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Clarifying the conceptual map of VUCA: a systematic review

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Abstract

Purpose – Over the past few decades, the environment for organisations has been frequently described using the acronym VUCA: a volatile, uncertain, complex and ambiguous environment. In spite of the popularity of this acronym, it is not unusual to find some overlap concerning the meaning of those terms, as well as poor definitions of each in the literature. Consequently, the main purpose of this paper was to conduct a systematic literature review to obtain a conceptual map of the components of VUCA and their relationships and to highlight some avenues for future research.

Design/methodology/approach – The authors conducted a systematic review of various databases between 1999 and 2021. A total of 833 papers were identified and 26 of them met the inclusion criteria for the current study.

Findings – The subsequent analysis revealed several overlaps and relationships between the four terms. Based on this analysis, the authors propose a conceptual map that could serve as a basis for future research and practice.

Research limitations/implications – Because of the exploratory nature of the study and the scarce number of empirical studies, the impact that the use of the VUCA framework has had on businesses could not be addressed.

Originality/value – By clarifying the different components of VUCA and specifying the relationships between them with a comprehensive conceptual map, this paper may contribute to more rigorous empirical research, as well as help managers and executives more effectively deal with turbulent environments.

Keywords Uncertainty, Volatility, VUCA, Complexity, Ambiguity

Paper type Literature review

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Change in the business world is not new; what is new is the acceleration of change and innovation that organisations have had to face almost constantly. As a result, this has increased the levels of unpredictability and complexity, including unforeseen problems and vulnerability which require new strategies and skills (Child and Rodrigues, 2011).

This poses new challenges to strategic management that tries to respond effectively to such a dynamic environment. Several theoretical frameworks have emerged in recent decades and can be useful to help organisations effectively interact with larger systems to survive and achieve their goals (Allen *et al.*, 2011; Boisot and Mckelvey, 2010; Scott and Davis, 2006). For instance, organisations can be seen as complex adaptive systems (CAS), an approach based on physics and biological systems. This framework enunciates several major processes such as adaptation, emergence, self-organisation and cooperation involved in the CAS interaction with their environments and can generate helpful insights to understand and navigate an unpredictable or "chaotic" world (Allen *et al.*, 2011). However, in spite of organisational dynamics and adaptation benefits from self-organising phenomena and emergent processes, most organisations do not exist as complete self-organising systems, such as biological beings. For instance, business purposes and goals require directing efforts and resources according to (hierarchical) strategic decisions. Implementing these decisions compels superordinate coordination of the diverse organisation parts to achieve specific goals (e.g. profit), in parallel or above the general adaptive survival purpose. Even if some parts of the organisation might operate autonomously as self-organising sub-systems, specific strategic decision-making requires a (bounded) interpretation of fast-changing phenomena, frequently unforeseen, to interact with their environments and try to achieve the intended targets. Nowadays, it is in the interface with the larger environmental system that, too frequently, the strategic management must decodify and make sense of volatile, uncertain, complex and ambiguous data and information to assure organisational success.

This problem emerged and was addressed a few decades ago in the context of a traditional hierarchical organisation, and since then has been treated by practitioners and scholars under the umbrella of the acronym VUCA (volatility, uncertainty, complexity and ambiguity).

The acronym was coined by the US Army War College in the late 1990s. It is a military-derived acronym to describe the "multipolar new world order" after the end of the Cold War era. It was later applied to the business environment to describe chaotic, unstable and rapidly changing work settings (Lawrence, 2013, p. 3). Since the birth of the acronym VUCA, it has also been used to describe the contemporary strategic environment (Johansen and Euchner, 2013), as it encompasses technological changes, global economic conditions, unstable financial markets and consumer behaviour. In the business world, VUCA gained more salience after the 2008 global financial crisis and refers to the unstable and chaotic business, economic and physical environment that everyone faces every day (Sullivan, 2012). Since 2020, the Covid-19 pandemic has increased its relevance in describing the main facets of the environment for most organisations.

Volatile environments are places where many things change rapidly, but there is no predictable trend or repeatable pattern (Sullivan, 2012). *Uncertainty* can be defined as "a term used to describe a situation characterised by a lack of knowledge, not as to cause an effect but rather about whether a certain event is significant enough to constitute a meaningful cause" (Bennett and Lemoine, 2014, p. 314). Volatile and uncertain situations differ from one another. Although change is more likely in volatile conditions, it may occur rapidly and in varying magnitudes. Nevertheless, there may be no inherent change in an uncertain situation (Bennett and Lemoine, 2014, p. 314). A *complex* situation is characterised

by many interconnected parts, making it difficult to understand the reasons and factors in a problem (Sullivan, 2012). When a situation is complex, it might not necessarily be volatile or uncertain. *Ambiguous* situations can be defined as one in which the causes and the "who, what, where, when, how and why" behind the causes and events are difficult to identify (Sullivan, 2012). Ambiguity is also about the reality's haziness and the ambiguous interpretations of many situations. Ambiguity is not equal to volatility; however, there is no reason to expect a rapid, unpredictable or unstable change in ambiguity. This also differs from complexity. There are not many moving or unstable parts here either. There is simply a lack of information about what will happen next, and this lack of information is different from uncertainty. In an uncertain situation, a person may have an idea of what causes the uncertainty.

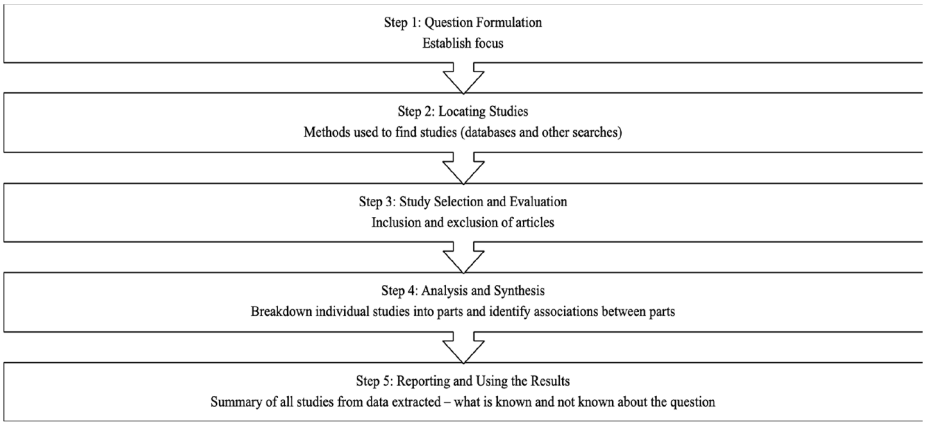
In recent years, organisations have faced large and unexpected events, such as financial crises, the Covid-19 pandemic, climate change and war, with a large impact on the world at several economic and societal levels, and the acronym VUCA has been frequently used by scholars and practitioners to try to understand such environmental dynamics (Bennett and Lemoine, 2014; Codreanu, 2016; Du and Chen, 2018). However, it is not unusual to find some overlap regarding the meaning of its components, as well as poor definitions of each one and the relationships between them, which may undermine the accuracy of the VUCA acronym to categorise and interpret the information from the environment, as well as its usefulness to adaptive decisions and actions at the strategic and operational levels of the organisation. To better understand what people are saying when they are talking about VUCA and to apply it more effectively in business, it is important to know the specific meanings of its components. Therefore, we conducted a systematic review with the main aim of clarifying the definitions of the elements of the acronym VUCA. As a key contribution to the literature, this paper clarifies the different features of VUCA by comprehensively mapping the constructs involved.

Research methodology: a systematic review of the VUCA literature

A methodological and objective way to develop information more profoundly about a particular subject is by conducting a systematic literature review (Briner and Denyer, 2012). Literature reviews adhere to a strict set of criteria and use a procedure that is transparent, repeatable and scientific (Tranfield *et al.*, 2003), increases internal validity and achieves transparency using an auditable procedure (Booth *et al.*, 2012). Conducting a systematic literature review allowed us to obtain robust findings through an evidence-informed approach based on rigor in terms of selection criteria, analyses and reporting (Denyer and Tranfield, 2009). We undertook this systematic literature evaluation to improve methodological rigor, replicability and communication about the fragmented body of research on VUCA. Denyer and Tranfield (2009) suggested five steps for conducting systematic reviews, which were followed in the paper (Figure 1).

Question formulation

The systematic review's initial stage was to identify the study's scope (Booth *et al.*, 2012; Rothman *et al.*, 2019), as well as to minimise ambiguity by defining and framing the review question (Rousseau *et al.*, 2008), as mentioned previously. A conceptual definition of VUCA was sought specifically by studying the existing literature and creating a thorough framework via a concept map. So, the aim is to answer the following review question: to inform research and practice, how might the constructs of the acronym VUCA be defined?



Source: Denyer and Tranfield (2009)

Figure 1.
Steps for conducting a systematic literature review

Locating studies

This phase entailed scanning relevant papers and selecting and evaluating relevant contributions to the original query (Denyer and Tranfield, 2009). To reduce bias and cover a wide range of sources, several Web databases were examined. The literature review was done using EBSCO (Academic Search Complete and Business Source Complete), Emerald, Science Direct, ABI/Inform Global, Web of Knowledge and Wiley Online, among other library databases. Similar researchers have used these datasets because they are large and freely available at academic institutions (Tukamuhabwa *et al.*, 2015). "Volatility", "uncertainty", "complexity" and "ambiguity" were chosen as search criteria. These terms were used to create search strings that included a Boolean connector: "AND" (Table 1). The investigations were to be located between 1999 and 2021. This process resulted in the identification of a total of 833 potentially relevant studies available up to January 2021. However, most of them were practitioner papers, not scientific papers. VUCA is a buzzword and has been frequently used by managers in practitioner papers and journals. This may explain the rarity of scientific papers about VUCA. As a result, after reading the abstracts of

Inclusion criteria	Rationale
Published in peer-reviewed journals	Peer-reviewed journals were considered to be of higher quality than non-peer-reviewed articles
Selection of papers published 1999–2021	The year 1999 was selected as a starting point because of the emergence date of studies on VUCA
Elements of VUCA were addressed within the context of work domains as this is one of the focuses of the paper	The aim of the review was to analyse and map the different features of VUCA to improve conceptual clarity and understanding
Published in the English language	English was the dominant language in the field
Inclusion of all the components of VUCA	The focus was on the acronym, so the four components (volatility, uncertainty, complexity and ambiguity) should be considered
Different types of articles considered (e.g. empirical, literature review, conceptual)	The focus of the study was to evaluate and synthesise the various constructs inherent to the acronym VUCA

Table 1.
Inclusion criteria for the systematic literature review of VUCA

these studies, 643 were excluded from a further review step because of their duplication, irrelevancy or failure to include all components of VUCA and the criteria of interest for this study. After excluding these papers, 190 studies remained to review for inclusion in this review. The introduction and the conclusion of these papers were read to determine their relevance, after which 164 papers were excluded, and 33 papers remained for the next step of screening. Full document screening was applied to all remaining papers and 26 papers were chosen for this study.

Study selection and evaluation

To ensure that this procedure was transparent, we used explicit selection criteria to assess the relevance of studies to our research issue (Booth *et al.*, 2012). The first screening, which involved reading the titles and abstracts of each item selected, was done using a list of inclusion criteria (Table 1). At this point, 833 papers had been screened. Articles that failed to match the inclusion requirements were irrelevant to the issue, and duplicates were eliminated. The remaining 186 publications were identified as possible candidates for evaluation. The preliminary list was further examined in the second screening by reading the introduction and conclusion of each paper to determine their relevance. This screening resulted in the exclusion of 163 papers because of their lack of relevance to the topic.

Following the two screenings, a total of 33 papers were selected for complete document screening. Each paper was thoroughly reviewed and examined considering the research question. Quality criteria were also used to ensure that the paper's rationale, methodology, execution, methodological rigor and addition to knowledge were all in line with the objective of this study (Miles and Huberman, 1994). The two screenings resulted in a total of 26 papers undergoing full document screening. Each paper was read in its entirety and analysed concerning the research question. Further, quality criteria were applied to check the alignment of the paper's rationale regarding the topic, methods and execution, methodological rigor and contribution to knowledge (Miles and Huberman, 1994).

We only selected papers published in peer-reviewed journals based on the Scimago database. The final review included a total of 26 papers.

Criteria for inclusion

For a study to be included in this paper, there were some inclusion criteria to be met. First, the study had to include all the components of VUCA: volatility, uncertainty, complexity and ambiguity. Second, various types of papers (conceptual, empirical, literature review, etc.) were considered. Third, only papers that were published between 1999 and 2021 were chosen. Fourth, the components of VUCA were addressed within the context of work domains. Lastly, the language of the papers was English.

Analysis and synthesis

The purpose of this step was to examine and synthesise the 26 papers chosen to obtain new knowledge and insights about the topic that could not be gained by reading each article separately (Denyer and Tranfield, 2009). Each study was broken down into the different features of VUCA, and the analysis was completed by inserting a summary of each of the 26 papers into a Microsoft Excel spreadsheet. The data collected offered a tabulation of all the research papers included in the study, as well as a detailed description of VUCA, which aided in the classification of themes and synthesis. The synthesis was carried out by making connections between the structures that make up the acronym VUCA.

There were several ways used to synthesise the outcomes of the systematic literature review, including aggregation, integration, interpretation and explanation (Rousseau *et al.*, 2008).

Because of the varied nature of the papers reviewed, we adopted an integrative technique. The study discovered 39 critical elements that appear to describe VUCA after analysing and synthesising the literature. Nine constructs emerged concerning volatility and ten for uncertainty. Eight constructs were found to underlie complexity and 12 constructs characterise ambiguity.

The conceptual and operational definitions of each VUCA component were reviewed using MAXQDA, a qualitative data analysis software.

Reporting and using the results

This stage summarised the findings from all the studies chosen, their relationships and what is known about VUCA (Denyer and Tranfield, 2009). The synthesis that followed was an informed evaluation of the scientific data about the study question, as well as the gaps discovered during the review process (Rousseau *et al.*, 2008). The findings on the current state of VUCA studies, as well as the conclusions relating to the three sub-questions, are presented in the following section.

Results

To comprehensively answer the first sub-question, the definitions of VUCA were examined. Then, to answer sub-question 2, we investigated the fundamental aspects that define each VUCA dimension. Finally, by including the VUCA components identified in this analysis, a holistic model was presented to improve conceptual clarity. A concept-mapping framework was used to show the model, which visually illustrated the links between the components.

Descriptive analysis

According to the criteria, the first paper found to address the acronym VUCA was developed by Bodenhausen and Peery in 2009. Figure 2 shows that most VUCA papers were published between 2017 and 2021, providing evidence for the recently growing body of literature and the importance of VUCA in organisational settings.

The papers were published in high-ranked journals covering areas such as business, management and accounting (Table 2). The range of the journals' research themes within those broad categories reflects the topic's multidisciplinary nature and the growing interest it is receiving from diverse research communities.

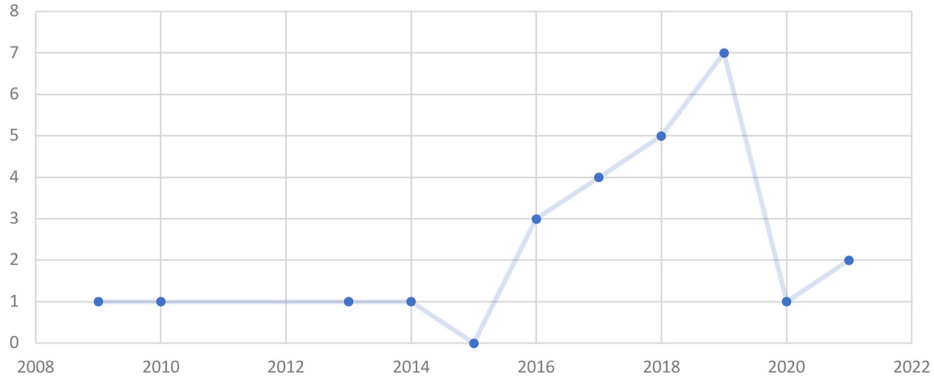


Figure 2.
Number of papers on VUCA 1999–2021

Journal	No. of papers published
Journal of Global Mobility	1
Medical Writing	1
Business Horizons	1
Social and Personality Psychology Compass	1
Corporate Communications: An International Journal	1
Arch Pathol Lab Med	1
SIAM Journal Control Optimization	1
Foresight	1
Technological Forecasting and Social Change	1
The TQM Journal	1
Transforming Government: People, Process and Policy	2
European Journal of Innovation Management	1
KIIT Journal of Management	1
Journal of Open Innovation Technological Market and Complexity	1
Effective Executive	1
International Journal of Public Leadership	1
European Journal of Futures Research	1
Development and Learning in Organizations	1
ASBM Journal of Management	1
Training Journal	2
Organization Development Review	1
European Journal of Teacher Education	1
Vaccines	1
International Journal of Production Research	1

Table 2.
Number of articles published in academic journals

Analysis of the definitions of VUCA

Change has been considered one of the fundamental attributes of VUCA environments (Saleh and Watson, 2017). The acronym VUCA appears to offer a way to understand the dynamic and constant change that characterises the world nowadays (Hernández-Santibánez and Mastrolia, 2019). Table 3 illustrates the diversity of the definitions of VUCA in the studies selected from the literature review. The analysis of the definitions identified several constructs underlying the acronym VUCA, which were analysed, synthesised and interpreted in the following sections. The results clarified how each component overlaps with and diverges from the others.

Volatility. The first construct related to the first idea of VUCA is volatility, which covers the constant change of the world (Billiones, 2019). To examine this, the constructs and ideas that characterise it in each definition were highlighted. Themes such as change (33), uncertainty (11), unpredictability (11), dynamics (10) and instability (7) were used to characterise volatility (Table 4). Moreover, volatility appeared to be associated with the disruption of trends (5), daily fluctuations (4), inherent to the volatile world (2) and unexpected occurrences (2). However, as Warwick-Ching (2013) noted, volatility provided the opportunity for profit (1) (Geysi *et al.*, 2019; see Figure 3).

Uncertainty. Uncertainty was the second construct studied. The "U" in the acronym VUCA stands for "unpredictability", or the inability to predict situations and incidents (Lawrence, 2013). This appeared to be associated with the unpredictable nature of the future (Bader *et al.*, 2019) and modern life (Billiones, 2019) (22). Uncertainty has also been characterised as the lack of information about the outcomes (12) (Bader *et al.*, 2019) and the mechanisms of change that were not only unpredictable but also unknown (9) (Bodenhausen and Peery, 2009). As Welbourn (2015) emphasised, it was the lack of knowledge about a

Table 3. Definitions of VUCA

Authors	Volatility	Uncertainty	Complexity	Ambiguity
Andrade *et al.* (2021)	Volatility: a volatile business environment is one that has extreme and rapid fluctuations	Uncertainty: an uncertain business environment is one in which there is no knowledge about situations or events, especially about their causes and their effects on relationships. This results in an unpredictable future, which affects the long-term growth of this organisation	Complexity: a complex environment arises naturally with rapid industrialisation, due to the need to interconnect sectors, networks and procedures in the organisation	Ambiguity: in an ambiguous environment, there is confusion about a situation or event and there is a diversity of potential results, so the result cannot be clearly described
April and Chimenya (2019)	Volatility denotes a situation or challenge that is unstable and unpredictable, but not necessarily involving a complex structure or lack of knowledge (Bennett and Lemoine, 2014), and is characterized by the nature, speed, volume, magnitude and dynamics of change of a situation that may be unpredictable (Horney *et al.*, 2010; Raghuramapatruni and Kosuri, 2017)	Uncertainty refers to situations that are characterized by lack of knowledge of whether an event is significant enough to have a meaningful cause (Bennett and Lemoine, 2014). Milliken (1990) defines uncertainty as "an individual's perceived inability to predict something accurately"	Complexity refers to a situation or challenge that is characterized by many interconnected parts and variables – complex situations involve confounding issues and the chaos associated with such issues (Raghuramapatruni and Kosuri, 2017)	According to Curley *et al.* (1986, p. 230), ambiguity "is characterized as uncertainty about the probabilities with which outcomes occur." Dequech (2000, p. 45) seems to agree with the definition, and defines ambiguity as referring "to a situation in which there is uncertainty about probabilities and this uncertainty is due to lack of information". According to Weick (1995), ambiguity refers to situations in which more than one interpretation exists. This is closely related to the definition offered by Bennett and Lemoine (2014) who believe that ambiguity is characterized by doubt over the nature of cause-and-effect relationships
Bader *et al.* (2019)	Volatility refers to the nature, magnitude and speed of	Uncertainty refers to the extent to which one can confidently	Complexity refers to the number of factors that one	Ambiguity is manifested by a lack of clarity and the

(*continued*)

Table 3.

Authors	Volatility	Uncertainty	Complexity	Ambiguity
	change that occurs within a company's internal and external environments	predict the future. In other words, even though the basic cause and effect of a situation is known, there is a lack of information about the outcome and also the mechanisms of change are unknown and often unpredictable	needs to take into account, their variety and the relationships among them	difficulty in understanding exactly what the situation is. This means that causal relationships are not completely clear and professionals of global mobility cannot rely on past experiences
Bello and Campbell (2019)		Uncertainty means that we know cause and effect, but don't have other information (Bennett and Lemoine, 2014)		
Bennett and Lemoine (2014)	1) Relatively unstable change; information is available, and the situation is understandable, but change is frequent and sometimes, unpredictable. 2) "Volatility provides profit opportunity" (Warwick-Ching, 2013)	1) A lack of knowledge as to whether an event will have meaningful ramifications; cause and effect are understood, but it is unknown whether an event will create significant change. 2) "Uncertainty is opportunity" (Hemingway and Marquart, 2013)	1) Many interconnected parts forming an elaborate network of information and procedures; often multiform and convoluted, but not necessarily involving change 2) "Simplifying IT complexity [is] a major opportunity" (Boston Consulting Group, 2013, as cited in Bennett and Lemoine, 2014)	1) A lack of knowledge as to "the basic rules of the game"; cause and effect are not understood and there is no precedent for making predictions as to what to expect. 2) "Ambiguity equals opportunity" (Amerasia Consulting Group, 2013, as cited in Bennett and Lemoine, 2014)
Billiones (2019)	Volatility comes from constant and rapid change	Uncertainty comes from the unpredictable nature of modern life	Complexity is seen in the multiple interconnected confounding issues we are faced with each day	Ambiguity is evident in today's mixed reality – a convergence of physical and virtual worlds
Bodenhausen and Peery (2009)	Volatility (a dynamically changing social context)	1) Uncertainty exists when relevant information is unavailable and thus unknown. 2) Uncertainty (missing information)	Complexity (multiple, potentially relevant dimensions)	1) Ambiguity exists when relevant information is available, but the meaning of it is unclear. 2) Ambiguity (multiple possible interpretations of the information available)

(*continued*)

Table 3.

Authors	Volatility	Uncertainty	Complexity	Ambiguity
Clayton (2016)	Volatility implies rapid change and instability of the current situation	Uncertainty results from poor knowledge of our situation and, particularly, of what may happen	Complexity arises from the multiplicity of interconnections between often-simple systems	Ambiguity arises when we cannot make sense of inter-relationships, meaning or motivations
Gandhi (2017)	In a more volatile world, periods of stability can seem like a thing of the past. Instead we have more instability, wider fluctuations and often very rapid and unexpected change	With so much volatility, not only is the future unlikely to be much like the past, but the present is often very different too	Uncertainty is amplified still further by complexity	Unknowns abound in complex, uncertain and volatile environments, and so ambiguity increases
Geysi *et al.* (2019)	The "volatile" nature of the world is reflected by the increasing speed and extreme nature of change, and the greater unpredictability of its causes	The lack of ability to forecast the long term or to predict the potential effects of events is called uncertainty. Uncertainty necessitates preparedness for the unexpected		
Hadar *et al.* (2020)	Volatility (the nature, speed, volume magnitude and dynamics of change)	Uncertainty (the lack of predictability of issues and events)	Complexity (the confounding of issues and surrounding factors)	Ambiguity (the haziness of reality and the mixed meaning of conditions)
Hartley (2018)	Volatility concerns the nature, speed, volume and magnitude of change, which may change rapidly and suddenly	Uncertainty concerns the difficulties of predicting what may happen and what may be the effects of that change on organisations and individuals	Complexity addresses the inter-relatedness of dynamics and processes across a whole system, with emergent properties, not only those which are planned (Uhl-Bien *et al.*, 2007)	Ambiguity concerns the difficulties of coming to a clear view or clear meaning of events, with instead a variety of interpretations and sense-making (Denis *et al.*, 1996; Baran and Scott, 2010)
Heinonen *et al.* (2017)	"Volatility" describes the increased dynamics in many fields characterized by "changing directions of change", by a high frequency of ups and downs, by more rapid disruptions of trends	"Uncertainty" indicates a fundamental condition that decision makers have met in all ages	"Complexity" implies that there is a multitude of qualitatively different factors or elements that interact in many different ways	"Ambiguity" describes the difficulties to understand and interpret novel, emergent or simply unusual phenomena, to make sense of them, to draw conclusions

(*continued*)

Table 3.

Authors	Volatility	Uncertainty	Complexity	Ambiguity
Hernandez and Allen (2013)	"[t]he nature and dynamics of change, and the nature and speed of change forces and change catalysts"	"[t]he lack of predictability, the prospects for surprise, and the sense of awareness and understanding of issues and events"	"[t]he multiplex of force, the confounding of issues[,] and the chaos and confusion that surround an organization"	"[t]he haziness of reality, the potential for misreads, and the mixed meanings of conditions; cause-and-effect confusion"
Hernández-Santibánez and Mastrolia (2019)	The notion of volatility is at the heart of mathematical finance, where unstable properties of financial products, such as prices, are modeled through the presence of noise in their dynamics	Uncertainty is the lack of knowledge for an active agent, due to information asymmetries between him/her and the other parts involved	Complexity holds when several interconnected entities interact, leading to issues whose solutions are not obvious at first sight	
Horstmeyer (2019)	Volatility is reflected in the increasing size, nature and amount of change as well as the accelerating pace of organizational change	Uncertainty refers to the inability to predict issues and events	Complexity refers to the general state of interacting forces and chaos at play in the organization	Ambiguity concerns difficulty in teasing out issues, the haziness of reality and the multiple possible interpretations of the conditions affecting companies
Kaivo-oja and Lauraeus (2018)	It means the nature, speed, volume and magnitude of change do not have a predictable pattern (Lawrence, 2013; Sullivan, 2012)	The "U" in the acronym VUCA stands for uncertainty, or the lack of predictability of issues and events (Lawrence, 2013; Kingsinger and Walch, 2012)		Ambiguity is the lack of clarity about the meaning of an event (Caron, 2009, as cited in Kaivo-oja and Lauraeus, 2018), or, as Sullivan (2012), Lawrence (2013) wrote, the "causes and the 'who, what, where, how, and why' behind the things that are happening (that) are unclear and hard to ascertain". Col. Eric G. Kail defined ambiguity in the VUCA model as the "inability to accurately conceptualise threats and opportunities

(*continued*)

Table 3.

Authors	Volatility	Uncertainty	Complexity	Ambiguity
				before they become lethal" (Lawrence, 2013; Kail, 2010)
Pandit *et al.* (2018)	Volatility relates to speed, magnitude and dynamics of change	Uncertainty is the lack of predictability of events and issues	Confounding issues faced by an organization (military or otherwise) lead to complexity	Ambiguity is the lack of clarity about conditions faced by the organization (Horney *et al.*, 2010)
Robbins (2018)	Volatility indicates chaos, where reliable prediction is impossible and where change is regular and substantial	Uncertainty refers to the difficulty in interpreting coherent patterns in the change (Ibid)	By complexity is meant the complex ecosystem of moving parts in any market. It describes iterations of simple patterns [9] combined in a labyrinth of overlaps and loops making it difficult to decipher the signal from the noise [8]	Ambiguity refers to our lack of capacity to read the signals from markets or consumers with any clarity, certainty or accuracy
Saleh and Watson (2017)	Volatility: the pace of the change in the business environment (Swarbrick and Stearman, 2012), the volume of the change (Horney *et al.*, 2010; Swarbrick and Stearman, 2012), its magnitude and hence the degree of turbulence it creates (Horney *et al.*, 2010; Welbourn, 2015)	Uncertainty: the lack of knowledge about a situation or an event, especially about its cause and effect relationship (Bennett and Lemoine, 2014a); hence, the future cannot be predicted confidently (Horney *et al.*, 2010; Shaffer and Zalewski, 2011; Welbourn, 2015) and the development of long-term strategic decisions is difficult (Rodriguez and Rodriguez, 2015)	Complexity: the interconnected parts, networks and procedures within the organization and with the external business environment (Bennett and Lemoine, 2014a; Rodriguez and Rodriguez, 2015), which might even be unidentifiable and/or contradict each other (Shaffer and Zalewski, 2011)	Ambiguity: the confused options presented by a situation or event (Horney *et al.*, 2010) and the diversity of potential results (Swarbrick and Stearman, 2012) in which the outcome cannot be clearly described (Swarbrick and Stearman, 2012)
Schulze *et al.* (2021)	"Volatility" is characterized by frequent and unpredictable changes	"Uncertainty" refers to the lack of knowledge as to whether an event will result in a significant change	"Complexity" is the presence of an interconnected and convoluted network of information and procedures	"Ambiguity" is defined as the inability to understand cause and effect
Sharif and Irani (2017)	Where there is a rate of change itself	Where there is a lack of clarity about present and future outcomes	Where there are multiple and competing decision factors	Where there may be a multiplicity of meanings and significance

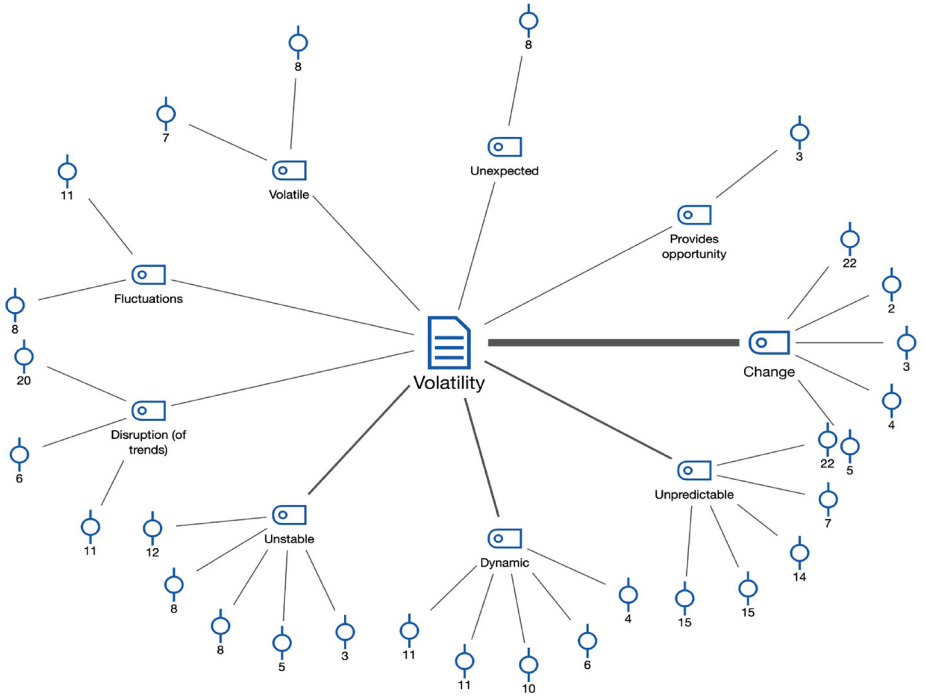
(*continued*)

Table 3.

Authors	Volatility	Uncertainty	Complexity	Ambiguity
Sturmberg (2010)	Volatility – the rate of change. Volatility refers to the nature and dynamics of change, the nature and speed of the forces of change, and the nature of change catalysts	Uncertainty – lack of clarity about the present situation and future. Uncertainty alludes to the lack of predictability, the prospects for surprise and the sense of awareness and understanding of issues and events	Complexity – the multiplicity of key decision factors. Complexity denotes interconnectedness, resulting from the multiplex of forces, the confounding of issues and the chaos and confusion that surround an organization	The lack of clarity about the meaning of an event. Ambiguity conveys the haziness of reality, the potential for misreads and the mixed meanings of conditions; and is associated to cause-and-effect confusion
Sucharita (2016)	Volatility – as the pace and volume of change is relentless in one's life-time	Uncertainty – regarding one's future performance, even when the present situation is stable	Complexity – in the different environment we pass through, with host of decision variables and stakeholders	Ambiguity – of choice of source, means and methods, for achieving the desired outcome
Ungureanu *et al.* (2018)	Volatility refers to the rate and unpredictability of change in an organization's environment over time, which creates doubts about the future conditions of the organization	Uncertainty refers to a lack of knowledge as to whether an event will create meaningful change, even when the cause and effect mechanisms are clearly understood	Complexity refers to many interconnected parts forming an elaborate network of information and procedures that are difficult to manage	Ambiguity refers to a lack of knowledge as to the basic rules of the game and to a lack of precedent for making predictions as to what to expect (Bennett and Lemoine, 2014a, b)
Webb (2016)	Volatility is about the nature and dynamics of change, and the nature and speed of change forces and change catalysts	Uncertainty is about the lack of predictability, the prospects for surprise and the sense of awareness and understanding of issues and events	Complexity is about the multiplex of forces, the confounding of issues and the chaos and confusion that surround these	Ambiguity is about the haziness of reality and the mixed meanings of various conditions and circumstances

	n
Volatility	
Change	23
Unpredictable	8
Dynamic	6
Unstable	6
Uncertainty	
Unpredictable	13
Lack of information	10
Unknown	6
Complexity	
Quantity of factors to analyse	14
Relations between factors	13
Confounding	7
Chaos and confusion	6
Ambiguity	
Inability to understand/interpret	11
Lack of clarity	10
Multiple interpretations	8
Uncertainty	7
Confounding	5

Table 4.
Main words associated with each component of VUCA



Note: "⌖" means the number of times they are identified in our review. "▬" means that they are the most common terms related with volatility

Figure 3.
Conceptual analysis of volatility*

situation or an event, especially about its cause-and-effect relationship (Bennett and Lemoine, 2014) (5), which enhanced the prospects for surprise (3) (Hernandez and Allen, 2013). Lastly, in spite of its unexpectedness (2), this construct might be seen positively as it provides opportunity (2) (Hemingway and Marquart, 2013). Uncertainty was also associated with the construct of volatility (1) (Bader *et al.*, 2019) (Figure 4).

Complexity. The "C" in the acronym VUCA was associated with the organisation's interconnected parts, networks and procedures, as well as the external business environment (Bennett and Lemoine, 2014; Rodriguez and Rodriguez, 2015), which could be unidentifiable and/or contradict each other (Shaffer and Zalewski, 2011). We ascertained that complexity was mostly associated with the quantity of factors needed to analyse (16) and with the relations between them (22). Similarly, Billiones (2019) emphasised that complexity was seen in the multiple interconnected confounding issues we faced each day. Thus, the confounding nature of the elements that individuals had to deal with (8) and the chaos and confusion that arises (9) create complex (7) and multiform environments (5), with a variety of factors to analyse (4). Complexity also appeared to be a cause of the U in the acronym VUCA (uncertainty) (9) (Figure 5).

Ambiguity. As defined by both Sullivan (2012) and Lawrence (2013), ambiguity is the "causes and the 'who, what, where, how, and why' behind the things that were happening (that) are unclear and hard to ascertain" and describes the lack of clarity about the meaning of an event (Caron, 2009, as cited in Kaivo-oja and Lauraeus, 2018). It was previously defined

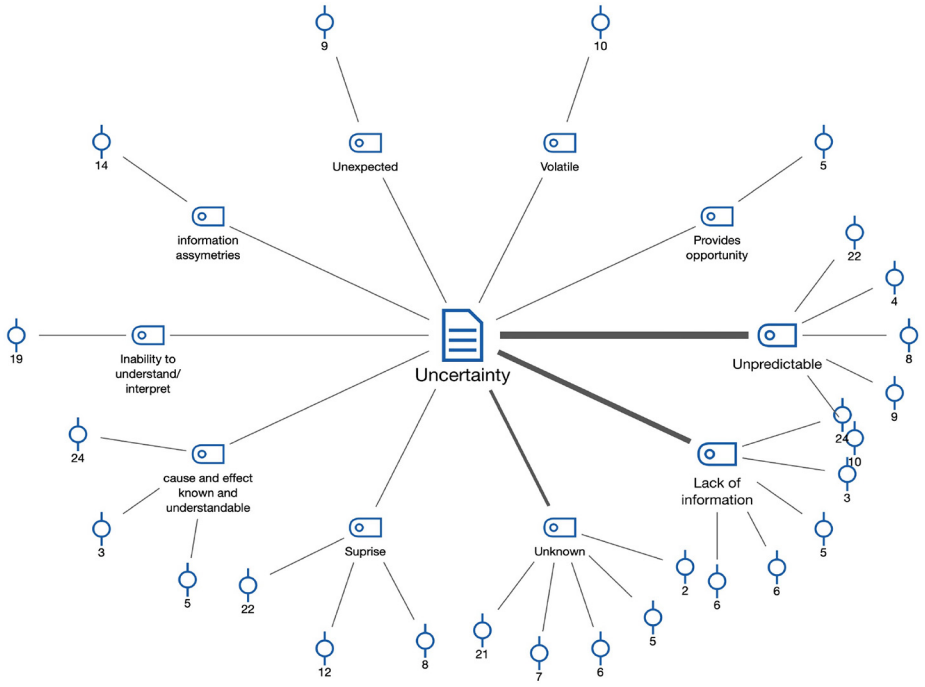
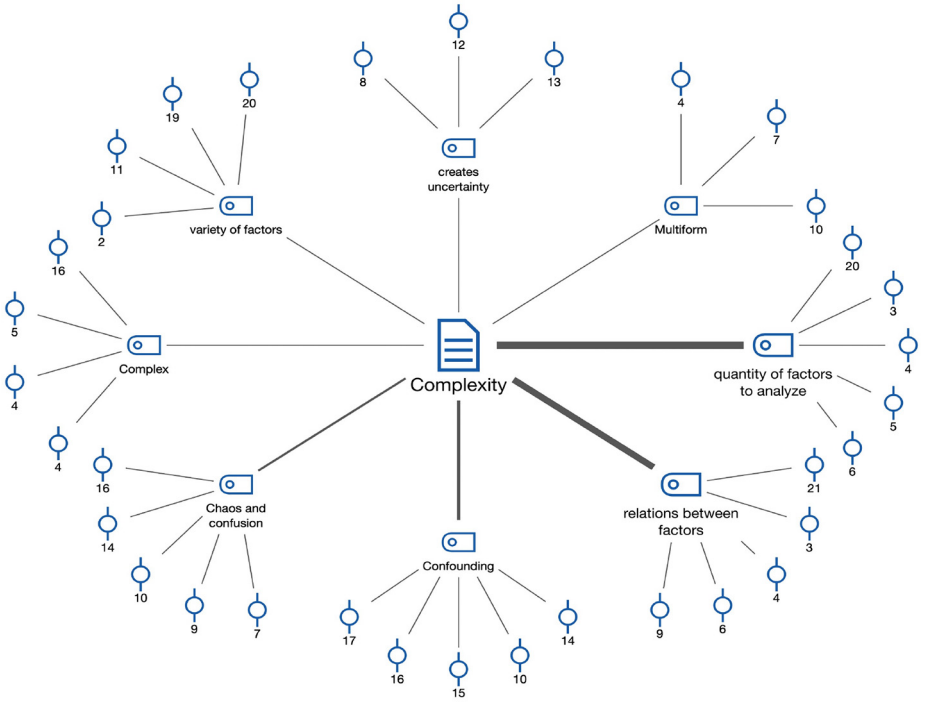


Figure 4.
Conceptual analysis of uncertainty*

Note: "⏀" means the number of times they are identified in our review. "▬" and that they are the most frequent terms related with uncertainty



Note: "⏀" means the number of times they are identified in our review. "▬" means that they are the most common terms related with complexity

Figure 5.
Conceptual analysis of complexity*

as an "inability to appropriately comprehend threats and opportunities before they become fatal" (Lawrence, 2013). Ambiguity was also associated with the inability to understand/interpret conditions or events (17), the lack of clarity (17) and, as a result, the potential multiple interpretations each event/condition may have (15). Furthermore, it has also been associated with uncertainty (9) and volatility (3) and was contextualised by complexity (2). Studies identified its relationship with the confounding nature of the multiple meanings that events may have (7), and with a lack of information to interpret them (4). The unpredictable nature of events was also associated with ambiguity (3), as well as its unexpectedness (1) and unknown meaning (1). Notwithstanding, in spite of the negative visions of ambiguity, it might equally be seen as an opportunity (1) (Bennett and Lemoine, 2014) (Figure 6).

Table 4 summarises the main words associated with each construct of VUCA derived from the literature review.

Synthesis and discussion

The primary aim of this review was to conduct a literature review and create a conceptual map of VUCA to elucidate the precise meaning of each component and how it may overlap with others. In total, 26 papers were analysed out of the 833 related papers to achieve this aim. Overlaps were indeed found among the components of VUCA. Certainly, the individual components of VUCA were not always disruptive on their own, usually existing in some

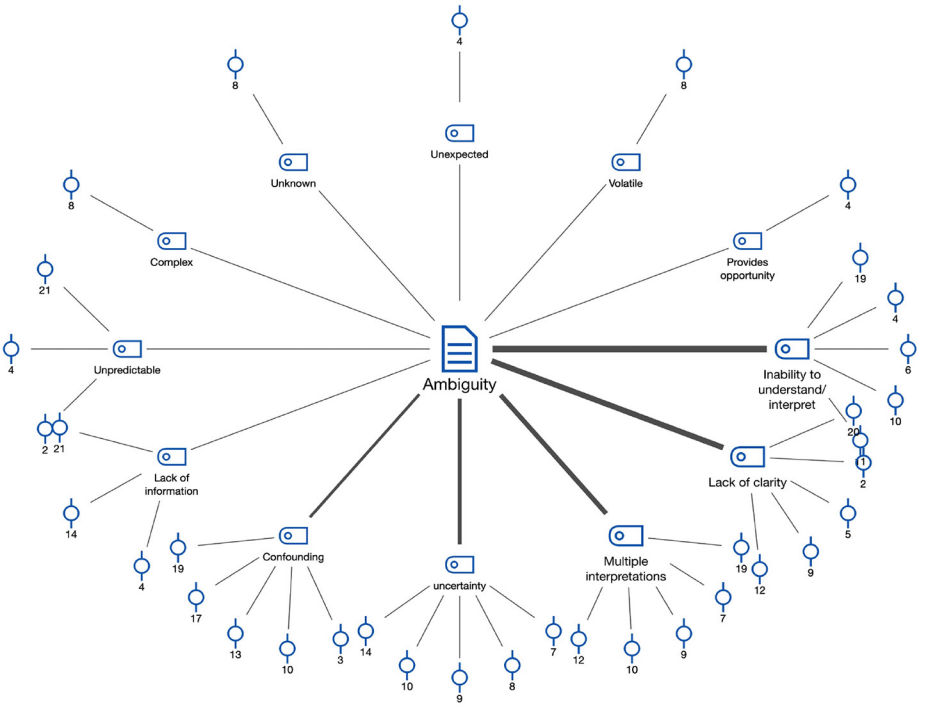


Figure 6.
Conceptual analysis of ambiguity*

Note: "⏀" means the number of times they are identified in our review. "▬" means that they are the most common terms related with ambiguity

combination. For example, a market for new products can be both volatile and ambiguous, or expanding into a new region during a period of major governmental change can be both complex and uncertain (Bennett and Lemoine, 2014, p. 317). Therefore, the distinctions between volatile, uncertain, complex and ambiguous business environments are not separated by a clear line (Loyd, 2015). The results showed that uncertainty was associated with the construct of volatility, complexity appeared to be a cause of uncertainty and ambiguity was mostly associated with uncertainty, whereas volatility appeared as a result of complexity. Thus, when researchers discuss one construct, it is not always clear what they are talking about. For example, when a researcher is talking about ambiguity, they might be referring to uncertainty, volatility or complexity. Therefore, when the components of VUCA are discussed, people might not be talking about the same thing because there has been no clear distinction between components. Thus, trying to investigate the same components by referring to different things can be very misleading.

In Figure 7, we present a picture of the meanings more commonly associated with each construct, without any overlap, that may increase managers' accuracy in dealing with tough environments. The conceptual map shows that, overall, volatility was mainly found to be linked to *change*; uncertainty was mostly related to the *unpredictable nature of events*; complexity was associated with the *quantity of factors and their multiple relations*; and ambiguity appeared to be the result of the *inability to understand and interpret the meaning*

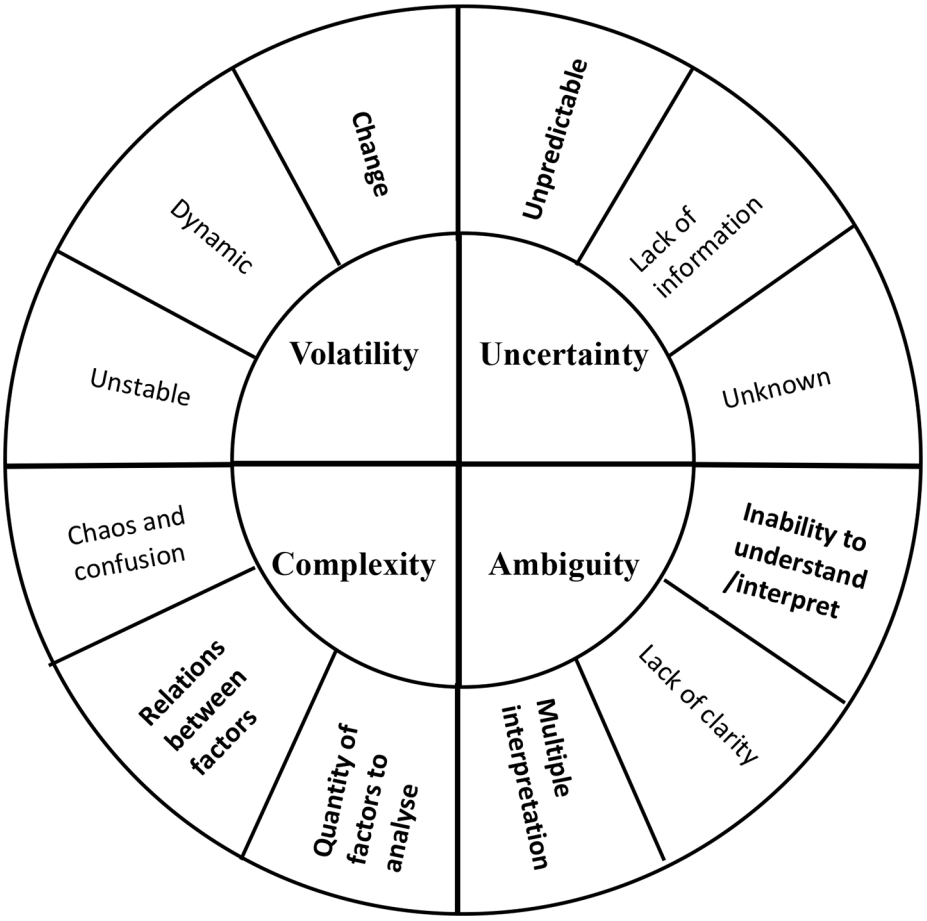


Figure 7.
Conceptual map of the acronym VUCA

of what happens (either for the lack of clarity or the multiple interpretations that it may derive). Thus, this study has shed some light regarding the meanings of the components and their specificities.

Strengths and limitations

The current review has several strengths. To begin with, to the best of the authors' knowledge, this is the first study to systematically review the acronym VUCA. Furthermore, this is the first study to create a conceptual map to analyse the overlaps of the components of VUCA. We conclude that there is no clear distinction among the constructs, and they do overlap with each other. Overall, the present review provides a sound basis for future studies.

In spite of the positive features of this paper, the present review has several limitations. Because of the exploratory character of the study and the role of the concept-mapping framework, we are unable to evaluate the model's indicated links empirically. The research is unique in that it uses a thorough concept-mapping methodology to classify distinct VUCA

components and build linkages and interactions between them. Moreover, there are a few empirical and experimental studies exploring VUCA. Therefore, we cannot draw a cause-and-effect relationship, namely, the impact the use of the VUCA framework has had on businesses.

Implications for research and practice

The conceptual map of VUCA, presented in the current review, might serve as a guide for future research and practice. An essential next step could be to propose a model of VUCA. Summarising what is known about the antecedents and consequences of VUCA on business performance might highlight some avenues for future research. This paper provides a conceptual map to the researchers, and with this conceptual map, they can see the "big picture" and have a better understanding of visualising the relationships. Another important next step could be to investigate the role of VUCA constructs in strategic decision-making. Are they clear, useful, insightful and applicable? Do they provide direction for action (namely, strategic action)? A better understanding of each component of the acronym may be useful for managers dealing with rapidly changing environments. Furthermore, it may be beneficial to investigate how to cope with VUCA and deal with the negatives of living through turbulent times. Lastly, our findings make an essential contribution to the literature by clarifying the components of VUCA, so, in future studies, researchers can separate the components more clearly and reach reliable results. The conceptual map may enable managers to more easily decodify environmental dynamics and improve their strategic decisions.

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Further reading

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