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Articles scientists

A theoretical definition of management managerial critical thinking and its rational transversality to managerial skills

Una definición teórica del pensamiento crítico gerencial y su transversalidad racional a las habilidades gerenciales

Uma definição teórica do pensamento crítico gerencial e sua transversalidade racional às habilidades gerenciais

De los Santos de Dios Santiago

Universidad Juárez Autónoma de Tabasco, México

santiago.delossantosdedios@ujat.mx

<https://orcid.org/0000-0003-0685-3250>

De los Santos de Dios Raquel Olivia

Universidad Popular de la Chontalpa, México

raquel.delossantos@upch.mx

<https://orcid.org/0000-0002-1341-657X>

Mazó Quevedo María Lysette

Universidad Popular de la Chontalpa, México

mlmazoquevedo@upch.mx

<https://orcid.org/0000-0001-9174-3704>

Abstract

The advancement of technology in computing and telecommunications has intensified market and organizational complexity. The aim of this paper is to propose an operational definition of managerial critical thinking based on economic rationality. The methodology involved summarizing the definitions of managerial critical thinking from various authors in the context of business. A map of common aspects was created to extract core concepts, which were then compared with the propose definition. The results are consistent with the proposed definition, except for the concept of “skill”, as managerial critical thinking is a

“capability” enhanced by logical-mathematical knowledge. This study concludes that the characteristics of managerial critical thinking are transversality and recursivity, which allow the continuous synthesis of managerial skills. The immediate and final effect can be summarized by communication skill. It is recommended that companies leverage critical activities to shift paradigms and that constrain them in the face of that make them vulnerable to unpredictable market changes.

Keywords: Critical thinking, logical-mathematical knowledge, managerial skills, rationality.

Resumen

El avance de la tecnología informática y de las telecomunicaciones ha intensificado la complejidad del mercado y de las organizaciones. El objetivo fue proponer una definición operativa del pensamiento crítico gerencial basada en la racionalidad económica. La metodología consistió en resumir las definiciones de pensamiento crítico de diversos autores en el contexto empresarial. Se creó un mapa de aspectos comunes para extraer “conceptos clave”, que posteriormente se compararon con la definición propuesta. Los resultados son consistentes con la definición propuesta, excepto por el concepto de «habilidad», ya que el pensamiento crítico es una «capacidad» potenciada por el conocimiento lógico-matemático. En este estudio se concluyó que las características del pensamiento crítico son la transversalidad y la recursividad, que permiten la síntesis continua de la habilidad gerencial. Su efecto inmediato y final se puede resumir en la habilidad comunicativa. Se recomienda que las empresas aprovechen las actividades críticas para cambiar paradigmas y rutinas que las condicionan frente a los cambios impredecibles del mercado.

Palabras clave: pensamiento crítico, conocimientos lógico-matemáticos, habilidades gerenciales, racionalidad.

Resumo

O avanço das tecnologias de informação e comunicação intensificou a complexidade do mercado e das organizações. O objetivo deste estudo foi propor uma definição operacional de pensamento crítico gerencial baseada na racionalidade econômica. A metodologia consistiu em sintetizar as definições de pensamento crítico de diversos autores no contexto empresarial. Um mapa de aspectos comuns foi criado para extrair os “conceitos-chave”, que foram posteriormente comparados com a definição proposta. Os resultados são consistentes com a definição proposta, exceto pelo conceito de “habilidade”, visto que o pensamento crítico é uma “capacidade” aprimorada pelo conhecimento lógico-matemático. Este estudo concluiu que as características do pensamento crítico são a transversalidade e a recursividade, que permitem a síntese contínua das habilidades gerenciais. Seu efeito imediato e final pode ser resumido como habilidades de comunicação. Recomenda-se que as empresas utilizem atividades críticas para mudar paradigmas e rotinas que limitam sua capacidade de resposta às mudanças imprevisíveis do mercado.

Palavras-chave: pensamento crítico, conhecimento lógico-matemático, habilidades gerenciais, racionalidade.

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Introduction

According to a study by the Organization for Economic Co-operation and Development (OECD, 2022) on managerial critical thinking in universities, only 45% of the evaluated students were deemed competent. The authors pointed out that companies are placing more emphasis on competitiveness in the workforce, even for people with university degrees, due to the digitalization and technologization of work. Mateo Berganza et al. (2019) pointed out that individuals in the 21st century are characterized by transversal skills such as creativity, critical thinking, flexibility, and communication, which are necessary to thrive in an increasingly dynamic environment and coexist with artificial intelligence. This study aims to restate the definition of managerial critical thinking to adapt to the challenges demanded by the market dynamics of the 21st century.

Within the framework of microeconomic theory of consumer choice, Katz and Rosen (1997) state that consumption preferences, a form of economic behavior of the agents in the market is explained by three assumptions: (1) rationality, which refers to choosing one good over another when its comparative benefit is greater; (2) reflexivity, which refers to the

identification that exists between the good and the individual who acquires it; (3) transitivity, where if the utility of a good C is less than that of a good B, which is less than that of A, as long as the given conditions do not vary, the assumption of rationality remains. Mackay, Franco and Villacis (2018), based on conceptual reflections by several authors, emphasized that within rationality as the distinctive ability of the human being, managerial critical thinking is a determinant that orders, improves, elevates reasoning and solves problems in an appropriate way. Thus, consumption preferences are determined by the rational behavior of economic agents.

In a market where the given conditions are constantly changing critical thinking, as Ennis (1991) pointed out, is a reasonable and reflective capacity in a cognitive and complex process where reason prevails over other dimensions, and is a mental concept that transcends, as its intersection is continuous to managerial critical thinking. Alonso and Fernandez (2013) discuss the social futurist ideas previously presented by Toffler in the 1970s. They refer to the anticipation that the shock of the future would be characterized by numerous changes occurring in short periods of time. In their analysis, they argued that the discourse of neomanagement assumes the concept of flow, which supposes that the economy should be prepared for the force of constant change and that individuals and whole societies cannot be exempt from it. Business schools aim to prepare students for a rapidly changing world in which business information is quickly outdated (Celuch & Slama, 1999). Bloom is cited as a reference in Reinstein and Bayou's (1997) work on the applications of managerial critical thinking in accounting environments, in their hypothesis it is recognized that high-level abilities are associated with critical thinking, and as a consequence, they make high-level knowledge feasible.

The tools used in business management are linked in a logical sequence by means of critical thinking. In addition, these tools are used to assess, through strategy, the optimal sequencing of tasks focused on organizational objectives. Superior skills are those that analyze, synthesize and logically solve problems, and are the focus of managerial critical thinking that seeks to understand and learn from the process (Reinstein & Bayou, 1997). Managers need to strategically align the company's resources with successive goals (Lapo & Jácome, 2016). Brown (1998) questioned the theories of managerial critical thinking in human societies and highlights that managerial critical thinking predisposes individuals to evaluate established organizational processes. As argued previously in the context of

economic rationality, managerial critical thinking is a rational capability of economic agents that enables them to adapt their managerial skills to high-intensity markets.

Starting from the assumptions of the rationality of the economic agents and the logical-mathematical knowledge that constitutes the formal tools through which business intelligence is expressed. The active and reciprocal correspondence with managerial critical thinking is maintained, with the latter considered as a passive component, and this relationship adjusted as necessary. Their products demonstrate verifiable and applicable results that can be expressed mathematically and statistically. There appears to be a significant relationship between the development of mathematical abilities in students and their managerial critical thinking skills (Rhee & Sternberg, 2016). According to a study on student managerial critical thinking skills, it has been suggested that there is a positive correlation between that level of managerial critical thinking and mathematical literacy (Pratama, 2020). In their review of the literature, Mackay et al. (2018) identified an inverse relationship and highlighted the importance of managerial critical thinking in research, and it was noted that the study of logical mathematics can enhance managerial critical thinking skills by providing training in problem-solving through logical expressions.

In addition to the above, the product of the appropriate and cross-cutting correspondence to the managerial skills between logical-mathematical knowledge and critical thinking, has been simplified and condensed into one tool that builds on those that came before. From an intra-individual perspective, Ossa and Díaz (2017) conducted an ontological classification of managerial critical thinking and stated that this type of reasoning has the potential to enhance and fortify the intellectual process and information filtering. From the same perspective Nickerson et al. (1987) had already pointed out that managerial critical thinking involves a cognitive and concrete process that allows productivity. The book CEOE for Spanish managers includes managerial critical thinking among managerial skills, as a summary of the competencies that senior management expects from talented personnel (CEOE, 2017). Hence, it could be contended that the cultivation of managerial critical thinking skills is a key factor in fostering the competitive growth of an organization, denominated by the managerial strategies that in turn were the development of elementary previous products.

Calma and Davies (2021) reviewed the literature on the importance of managerial critical thinking in business education and pointed out the lack of focus in isolating critical thinking. Managerial investigations have referred to managerial critical thinking as a

cultivated ability that emerges from an environment of managerial skills, yet these references do not clarify the internal dynamics of these concepts. Starting from the correspondence between logical-mathematical knowledge and managerial critical thinking and their synthetic productivity, it is clear that this relationship is mediated through an analytical interpretation process. Everything operates on a similar principle that of a core or axis, which simplifies and multiplies into a factorial system of managerial skills. Under this same principle, Haase (2010) also defended the role of managerial critical thinking in the process of decision making and argued that critical thinking is similar to a rhizome: as an intellectual instrument, it can be linked with other types of thinking that are interrelated.

In this context, critical thinking is a recurring process that involves recursive periods, gradually making implicit information explicit through concrete procedures and compressing complexity into concepts. This occurs through the innovation, codification, and extension of a language structured as a synthetic product of this process. Consequently, critical thinking has a direct, immediate, and final link with communicative skills, and these periods are dialectical because it is important that the implementation of the defined objectives is communicated in the same way. Ossa and Díaz (2017) proposed that critical thinking can be analyzed ontologically as a dialectical process between individual and inter-individual action that enables change. Samaras, Adkins and White (2022) concluded that recursive learning improves critical thinking skills based on their comparative analysis of case studies and simulations. In this same progressive sense, Piedrahita, Santos and Valbuena (2006) accepted that critical thinking as a product of social development, spreads to increase in the human being. From an inter-individual perspective, authors such as Montero (2010) and Akdere (2010) have recognized that critical thinking serves the purpose of developing cultural products, as it is based on a communicative and relational process.

Various analytical models exist for classifying managerial skills as the fourth production factor. These models often emphasize decision-making ability. Haase (2010) pointed out that managerial critical thinking can be used as a tool for the investigation process and decision making. The process of management is simplified through critical thinking, which involves storing and retrieving conclusions from previous problems that were fundamental for their use in more complex problems. Currently, large corporations have started delegating tasks to artificial intelligence software that uses recursive algorithms to learn from massive data. The decision-making process involves identifying the optimal solution to a given problem (Hernández Pérez, 2018).

Starting from recursivity , these critical cycles acquire progressively greater depth in each solving iteration, which is determined by the nature of the problem, the level of uncertainty that exists for the lack or excess of data spreads to increase and as a consequence, it defines the heuristic and the intensity of business intelligence tasks. The purpose of managerial critical thinking is to provide a model useful as an intelligence model for solving real world problems (Halpern & Butler, 2018). Even Tripathy (2020) studied the impact of managerial critical thinking on high complexity problems, and pointed out that managerial critical thinking can extend beyond the logical method, depending on the nature of the problem. In summary, managerial critical thinking is responsible for generating technical innovations, tools, and directives to solve problems.

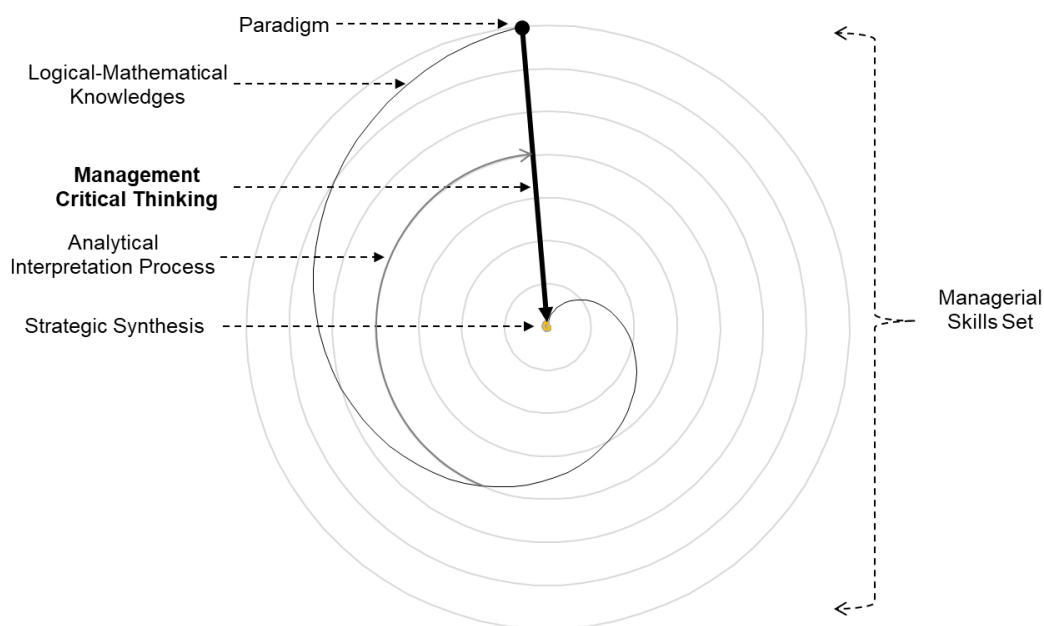
It is important to note that managerial critical thinking employs the inductive method, which relies on a priori correct formulation of opposing, mutually exclusive, and dimensional statements to eliminate erroneous conclusions regarding the problem, based on the previous data of observation of the reality and its constant variation, for that, unlike routine and dogmatic, the managerial critical thinking approaches evolving reality empirically, it is through induction that strategic new tools are developed to solve contextualized problems in an appropriate and singular way. Facione (1990) emphasized the need to restate evidence in order to identify a problem using theories, questions, hypotheses and all relevant instances for making inferences. The importance of empirical results in the managerial critical thinking process, involves a change of paradigms and ways of thinking (Jácome & Lapo, 2015). Bailin et al. (1999) emphasized that critical thinkers possess prior knowledge and highlighted the importance for companies to distinguish between the concept of managerial critical thinking as a mental process and as a procedure (Bailin et al., 1999).

Managerial critical thinking is essential to convert tacit knowledge into explicit knowledge. This synthesis elevates the intellectual capital of the organization. Therefore managerial critical thinking does not create knowledge, but rather provides new reductionist tools to represent knowledge at a higher level of abstraction. In their study, Indrašienė et al. (2021) analyzed the relationship between managerial critical thinking and knowledge management. They found that, in terms of managerial critical thinking and knowledge management, in the taxonomic pattern of Bloom's transfer of knowledge model, all knowledge cannot be considered explicit until it is verified and validated. Therefore, it is important to consider this at the beginning of the process, rather than at the end. The authors also noted that the relationship between innovation and knowledge lies in the fact that

effective innovation processes are guaranteed by continuous knowledge management and application.

Starting with a recapitulation, managerial critical thinking can be understood as a structured reasoning process that builds upon logical and mathematical principles to enhance managerial skills, as a strategic foundation for the development of language, technologies, tools, and concrete applications, these synthetic products enhance managerial skills and increase knowledge economy. Jácome and Lapo (2015) conclude that developing managerial critical thinking in organizations is necessary for obtaining strategic results. On the other hand, Massing ham (2004) proposed a model for the process of knowledge management as a managerial strategy and pointed out that current competition is based on knowledge management strategies. According to Indrašienė et al. (2021) managerial critical thinking can be interpreted in three ways: as a condition, an instrument, and an objective for addressing knowledge. Finally, it is affirmed that in an environment of constantly changing markets, agents with the capacity for managerial critical thinking based on the rationality of logical-mathematical knowledge are essential and the use of managerial tools can accelerate the management process. These tools can externalize advanced knowledge through abstraction and simplification, optimizing the actions of the management team. Figure 1 shows a graphic representation of the management managerial critical thinking model.

Figure 1. Management managerial critical thinking model



Note. Authors' own elaboration.

Significant literature exists on critical thinking, as previously mentioned by Calma and Davies (2021), who pointed out that there are not yet enough theoretical proposals to clarify the nature and dynamics of critical thinking in relation to other skills. Bensley and Spero (2014) also acknowledge the ongoing debate about whether managerial critical thinking is an innate skill or whether it is related to specific topics for its expression. Most authors recognize that companies are interested in identifying elements for the development of managerial critical thinking that benefit managerial development. Brookfield (1987) stated that companies will achieve positive results with high impact by changing work methods based on knowledge.

Building on the previous arguments, it is necessary to answer the following questions: (1) what is the definition of critical thinking?; (2) Can managerial critical thinking be considered a skill?; (3) Is managerial critical thinking an inherent characteristic of human beings or is it related to an acquired activity? And (4) What are the common aspects among the definitions of critical thinking?

From a positivist perspective, the objective of this conceptual document was to verify the hypotheses through an operational definition of managerial critical thinking at the managerial level, by comparing the definitions of authors from the late 20th century to the beginning of the 21st century, and examining their cognitive relationship with human reasoning. This study aims to answer the aforementioned questions. The definition of managerial critical thinking in this document is based on the operational character of scientific concepts pointed out by Bridgman (1927) and Wittgenstein's (1953) assertion that we can establish the meaning of a word by observing its use. Additionally, Zhou (2022) proposed that a definition of managerial critical thinking should be based on a principle, taking into consideration the different conceptions of critical thinking. The above statement aligns with the arguments presented in this document, which assert that managerial critical thinking is the foundation for managerial skills and their development. With these hypothetical considerations and theoretical discussions, we intend to provide the following formal definition:

Management managerial critical thinking is the capacity to reason across and recursively within the set of managerial skills. This capacity becomes essential when a stratification or difference emerges within these skills that deviates from the existing conceptual paradigm that synthesizes them.

Methods

An extensive search of scientific repositories was conducted to find definitions of critical thinking, with a preference for studies conducted in business contexts. For the purposes of this study, 27 definitions were analyzed after a filtering process. These selected definitions were categorized into two groups based on their publication dates. The first group includes definitions from the end of the twentieth century, while the second group includes definitions from the beginning of twenty-first century. Table 1 shows the authors whose work was reviewed for the analysis.

Table 1. Authors whose critical thinking definitions were reviewed

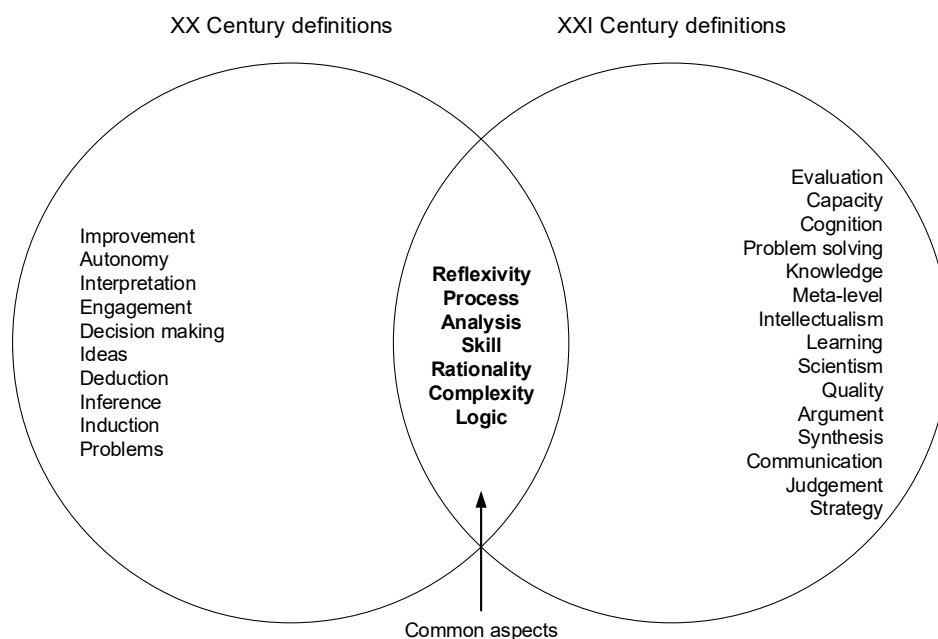
Author	Year
Lipman, M.	1988
Facione, P.	1990
Ennis, RH	1991
McPeck , J.	1991
Chaffee, J.	1992
Freeley , AJ	1993
Drewett , M.	1995
Pithers , RT & Soden, R.	2000
Díaz-Barriga, F.	2001
Fisher, A.	2001
White, D. & Robinson R.	2001
Epstein, RL	2002
Miller, D.	2002
Paul, R. & Elder, L.	2003
Cassany , D.	2005
Doddington, C.	2007
Scriven, M. & Paul, R.	2008
Harada , E. & Gonzalez , H.	2009
Tung, CA & Chang, SY	2009
Montero, M.	2010
Siegel, H.	2010
Antequera, G.	2011
Daniel, M. & Auriac , E.	2011
Marin , L. & Halpern, D.	2011
Yang, YT	2012

Oyler , DR & Romanelli , F.	2014
Rodríguez, G.	2018

Note. Own elaboration

The procedure for extracting the essential components of critical thinking definitions consisted of extrapolating the “stellar concepts” used in the field of education (Braslavsky as cited in Frigerio and Poggi, 2000, p. 44). An operationalization matrix was created to record the identified concepts, authors and publication years. To contrast the identified core concepts, we used information-processing strategies. Specifically, in figure 2 we used cognitive maps in the category of “maps of common aspects”, which share similarities with Venn diagrams. Group A contains core concepts of definitions from the 20th century, while Group B contains those from the 21st century. The common elements in the intersection between both groups of definitions were compared with the elements included in the definition proposed in this study. The excluded elements were referred to as differences.

Figure 2. Core concepts in managerial critical thinking definitions



Note. Authors' own elaboration

Results

The map of common aspects shows that reflexivity and rationality are key terms in the various definitions of managerial critical thinking presented in this research. Additionally, logic is another concept that is highlighted as an essential characteristic of managerial critical thinking and its linearity, as previously argued in this study. The proposal suggests that recursive periods of managerial critical thinking can simplify complex concepts and their associated processes. In conclusion, the concept of analysis prevails in the various definitions proposed in the context of critical thinking. Similarly, although this study does not provide direct indicators of this concept, it is implicitly present in the proposed concept of synthesis or synthetic product.

Discussion

Based on the results of this analytical exercise, this study differs from the literature that conceptualizes managerial critical thinking as belonging to the managerial skills set, this study assumes that the behavior of agents in the market is rational as per Katz and Rosen (1997) to explain the dynamics that govern the relationship among managerial skills, it is necessary to follow a principle (Zhou, 2022). Ennis (1991) and Mackay et al. (2018) both emphasize the transcendence of critical thinking powered by the logical and mathematical knowledge, rather than managerial skills. Based on this rationalistic approach, the transversality and recursivity of this rational capacity imply a sense of direction and purpose. This relates to the arguments for linearity presented by Lapo and Jácome (2016) and the concept of logicity of Reinstein and Bayou (1997).

Haase (2010) agrees with the central role of managerial critical thinking within the managerial skills set. This perspective also relates to the views of Facione (1990) and Lapo & Jácome (2015), in that managerial critical thinking involves using empirical evidence to form hypotheses about evolutionary reality and draw inferences that lead to updated conclusions for a given strategy, rather than relying on routine. Regarding the synthesis or synthetic product of critical thinking, this study's proposed definition aligns with the concepts of improvement and robust information filtering outlined in the ontological classification of Ossa and Díaz (2017), as well as the concept of synthesizing competencies referred to in the CEOE handbook for Spanish managers.

The concept of skill also highlights these aspects, but it is the only element not shared with the proposed definition. Substantively in this discussion, we have argued that managerial critical thinking is not the emergence of managerial skills, as it has traditionally been understood, but rather it is a concept that transcends them. Instead, it functions as an enabler that enhances managerial skills such as communication, decision making, and innovation.

Conclusions

The preceding discussion highlights the need to thoroughly examine the concept of managerial critical thinking as the primary characteristic of economic agents in organizational management. This study argues that managerial critical thinking simplifies management processes through strategy and innovation in language, knowledge, techniques, and technologies. However, since it is a factor and not a product, it cannot be defined as a skill but rather as a capacity that enhances the managerial skills set. Therefore, it can be considered that the managerial critical thinking leads to other consequential outcomes, ultimately resulting in the basic function of language.

It has been argued that managerial critical thinking is directly related to logical-mathematical knowledge through the analytical interpretation process. Increasing knowledge in these areas, which are related to the exact sciences, can facilitate this correspondence. Managerial critical thinking enhances formal communication skills, leading to more effective development and evaluation of synthetic products as the cumulative intellectual capital in organizations. Therefore, it can also be concluded that the managerial critical thinking seeks to complete the three assumptions underlying consumption preferences in markets. Furthermore, it rationalizes the activity and the use of the resources based on optimization, and this process reproduces recursively and transitively towards other previously synthesized resources.

On the other hand, this study concludes that managerial critical thinking completes recursive cycles. In each iteration, it synthesizes the accumulated complexity from previous experience and historical data, taking the “concept” as a unit without containing itself, and within it a group of other second-order concepts. This structure contributes to the knowledge and intellectual capital of the organization, and it also enables effective reproduction of the managerial process, from communication to teamwork skills. To compete and adapt to high-intensity markets with constant changes, organizations can benefit from critical thinking, to

move away from procedural paradigms and strategic imitation, and instead use codes and languages that can be transformed into knowledge management models. These models should reduce the need for non-contextualized models that are very costly. It is also important to emphasize that organizations cannot acquire technology and knowledge when they are granting more power to those who possess information and technology, putting democracy at risk.

Future lines of research

Finally, it is recommended that future studies be initiated based on the inquiries outlined in this study. These investigations should prioritize the examination of ordinal disposition, synthetic integration, and the impact of managerial skills within organizations that employ strategies and comparable actions to improve efficiency and effectiveness. These dependent variables should be considered as the focal point of these studies. It is worthwhile to examine the comprehensive nature of communication skills, particularly as they relate to managerial skills. In addition, it is considered necessary to deepen the analysis to identify a classification that can modulate and formalize the managerial skills as a set. Also, it is imperative to ascertain the existence of a relationship between a managerial critical thinking scale and the managerial skills set, as well as the type of effect on the strategy, such as the synthesis of a recursive process.

Statements and Declarations

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The authors have no competing interests to declare that they are relevant to the content of this article.

All authors whose names appear on the submission agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Contribution Role	Author(s)
Conceptualization	Santiago De los Santos de Dios.
Methodology	Raquel Olivia De los Santos de Dios.
Software	NOT APPLICABLE.
Validation	Santiago De los Santos de Dios; Raquel Olivia De los Santos de Dios; María Lyssette Mazó Quevedo.
Formal Analysis	Santiago De los Santos de Dios.
Investigation	Santiago De los Santos de Dios; Raquel Olivia De los Santos de Dios; María Lyssette Mazó Quevedo.
Resources	Santiago De los Santos de Dios; Raquel Olivia De los Santos de Dios; María Lyssette Mazó Quevedo.
Data curation	Santiago De los Santos de Dios; Raquel Olivia De los Santos de Dios.
Writing - Preparing the original draft	Santiago De los Santos de Dios.
Writing - Reviewing and Editing	María Lyssette Mazó Quevedo.
Display	Santiago De los Santos de Dios; Raquel Olivia De los Santos de Dios; María Lyssette Mazó Quevedo.
Supervision	Santiago De los Santos de Dios; Raquel Olivia De los Santos de Dios.
Project Management	Santiago De los Santos de Dios.
Acquisition of funds	NOT APPLICABLE.