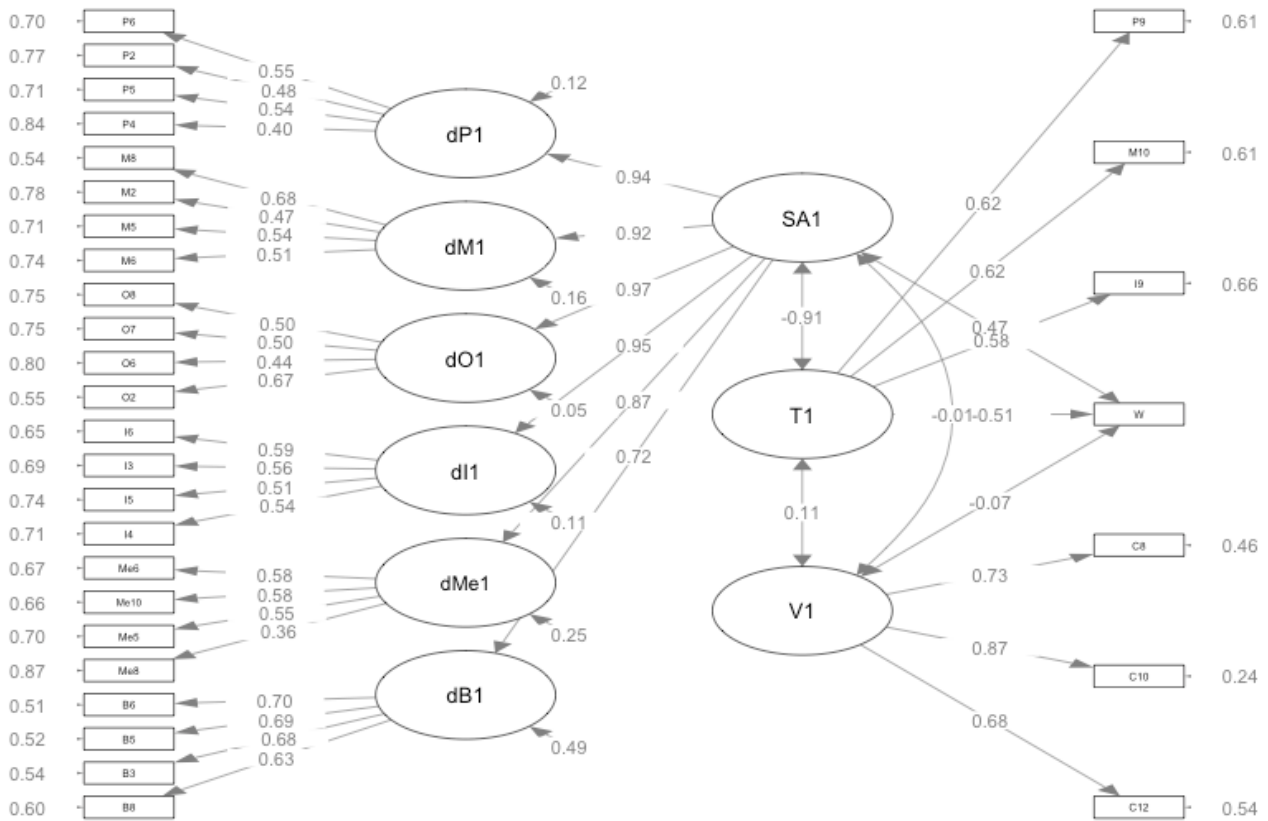
The Root Mean Square Error of Approximation (RMSEA) equals 0.043 and the Standardized Root Mean Square Residual (SRMR) equals 0.041 indicating a good fit of the model. The Comparative Fit Index (CFI) reached 0.91 to be considered as a fair fit (Hooper, Coughlan, & Mullen, November 2007) of the Systemic Agility model with the observations used in the research.

The standardized estimates of the variances between items and latent variables show a fair and balanced contribution of each item to the connected endogenous factors. The contribution of the domains dX to SA is also rather balanced with values around 0.9 except for the behavior's contribution $dB1$ that scores 0.72.

5.4 Hypothesis Validity

The model assumes that SA creates the conditions to operate in a turbulent environment. We may therefore explore the relationships between SA , V , T and W (Table 3).

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**Figure 2 Model's Factor Analysis Illustrating The Standardized Coefficients
(Standardized Estimates of the Variances of Both Latent and Observed Variables)**

Table 3 Hypothesis Analysis

Hypothesis	Std. estimates	Conclusions
H1. <i>SA</i> is a response to <i>V</i>	-0.012	No, the analysis of the observations suggests that there is no clear relationship between the Systemic Agility and the VUCAness
H2. <i>SA</i> and <i>W</i> are positively associated	0.426	Yes, a clear relationship exists between the Systemic Agility and the wellbeing at work
H3. <i>SA</i> and <i>T</i> are negatively associated	-0.911	Yes, a clear relationship exists between the Systemic Agility and the tensions in the organization, when <i>SA</i> improves, <i>T</i> regresses.
H4. <i>V</i> and <i>T</i> are positively associated	0.114	Yes, there is a loose association between the VUCAness and the tensions in the organization
H5. <i>V</i> and <i>W</i> are positively associated	-0.064	No, there is a loose negative association between the VUCAness and the wellbeing in the organization
H6. <i>W</i> and <i>T</i> are negatively associated	-0.463	Yes, a clear negative relationship exists between tensions and wellbeing in the organization.

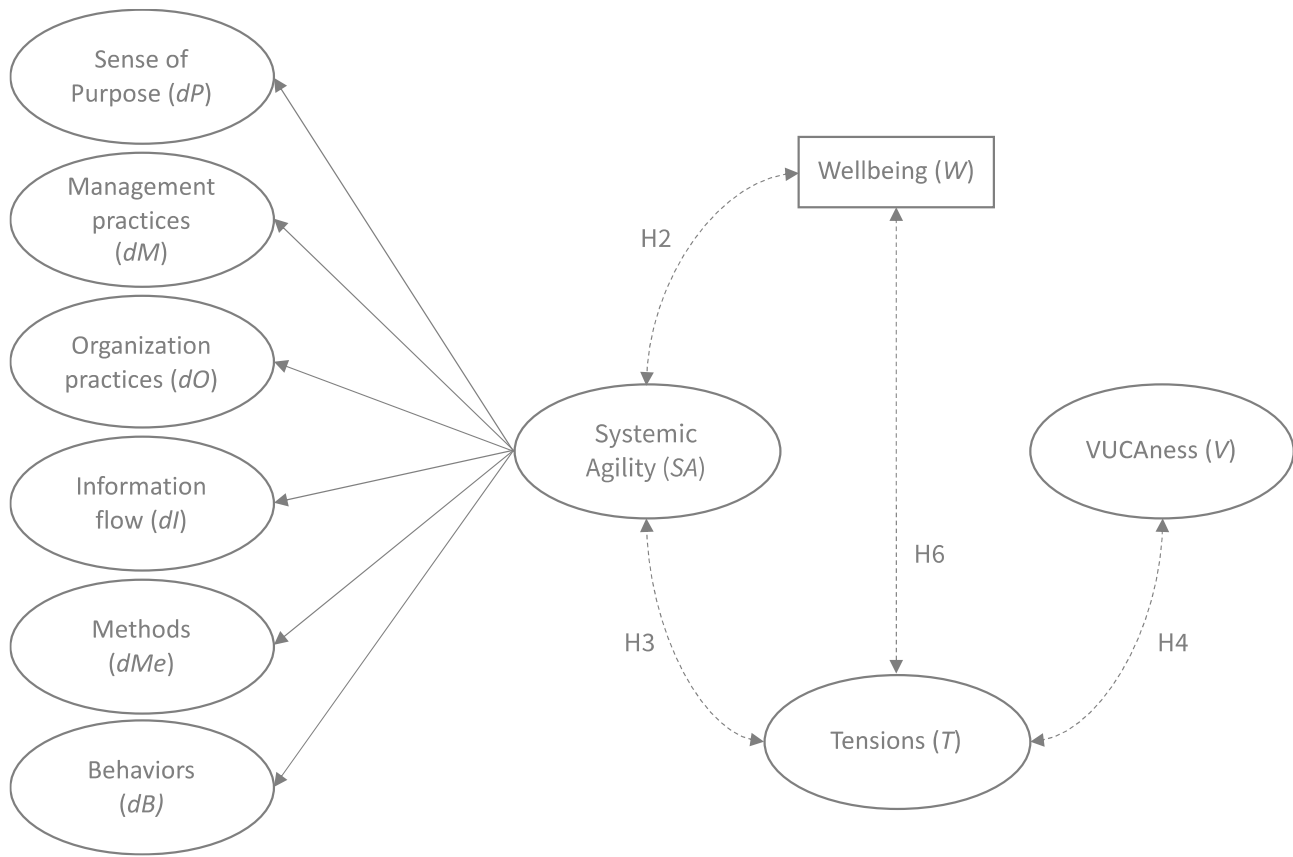


Figure 3 Confirmed Hypothesis

6. Discussion

The factor analysis was not able to confirm the association between the Systemic Agility and the VUCAness of the environment. This adaptation mechanism may be better analyzed under the lenses of the system Dynamical Causal Modelling (DCM) to better model the nonlinear causal loops (Hovmand, 2003).

The analysis suggests that a fair association exists between the perceived Systemic Agility (*SA*) and the expressed wellbeing of the organization's members (*W*) while Systemic Agility plays a key role to reduce the perceived presence of tensions (*T*). The challenges of the postmodern era require to leverage human capital and that's what the questionnaire investigate. We may deduct that those postmodern practices increase wellbeing and reduces tensions at work (Malone, 2005). The perceived VUCAness is a factor that may be loosely associated with tensions in the organization while remaining marginal. A slightly negative relation between the VUCAness and the wellbeing suggests that the turbulence may have positive impact on individuals by activating for example extrinsic and intrinsic motivation factors (Ryan & Deci, 2000).

Aside from those conclusions, the model helps to structure complex and interlinked domains in a systemic way. It depicts the relationships between the key domains of organizational development and supports the integration of the various practices.

Looking at the limitations of the research, the sampling method used to onboard companies is rather opportunistic as only companies that had an interest in measuring their Systemic Agility took part in the study. We may suspect that going through the questionnaire requires some courage, especially for more modern companies

who would feel at risk by exposing their employees to the questionnaire. Similarly, we can report the geographic and sector partiality of the sample. The model has been initially conceived as an orientation tool to support companies in their adaptation to the VUCA environment and this research came second. The questionnaire is well fitted to measure the constituent of SA and less its outcome.

Finally, the analysis done under the lenses of the Structured Equation Modelling serves the purpose of identifying the relationship between the factors to validate the model and confirm part of the hypothesis. A Dynamic Causal Modelling (DCM) analysis may further support the inspections of the relationships between the variables over time and provide further perspectives.

7. Conclusion

The contribution of this research for the business resides in the validity of the model to be used to position organizations in the continuum between modern and postmodern perspectives, providing organizations with quantitative information on their positioning. The association of multiple quantitative information (items and/or domains) supports the creation of organizational archetypes such as “start-up”, “top-down”, “manage and control” and “agile” (Barand & Deglaine, 2018). It may therefore be used as a relevant assessment tool for organizations while the domains and specific levers derived from each item may be used as development vectors. The complete questionnaire may be useful to support organizations in their transformation journey and the quantitative analysis should be based on a simplified version of the questionnaire to leverage on the best model fit. This research provides a reference model to be used and extended to specific basin and be associated with other dependent variables as suggested at the end of the conclusions. Further papers may be still published based on more specific analysis of the observations considering the incidence of gender, role or seniority in the organization for example.

The research explores the perception of the corporate culture and investigate on operations from a meta position (Glăveanu, 2020) without entering the specificity of the company strategy. We may therefore find in that fields several confounding factors that may influence the wellbeing and the presence of tensions. Peter Drucker coined the expression “culture eats strategy for breakfast” (Campbell, Edgar, & Stonehouse, 2011) and it may be interesting to explore the relationship between Systemic Agility and companies’ strategy to examine the presence of a moderation or mediation relationships between those two factors.

Those initial results open the door to further analysis and research to explore:

- the dynamic relationships of the model under the lenses of Dynamic Causal Modelling (DCM),
- the relationships between SA (independent variable) and organizations’ global performance (dependent variable) including financial, social and “time to market” indicators,
- the association between SA (independent variable) and wellbeing at work (dependent variable) through the integration of Siegrist’s Effort Reward Imbalance Questionnaire (ERIQ) (Langevin & Boini, Déséquilibre “efforts/recompenses” (Questionnaire dit de Siegrist), 2015) and/or Karasek Job Content Questionnaire (JCQ) (Langevin, François, Boini, & Riou, 2011),
- the exploration of Systemic Agility in other geographical basins and sectors,
- the association between Systemic Agility and companies’ strategy.

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