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ENHANCING INNOVATION CULTURE: THE CASE OF MULTINATIONAL ADVERTISING AGENCY VMLY&R LISBOA

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Abstract. The world is going through an unprecedent experience marked by one of the most serious pandemic to date. Companies currently face multiple challenges, including maintaining their organizational culture while defining and validating new working and business models and completely rethinking past competitive advantages. Innovation is a fundamental part of these processes. This study identifies the main findings in the literature on company culture and the promotion of innovation within organizations. Problem structuring methods (i.e., design thinking (DT) and decision making trial and evaluation laboratory (DEMATEL)) were applied to explore innovation culture further and apply the results to the multinational advertising agency VMLY&R Lisboa in order to delineate this company's culture and enhance its potential for innovation. An expert panel was recruited to develop a fuller understanding of the cause-effect relationships between factors that influence innovation and to enable a more collaborative, constructivist approach to this decision problem. The main findings were validated by VMLY&R Lisboa's chief executive officer, and concrete initiatives were proposed that can enhance this company's innovation culture. The study's contributions and limitations are also discussed.

Keywords: DEcision MAking Trial and Evaluation Laboratory (DEMATEL), Design Thinking (DT), innovation, Problem Structuring Method (PSM), organizational culture, VMLY&R Lisboa.

JEL Classification: M10, M2.

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Introduction

Organizational culture is central to management as this culture shapes how companies organize themselves, structure and define internal procedures, manage resources, and secure competitive advantages in an increasingly competitive global context (Gailly, 2018). Thus, much of the literature on management focuses on how firms should think, design, and build their organizational culture, as well as how this culture intersects with innovation (Acosta Rubio et al., 2022; Huang et al., 2021; Michelis et al., 2018).

The current pandemic crisis has had a profound effect on not only a social level but also an economic level, including major impacts on organizations. Currently, companies are being forced to transform their working models while deeply questioning their organizational culture to enable them to conduct strategic analyses and redesign tools. This phenomenon provided the motivation to conduct the present study, which sought to answer the following questions:

– What is the relationship between organizational culture and innovation?
– How can these two concepts be applied to the specific case of the multinational advertising agency VMLY&R Lisboa to help it strengthen its innovation culture?

The main limitations of the existing literature in this area are generic models that do not always reflect companies' idiosyncratic nature, so this research focused on addressing this issue by applying constructivist and collaborative methods. These techniques draw on participants and decision makers' experience to create viable solutions, as well as streamlining decision-making processes by clarifying the influence of specific factors on the decision problem under study and the cause-effect relationships between them. This study's goal is to facilitate the development of initiatives that can enhance VMLY&R Lisboa's innovation culture. To this end, two multicriteria analysis methods were applied: design thinking (DT) and decision-making trial and evaluation laboratory (DEMATEL) (Gabus & Fontela, 1972). Both techniques rely on problem structuring methods (PSMs) (Belton & Stewart, 2002).

The remainder of this paper is structured as follows. The next section presents the literature review findings and discusses the concepts of organizational culture and innovation culture. Section two contextualizes the methodological approach adopted. Section three then describes the model-building process, including a discussion of the results of a real-world application. The last section offers the main conclusions and suggestions for future research.

1. Literature review and research gap

One of the most structured definitions of organizational culture was developed by Schein (1992), as follows:

"[Organizational culture is] *the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems*" (p. 3).

Schein (1992) also asserts that this culture can be expressed on three distinct levels. The first is the visible artefacts that constitute organizations, such as their environment, physical spaces, codes of conduct, and clothing. The second level is the values that have a direct impact on teams' behavioral patterns. The last is the assumptions made by specific participants in an organizational culture, which are expressed as unconscious values and codes of conduct.

Empirical research has highlighted the importance of organizational culture to a market orientation and better competitiveness and financial performance (*cf.* Homburg & Pflesser, 2000; Michelis et al., 2018), as well as its impact on teams' attitudes, behavior, and efficiency (Gregory et al., 2009). According to Zheng et al. (2010), organizational culture also strongly contributes to knowledge management, and companies' organizational and strategic efficiency. O'Reilly et al. (1991) further describe organizational culture as a powerful tool that influences work teams' behavior more deeply than formal control systems and establishes procedures and hierarchical structures.

Kitayama (2002) and Markus and Kitayama (2010) have also suggested that company cultures and individual members influence each other, and that this interaction is a result of elements that can be freely organized, such as mental practices or processes. These findings indicate that behaviors in groups are not necessarily determined by the relevant organizational cultures' shared and internalized values. Stanford (2007), in turn, extensively studied how organizational culture can be designed and redesigned over time, thereby combining this culture with design. The author asserts that *"organization design is the whole sequence of work that results in an alignment of vision/mission, values/operating principles, strategies, objectives, tactics, systems, structure, people, processes, culture and performance measures in order to deliver the required results in the operating context"* (Stanford, 2007, p. 16). Companies' adaptability is, therefore, intimately related to organizational culture.

In addition, Cameron et al. (2006) developed a competing values framework and identified four main types of company culture. The first is adhocracy, which focuses on adaptability, agility, and flexibility, with the main goal of generating differentiated, cutting-edge results. The second type is clan, which concentrates on cohesion, participation, and communication, with the ultimate goal of maintaining teams' motivation and commitment. The third is hierarchy, which focuses on processes, consistency, and performance measurement, with the primary goal of achieving efficiency, reaching milestones, and meeting deadlines. The last type of organizational culture is market, which concentrates on consumers, productivity, and competitive performance, with the overall goal of gaining a larger share of the market, making a profit, and achieving predefined objectives.

One of the first authors to conduct research on innovation was Schumpeter (1934), who argues that companies should identify new opportunities to exploit the relevant economies based on the resources these firms control and the capabilities they have (see also Murcia et al., 2022). This strategy should contribute to a continuous process of introducing new products or services into the appropriate markets and making these solutions better and more innovative than those that already exist. The contribution of innovation to companies' success was also studied by Drucker (1954), who considered innovation an essential function. Decades later, the Organization for Economic Cooperation and Development (2010) similarly highlighted the potential contribution of innovation to long-term economic growth.

In more general terms, innovation can also be defined as being radical or incremental if it involves the capacity to develop disruptive innovation, which creates products, services, or technologies that, in most cases, make what previously existed obsolete. Another parallel ability is when companies produce innovations that refine or improve existing products, services, or technologies (*cf.* Subramaniam & Youndt, 2005). Innovation can further be technical or administrative (*cf.* Han et al., 1998) or can be applied to products or processes (*cf.* Chen, 2009). Gailly (2018, p. 14) proposes a related definition of innovation that was used in the present study, namely, that *"innovation can be defined as the combination of newness and change, or as a change toward something new"*. Hogan and Coote (2014, p. 1618) additionally observe that *"innovation is a prerequisite for success in increasingly dynamic and competitive markets. In professional firms in particular, a culture of innovation is a crucial precursor to the types of innovative behaviors that can sustain organizations and foster organizational renewal"*.

Building on Schein's (1992) model, Hogan and Coote (2014) conducted research on the interdependent relationships between organizational culture, innovation, and performance. The latter cited authors concluded that, first, innovation value in organizational culture by itself is not enough to generate improved performance. Second, this culture includes the architecture of physical spaces, rituals, stories, and language adopted, which can have a positive stimulating effect on innovation culture. Last, to foster innovation, proper conditions must be created so that teams can take risks, which entails encouraging constant questioning – and a willingness to change – the status quo. In this context, employees' efforts, dedication, and achievements are valued and cooperation between teams is fostered through the values of flexibility, openness, and internal communication.

Michelis et al. (2018) also studied the correlation between innovation culture and performance when launching new products. The authors took as their starting point the eight-dimension model created by Dombrowski et al. (2007) and added a ninth dimension. Michelis' et al. (2018) nine-dimension model is essential to defining innovation culture: (1) innovative mission and value statements, (2) democratic communication, (3) safe spaces, (4) flexibility, (5) boundary spanning, (6) collaboration, (7) incentives, (8) leadership, and (9) sustainability. The latter is especially important given organizations' growing concerns about integrating environmental and sustainability issues into innovation processes.

Another important perspective within the current study's scope was defined by Price (2007, p. 320), who examined the organizational mindset that targets innovations. The author asserts that *"the correct definition of innovation is problem solving. It is the ability to see a need and to think creatively how that need might be met in a better way"*. Price (2007) identified four main characteristics that distinguish extremely innovative organizations, of which the first is awareness, which implies the ability to correlate different tools and concepts in order find the best way to solve innovation problems. The second characteristic is intense motivation, which implies the presence of specific intrinsic and extrinsic factors. The third is a surfeit of skills and competencies, which is a common denominator among extremely innovative organizations (i.e., the presence of highly qualified professionals). The last characteristic is supportive infrastructure, which is important as it provides teams with the necessary resources to enhance their innovative work.

Claver et al. (1998) behavioral perspective on innovation culture was also integrated into the present study. This culture is understood to be a way of thinking and acting that develops within organizations, fosters the generation of innovative ideas, and treats change as a necessary mechanism to increase efficiency. Claver et al. (1998) state that:

"[F] *or innovative culture to succeed, certain requirements must be met involving four kinds of attitudes:* (*1*) [a] *corporate management* […] *willing to take risks*; (*2*) *the participation of all members of the firm* […]; (*3*) *creativity* […] *stimulat*[ion …]; *and* (*4*) […] *shared responsibility*" (p. 61).

The relationship between innovation culture and creativity has been explored using empirical research methods. The results highlight the key role of diversity in promoting creativity (*cf.* Kauppila et al., 2018), and in fostering collaborative teamwork (*cf.* Aggarwal & Woolley, 2018). In addition, a direct correlation was found between a creative organizational culture and firms' competitive capacity for innovation (*cf.* Anderson et al., 2014). The evidence gathered also supports the conclusion that *"creative companies generate higher innovative output"* and that *"creative corporate culture is positively associated* [… with] *firm value*" (Fiordelisi et al., 2019, p. 2).

The existing literature has limitations, which include the dearth of studies on the significance of interpersonal relationships and cultural, social, and economic contexts to the dynamics of creation, implementation, and change in organizational culture. Another gap is the lack of empirical research on the growing number of startups and technology-based companies worldwide that make use of lean, agile, and collaborative practices, which may be directly correlated with innovation. Empirical studies of these topics could add interesting new dimensions and eventually have an impact on organizational and innovation culture.

A further identifiable limitation is related to how analyses often concentrate on firms in specific sectors yet fail to take into account that innovation is an extremely intricate challenge strongly connected to individual firms' nature, business model, market, and customers (*cf.* Castela et al., 2018). Finally, a profound transformation is currently occurring in consumer behavior, socialization, and working models due to the pandemic worldwide, as well as the accelerated use of digitization processes in many economic sectors and the evolving nature of Industry 4.0 (Fatimah et al., 2020; Sindhwani et al., 2022). These trends present challenges that traditional innovation models might not be able to overcome. Thus, researchers must seek to understand whether companies can continue to pursue innovation based on their present values, processes, and teams or whether new challenges require fresh solutions that decision makers are still slowly exploring.

2. Methodological background

The current study adopted a constructivist and collaborative epistemological approach (*cf.* Belton & Stewart, 2002) that draws on participants and decision makers' experience to find viable solutions. The present research methodologies were based on dynamic visual models that help streamline decision-making processes by clarifying the influence of specific criteria on innovation and the cause-effect relationships between these criteria. To this end, DT and DEMATEL multicriteria methodologies were applied.

2.1. PSMs and DT

PSMs are used to solve complex decision problems and are derived from operational research (OR). The idea of a PSM was first introduced in Rosenhead's (1989) seminal work, *Rational*

Analysis for a Problematic World, and further developed by Rosenhead and Mingers (2001). This novel approach was a response to the need to find new models for solving complex social problems that could not be dealt with by applying traditional quantitative approaches focused on maintaining objectivity (Mingers & Rosenhead, 2004). A distinction is often made between hard approaches – typically multicriteria analysis using mathematical models to solve problems rationally and objectively – and soft approaches – usually multicriteria analyses involving a greater number of stakeholders and less data (Ferreira, 2011).

When PSMs are used to analyze challenges, these methods seek to improve different stakeholders' understanding of and commitment to decision-making processes (Ackermann, 2012; Midgley et al., 2013). These aims are achieved through the facilitation of (Franco & Montibeller, 2010), participation in (Rosenhead, 1996), and encouragement of open dialogue (Mingers & White, 2010), which allows participants to break down the structure of the problems under analysis. The final goal is to promote a learning process that leads to the definition of concrete initiatives that can solve real problems (Pidd, 2009).

Among the many existing PSMs (*cf.* Rosenhead & Mingers, 2001), the DT approach has become increasingly popular and has been more widely adopted by companies all around the globe. Prior academic studies have highlighted the broad range of areas in which this method can be applied (*e.g.*, Beverland et al., 2015; Cooperrider, 2010), its underlying guiding principles (Michelis et al., 2018), and its connections to organizational capabilities (*e.g.*, Elsbach & Stigliani, 2018; Zheng, 2018). According to Nakata and Hwang (2020, p. 118), DT should be understood as a *"design-based approach to solving human problems"*. This definition is in line with what various other authors have written (*e.g.*, Brown, 2008; Carlgren et al., 2016; Liedtka, 2015; Micheli et al., 2019).

Nakata and Hwang (2020) also identified three main characteristics of the DT approach, of which the first is human centeredness, that is, the ability to focus on human beings (i.e., clients or users) and place them at the center of the innovation process. The second characteristic is abductive reasoning, which is based on constantly questioning the status quo and intensively searching for better alternatives. The last is learning by failing, which places the trial and error process at the center of DT implementations.

Kelley and Littman (2001) stipulate that the DT method should be applied in five steps. The first is to understand the decision problem, which includes the crucial task of learning about the markets, technologies, users, and clients involved to gain a holistic view of the issue to be addressed. The second step is to observe, which requires a comprehensive examination of the problem from the main target audiences' point of view and the cultivation of empathy to develop the most humanized understanding of the issue possible. The third step is to visualize the decision problem so that new concepts can emerge through ideation and creativity. The fourth is to evaluate and refine the ideas generated, which constitutes a basic pillar of DT because this method assumes that all good, potentially applicable ideas must be tangible and prototyped in order to be tested and refined based on the feedback received. The last step is to implement the solutions identified through the implementation and commercialization of the new conceptual framework after it has been tested and validated. This methodology appeared to be ideally suited for the present study, which focused on proposing concrete initiatives to help VMLY&R Lisboa enhance its innovation culture.

2.2. DEMATEL

The DEMATEL technique was developed and refined between 1972 and 1976 as part of the Science and Human Affairs Program run by the Battelle Memorial Institute of Geneva (*cf.* Gabus & Fontela, 1972). This methodology has grown in terms of its importance and application to diverse decision problems in multiple fields such as computer science and artificial intelligence, OR, management, civil engineering and environmental sciences (Dong et al., 2021; Dwijendra et al., 2021; Lu et al., 2022; Tzeng et al., 2007; Yazdi et al., 2020). DEMATEL applications follow six steps, which are described below (*cf.* Braga et al., 2021; Chen et al., 2019; Ho et al., 2011; Lin et al., 2010).

2.2.1. Step 1: Calculate initial direct influence matrix

Once the factors to be evaluated have been identified, the first step is to create a direct influence matrix based on the opinions of the decision makers involved. The n factors to be assessed are defined as $F = \{F_1, F_2, F_3, \ldots, F_n\}$ and m as the decision makers in decision group $D = \{D_1, D_2, D_3, \ldots, m\}$. Next, the participants must specify how much direct influence factor F_i has on factor F_j using a five-point scale with the following levels: 0 = no influence; 1 = little influence; 2 = medium influence; 3 = strong influence; and 4 = extremely strong influence (Sumrit & Anuntavoranich, 2013; Yazdani et al., 2019; Yazdi et al., 2020).

Each decision maker's influence matrix can be expressed as $A^k = \left[a_{ij}^k\right]_{n \times n}$, in which a_{ij}^k is the result of each participant's input and k represents numerically that individual's participation in the evaluation process, with scores ranging from 1 to m $(1 \le k \le m)$. After collecting m decision makers' opinions, $A^1, A^2, A^3, \ldots, A^m$ matrices can be constructed and the average matrix can be calculated with Eq. (1):

$$A_{ij} = \frac{1}{m} \sum_{k=1}^{m} a_{ij}^k \tag{1}$$

in which $i, j = 1, 2, \ldots, n$.

2.2.2. Step 2: Determine normalized direct influence matrix X

This step estimates the normalized direct influence matrix X using Eq. (2) (Braga et al., 2021; Freire et al., 2021; Lin et al., 2010):

$$X = s \times A \tag{2}$$

in which s is calculated according to Eq. (3):

$$s = \min_{i,j} \left[\frac{1}{\max\limits_{1 \le i \le n} \sum_{j=1}^{n} \left| a_{ij} \right|}, \frac{1}{\max\limits_{1 \le j \le n} \sum_{i=1}^{n} \left| a_{ij} \right|} \right] \tag{3}$$

in which $i, j = 1, 2, \ldots, n$.

2.2.3. Step 3: Calculate total influence matrix T

In the third step, total influence matrix T is constructed. This matrix is created by applying Eq. (4) (Chen et al., 2019; Milici et al., 2021):

$$T = X + X^2 + X^3 + \ldots + X^h = X\left(I - X\right)^{-1} \tag{4}$$

in which $\lim\limits_{h \to \infty} X^h = \left[0\right]_{n \times n}$.

2.2.4. Step 4: Obtain R and C vectors

The totals of the columns and lines in total influence matrix T are calculated to obtain the R and C vectors' values using Eqs (5) and (6), respectively (Braga et al., 2021; Lin et al., 2010):

$$R = \left[\sum_{j=1}^{n} t_{ij} \right]_{n \times 1} = \left[r_i \right]_{n \times 1} = \left(r_1, \ldots, r_i, \ldots, r_n \right); \tag{5}$$

$$C = \left[\sum_{i=1}^{n} t_{ij} \right]_{1 \times n}^{'} = \left[c_j \right]_{1 \times n}^{'} = \left(c_1, \ldots, c_j, \ldots, c_n \right). \tag{6}$$

2.2.5. Step 5: Determine threshold (α) value

The α value can be estimated based on total influence matrix T, taking into consideration the matrix's N elements (Rodrigues et al., 2022; Sumrit & Anuntavoranich, 2013). The α value is obtained with Eq. (7):

$$\alpha = \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} \left[t_{ij} \right]}{N}. \tag{7}$$

This step is when the least significant effects can be eliminated from the matrix to make the task of interpreting the structural relationships between the distinct factors easier (*cf.* Lee et al., 2013; Si et al., 2018; Sumrit & Anuntavoranich, 2013).

2.2.6. Step 6: Design cause-effect relationship map

The last step is to create a relationship map based on $R + C$ and $R - C$ values. In this way, the distinct factors can be positioned in the four quadrants shown in Figure 1 (Yazdi et al., 2020).

The causal relationships map helps decision makers choose which central factors should be subjected to strategic analysis. The data obtained by applying DEMATEL can be analyzed and used to reach conclusions and formulate recommendations, which is the present study's main goal, namely to understand VMLY&R Lisboa's current situation and suggest ways that this firm can strengthen its innovation culture. DEMATEL was thus chosen because it helps to identify and analyze the cause-effect relationships between criteria, and thus to generate recommendations based on the direction and intensity of these direct or indirect cause-effect relationships (Braga et al., 2021; Huynh et al., 2021; Lin et al., 2021; Sara et al., 2015).

3. Application and results

3.1. DT application

Before applying the DEMATEL technique, the decision problem was structured using strategic options development and analysis (Ackermann & Eden, 2010), in which a group model is created by a panel of experts on the selected topic who actively discuss and reflect on the relevant factors. The first step was to recruit appropriate professionals from VMLY&R Lisboa for this panel, namely: the chief executive officer (CEO); chief creative officer; and five other staff members who represented the company's key areas (i.e., strategic management, key accounts, advertising, branding, and social media). The panel complied with the guidelines developed by Bana e Costa et al. (2002, p. 227) (i.e., *"a decision-making group of 5–7 experts and other key-players"*).

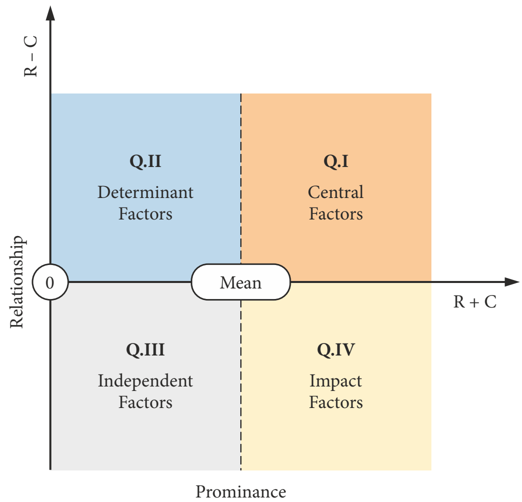

Figure 1. DEMATEL cause-effect relationships map (Yazdi et al., 2020, p. 5)

The next step was to hold two groupwork sessions online using the Zoom and Miro platforms because of pandemic-related restrictions. The meetings lasted 7 hours in total. The decision-making process comprised three phases: (1) structuring; (2) evaluation; and (3) recommendations. The result was *"a more or less formalized model* [...] *accepted* [by the panel] *as a representation scheme and organization of elements* [...] *that* [could serve] *as a basis for* [decision makers'] *learning, communication and discussion*" (Ferreira, 2011, p. 105).

To start this process, the following trigger question was presented to the expert panel: *"Based on your professional experience, what initiatives and/or measures can enhance VMLY&R Lisboa's innovation culture?"*. The panel was then asked to share their answers to the question using the "post-its technique" (Ackermann & Eden, 2010). This DT technique consists of writing evaluation criteria on post-it notes and deciding if each criterion has a positive or negative impact on innovation culture. The VMLY&R panel collectively defined 122 criteria.

After this first step was completed, the decision makers grouped the post-it notes into areas of concern, thereby creating five clusters that were labelled as follows: *Physical Space* (C1); *Management/Human Resources* (C2); *Processes* (C3); *Culture* (C4); and *Training* (C5). These categories organized the criteria into thematic areas and facilitated the identification of possible cause-effect relationships between the clusters' components (*cf.* Ferreira et al., 2015; Rosário et al., 2021). The second groupwork session was dedicated to applying DEMATEL.

3.2. DEMATEL application

In the second session, DEMATEL was used to analyze the cause-effect relationships between the defined decision criteria. This technique brought more objectivity to the panel's exploration of the complex, ambiguous topic under study and ultimately made the company's decision-making process easier regarding which initiatives can strengthen their innovation culture. The latter was this research's main focus.

Once the five clusters had been defined by the decision makers, they could prioritize the criteria according to which might have the most impact on their firm's innovation culture. This step was completed using nominal group and multi-voting techniques. As with previous steps, group dynamics were important because they allowed individuals to encounter contrasting perceptions and reach more consensual conclusions. The final list of the most important criteria is shown in Table 1.

Table 1. Most influential criteria according to decision panel

Clusters	Criteria/Initiatives
C1 Physical Space	2. Silos
	4. Cream talk events
	6. Teamwork spirit
	12. Flexibility in the workplace
	14. Workshops with clients
C2 Management/Human Resources	24. Processes
	25. Evaluations and meritocracy regime
	26. Young team
	27. Transparency
	42. Lack of reviews and evaluations
	44. Better balance between personal and professional life
	47. Client onboarding process
C3 Processes	66. Content sharing activities
	67. More diversified portfolio
	68. Greater integration of teams (i.e., branding, advertising, and socializing)
	69. Factory mode
	70. Creativity meetings
	77. Survivor mode
	90. Time to create
C4 Culture	97. Less reactive, more proactive leadership
	98. Shared and aligned mindset
	101. Prizes for superior work in key digital areas
	102. Self-promotion
	103. Proactivity
C5 Training	111. Partnerships with schools
	116. Lack of data
	117. Creative exchanges and workshops
	118. Creative hives in networks
	122. Support for training

Once the prioritization exercise was completed, the DEMATEL technique could be applied to identify more objectively which variables are causes or effects on both the inter- and intra-cluster level. The list of the most influential criteria within each cluster was used to create six matrices, and the panel analyzed the causal links within each cluster and scored their strength on the previously mentioned influence scale (i.e., from 0 ["no influence"] to 4 ["extremely strong influence"]). The next six tables below show the matrices containing the results obtained by following all the DEMATEL steps (see Section 2.2).

3.2.1. Step 1: Calculate initial direct influence matrix A

The first matrix reflects the inter-cluster influence scores. In other words, this matrix contains each cluster's impact on the other clusters (see Table 2).

Table 2. Direct influence matrix for inter-cluster relationships

	C1	C2	C3	C4	C5	Total
C1	0.00	3.00	1.00	4.00	2.00	10
C2	3.00	0.00	4.00	4.00	3.00	14
C3	1.00	3.00	0.00	4.00	2.00	10
C4	3.00	3.00	3.00	0.00	3.00	12
C5	0.00	3.00	3.00	3.00	0.00	9
Total	7.0	12.0	11.0	15.0	10.0	

An analysis of Table 2 reveals that C5 has no influence on C1, and C3's impact on C1 is extremely weak (1.00). C2 has a very strong influence on C3 and C4, and C3's effect on C4 is extremely strong as well.

The same assessment of direct influence was then carried out within each cluster (i.e., intra-cluster analyses). The results for C1 are shown in Table 3, namely the effects of criteria 2, 4, 6, 12, and 14 on each other.

Table 3. Direct influence matrix for C1 *Physical Space*

	2	4	6	12	14	Total
2	0.00	0.00	4.00	2.00	0.00	6.0
4	2.00	0.00	4.00	0.00	2.00	8.0
6	4.00	2.00	0.00	3.00	1.00	10.0
12	3.00	0.00	4.00	0.00	0.00	7.0
14	2.00	2.00	3.00	0.00	0.00	7.0
Total	11.0	4.0	15.0	5.00	3.00	

Table 3 highlights the importance of criterion 6 in terms of its total influence score. In addition, criterion 12 strongly influences criterion 6 (4.00), and criterion 2 has a heavy impact on criterion 6 (4.00).

The third matrix is presented in Table 4. These results focus on the influence exerted within C2 by the most significant criteria (i.e., 24, 25, 26, 27, 42, 44, and 47).

Table 4. Direct influence matrix for C2 *Management/Human Resources*

	24	25	26	27	42	44	47	Total
24	0.00	2.00	3.00	3.00	4.00	4.00	4.00	20.0
25	2.00	0.00	4.00	4.00	4.00	3.00	0.00	17.0
26	4.00	4.00	0.00	3.00	3.00	4.00	0.00	18.0
27	4.00	4.00	4.00	0.00	4.00	2.00	2.00	20.0
42	2.00	4.00	4.00	4.00	0.00	0.00	0.00	14.0
44	4.00	3.00	4.00	4.00	0.00	0.00	0.00	15.0
47	4.00	0.00	0.00	3.00	0.00	3.00	0.00	10.0
Total	20.0	17.0	19.0	21.0	15.0	16.0	6.0	

Table 4 reveals that criterion 25 has no influence on criterion 47, and the same is true of criteria 42 and 44's effects on criterion 47. This cluster contains a large number of quite influential criteria (i.e., with the maximum score or 4.00), including the impact of criterion 24 on criterion 42 or the influence of criterion 26 on criteria 24, 25, and 44.

The matrix presented in Table 5 refers to C3. The most important criteria analyzed were 66, 67, 68, 69, 70, 77, and 90.

Table 5. Direct influence matrix for C3 *Processes*

	66	67	68	69	70	77	90	Total
66	0.00	0.00	4.00	3.00	4.00	3.00	4.00	18.0
67	0.00	0.00	4.00	4.00	3.00	0.00	0.00	11.0
68	4.00	4.00	0.00	4.00	4.00	2.00	2.00	20.0
69	3.00	4.00	4.00	0.00	3.00	4.00	4.00	22.0
70	4.00	4.00	4.00	3.00	0.00	1.00	0.00	16.0
77	4.00	4.00	4.00	4.00	4.00	0.00	4.00	24.0
90	4.00	4.00	4.00	4.00	4.00	4.00	0.00	24.0
Total	19.0	20.0	24.0	22.0	22.0	14.0	14.0	

Table 5 confirms that criteria 77 and 90 are quite dominant as they have an extremely strong influence (4.00) on criteria 66, 67, 68, 69, and 70. In contrast, criterion 67 has little influence on almost all the other criteria.

The results for C4 are shown in Table 6. This cluster is smaller, so only five criteria were chosen as particularly significant: 97, 98, 101, 102, and 103.

Table 6. Direct influence matrix for C4 *Culture*

	97	98	103	101	102	Total
97	0.00	3.00	4.00	4.00	4.00	15.0
98	4.00	0.00	4.00	3.00	4.00	15.0
103	4.00	1.00	0.00	4.00	3.00	12.0
101	0.00	0.00	1.00	0.00	4.00	5.0
102	0.00	3.00	1.00	2.00	0.00	6.0
Total	8.0	7.0	10.0	13.0	15.0	

The above matrix highlights the importance attributed by the panel to criteria 97 and 98. In contrast, criteria 101 and 102 have a quite weak impact on most of the remaining criteria.

The last matrix refers to C5, which was another small cluster. The results for the five most significant criteria identified (i.e., 111, 116, 117, 118, and 122) are presented in Table 7.

Table 7. Direct influence matrix for C5 *Training*

	111	116	117	118	122	Total
111	0.00	3.00	4.00	0.00	4.00	11.0
116	2.00	0.00	0.00	0.00	0.00	2.0
117	1.00	3.00	0.00	0.00	1.00	5.0
118	0.00	3.00	1.00	0.00	1.00	5.0
122	4.00	4.00	4.00	4.00	0.00	16.0
Total	7.0	13.0	9.0	4.0	6.0	

As shown in Table 7, criterion 116 exerts no influence on almost all the other criteria, except for criterion 111 (2.00). At the opposite end, criterion 122 stands out with an extremely strong effect (4.00) on the other criteria.

After this first step was completed, the remaining DEMATEL steps were followed. The main objective was to define inter-cluster relationships maps in order to analyze further the importance of the five clusters to innovation culture.

3.2.2. Step 2: Determine normalized direct matrix X

The second step comprised constructing normalized direct influence matrix X for the inter-cluster relationships. This matrix contains the values obtained by multiplying the scores previously used to fill in initial direct influence matrix A. The results of these calculations are summarized in Table 8.

Table 8. Normalized direct influence matrix X for inter-cluster relationships

Max	15,0	14
1/max	0.066666667	0.071428571
1/s	0.066666667	

	C1	C2	C3	C4	C5
C1	0.0000	0.2000	0.0667	0.2667	0.1333
C2	0.2000	0.0000	0.2667	0.2667	0.2000
C3	0.0667	0.2000	0.0000	0.2667	0.1333
C4	0.2000	0.2000	0.2000	0.0000	0.2000
C5	0.0000	0.2000	0.2000	0.2000	0.0000

3.2.3. Step 3: Determine total influence matrix T

The next step involved determining total influence matrix T for the inter-cluster links, starting with the construction of identity matrix I (see Table 9). Inter-clusters matrix $I - X$ was then estimated (see Table 10), after which the necessary calculations were completed to produce inter-clusters matrix $(I - X)^{-1}$ (see Table 11). The final step consisted of constructing total influence matrix T for the inter-cluster connections (see Table 12).

Table 9. Identity matrix I for inter-cluster relationships

	C1	C2	C3	C4	C5
C1	1.0000	0.0000	0.0000	0.0000	0.0000
C2	0.0000	1.0000	0.0000	0.0000	0.0000
C3	0.0000	0.0000	1.0000	0.0000	0.0000
C4	0.0000	0.0000	0.0000	1.0000	0.0000
C5	0.0000	0.0000	0.0000	0.0000	1.0000

Table 10. Matrix $I - X$ for inter-cluster relationships

	C1	C2	C3	C4	C5
C1	1.0000	–0.2000	–0.0667	–0.2667	–0.1333
C2	–0.2000	1.0000	–0.2667	–0.2667	–0.2000
C3	–0.0667	–0.2000	1.0000	–0.2667	–0.1333
C4	–0.2000	–0.2000	–0.2000	1.0000	–0.2000
C5	0.0000	–0.2000	–0.2000	–0.2000	1.0000

Table 11. Matrix $(I - X)^{-1}$ for inter-cluster relationships

	C1	C2	C3	C4	C5
C1	1.3065	0.6148	0.5038	0.7495	0.5142
C2	0.5504	1.5825	0.7760	0.9108	0.6755
C3	0.3690	0.6148	1.4413	0.7495	0.5142
C4	0.5020	0.6774	0.6593	1.6129	0.6129
C5	0.2843	0.5750	0.5753	0.6546	1.3605

Table 12. Total influence matrix T for inter-cluster relationships

	C1	C2	C3	C4	C5
C1	0.3065	0.6148	0.5038	0.7495	0.5142
C2	0.5504	0.5825	0.7760	0.9108	0.6755
C3	0.3690	0.6148	0.4413	0.7495	0.5142
C4	0.5020	0.6774	0.6593	0.6129	0.6129
C5	0.2843	0.5750	0.5753	0.6546	0.3605

3.2.4. Steps 4 and 5: Obtain R and C vectors and determine α value

At this stage of the process, the R and C vectors could be determined by adding the matrix's row and column values separately, after which the α value was calculated (0.5755) by averaging the values in total influence matrix *T*. Table 13 shows the *R* and *C* vector values and, based on the α value, the most important effects between clusters (i.e., shaded in blue).

Table 13. Total influence total *T* – inter-clusters (auxiliary calculations)

	C1	C2	C3	C4	C5	*R*
C1	0.3065	0.6148	0.5038	0.7495	0.5142	2.6888
C2	0.5504	0.5825	0.7760	0.9108	0.6755	3.4953
C3	0.3690	0.6148	0.4413	0.7495	0.5142	2.6888
C4	0.5020	0.6774	0.6593	0.6129	0.6129	3.0645
C5	0.2843	0.5750	0.5753	0.6546	0.3605	2.4497
C	2.0121	3.0645	2.9556	3.6774	2.6774	

3.2.5. Step 6: Design cause-effect relationships map

The last step of the DEMATEL process was to generate the inter-cluster cause-effect relationships maps. Table 14 presents the resulting *R* – *C* scores on the vertical axis and the *R* + *C* scores on the horizontal axis.

Table 14. Auxiliary calculations for cause-effect relationships map

	R	*C*	*R* + *C*	*R* – *C*
C1	2.6888	2.0121	4.7009	0.6767
C2	3.4953	3.0645	6.5598	0.4307
C3	2.6888	2.9556	5.6444	–0.2668
C4	3.0645	3.6774	6.7419	–0.6129
C5	2.4497	2.6774	5.1271	–0.2277

The next task was to design the DEMATEL diagram (see Figure 2).

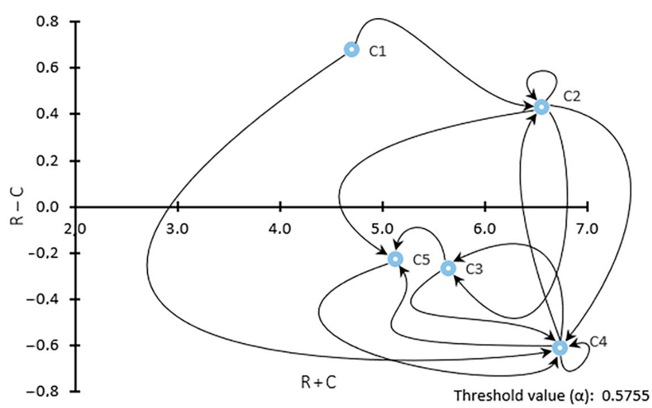

Figure 2. DEMATEL inter-cluster relationships diagram

The analyses of this DEMATEL inter-cluster relationships map, as well as the findings for each of the five clusters, are discussed in the next subsection.

3.3. Main results

The DEMATEL inter-cluster relationships map in Figure 2 shows that the most important cluster in the analysis system created is C4, followed by – in descending order of importance – C2, C3, C5, and C1. Using the vertical *R* – *C* axis, the two-way cause-effect relationships between clusters can be measured. Clusters C3, C4 and C5 are effects (i.e., negative *R* – *C* values), while C1 and C2 are causes (i.e., positive *R* – *C* values).

The results obtained for relationships within each cluster are presented in the order that they were created (i.e., C1, C2, C3, C4, and C5). The results for C1 are shown in Tables 15 and 16 and Figure 3.

Table 15. Total influence matrix *T*

	2	4	6	12	14
2	0.1643	0.0572	0.3950	0.2342	0.0340
4	0.3108	0.0819	0.4407	0.1296	0.1736
6	0.4410	0.1842	0.2721	0.3132	0.1094
12	0.3505	0.0606	0.4182	0.1304	0.0360
14	0.2849	0.1887	0.3658	0.1112	0.0496

Table 16. Auxiliary calculations for C1 *Physical Space*

	R	*C*	*R* + *C*	*R* – *C*
2	0.8847	1.5516	2.4363	–0.6668
4	1.1366	0.5726	1.7092	0.5641
6	1.3199	1.8919	3.2118	–0.5719
12	0.9956	0.9186	1.9142	0.0770
14	1.0002	0.4025	1.4026	0.5977

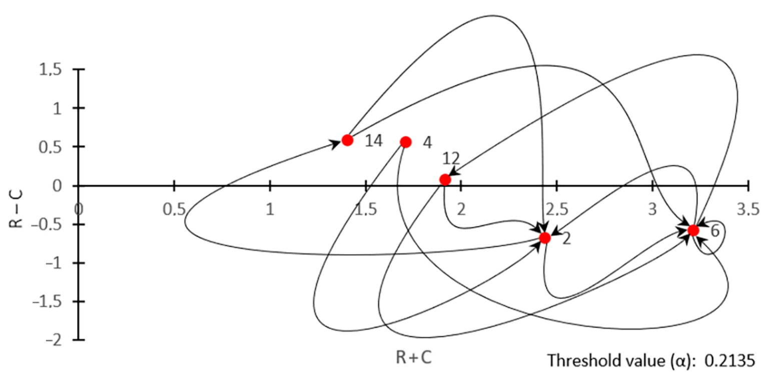

Figure 3. DEMATEL relationship diagram for C1 *Physical Space*

The results highlight that criterion 6 is the most important factor with a value of 3.2118. Criterion 14 has a value of only 1.406, which makes it the least significant. The most important criteria in terms of effects (i.e., a negative *R* – *C* value) are 6 and 2. This means that these criteria are more influenced by all the others. The causal factors (i.e., the criteria that exert more influence) are criteria 12, 4, and 14.

The next cluster analyzed refers to C2 (see Tables 17 and 18 and Figure 4). The results show that criteria 27 and 26 are the most significant within this cluster. The remaining criteria are – in descending order of importance – as follows: 24 > 25 > 44 > 42 > 47. Finally, the criteria that have more influence on all the others are 42, 26, 25, 27, and 24 because of their negative *R* – *C* scores. The factors that are the most affected by all the others (i.e., positive *R* – *C* values) are 4 and 47.

Table 17. Total influence matrix *T*

	24	25	26	27	42	44	47
24	0.6428	0.6937	0.7871	0.8024	0.7103	0.6940	0.3893
25	0.6757	0.5872	0.7987	0.7912	0.6958	0.6121	0.2041
26	0.7793	0.7702	0.6687	0.7887	0.6837	0.6834	0.2236
27	0.8212	0.8036	0.8622	0.7060	0.7576	0.6435	0.3189
42	0.5900	0.6681	0.7092	0.7023	0.4747	0.4354	0.1793
44	0.7143	0.6586	0.7461	0.7410	0.5092	0.4724	0.2066
47	0.5323	0.3410	0.3797	0.5024	0.3163	0.4344	0.1492

Table 18. Auxiliary calculations for C2 *Management/Human Resources*

	R	*C*	*R* + *C*	*R* – *C*
24	4.7196	4.7556	9.4752	–0.0360
25	4.3649	4.5224	8.8873	–0.1575
26	4.5975	4.9516	9.5491	–0.3542
27	4.9129	5.0341	9.9470	–0.1212
42	3.7591	4.1478	7.9068	–0.3887
44	4.0483	3.9751	8.0234	0.0732
47	2.6553	1.6710	4.3263	0.9844

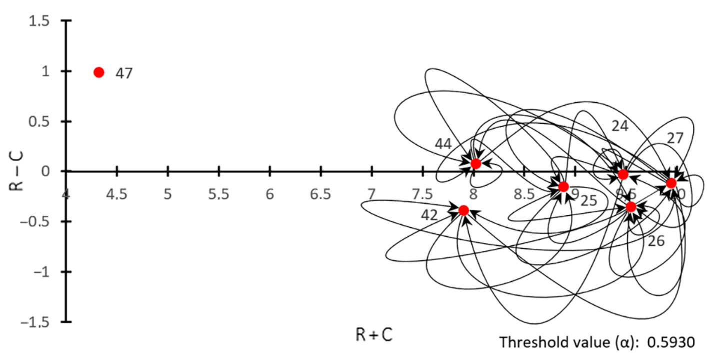

Figure 4. DEMATEL relationships diagram for C2 *Management/Human* Resources

The results for C3 are presented in Tables 19 and 20 and Figure 5. The most significant criterion is 69, with an *R* + *C* score of 8.5889, which is followed closely by criterion 68. The criteria ranked as effects (i.e., influenced by the other factors) are 68, 67, and 70. The criteria that are clearly causes are 90, 77, 66, and 69.

Table 19. Total influence matrix *T*

	66	67	68	69	70	77	90
66	0.4507	0.4761	0.6833	0.6085	0.6446	0.4456	0.4744
67	0.2585	0.2766	0.4563	0.4330	0.3953	0.1898	0.1849
68	0.5797	0.6066	0.5466	0.6457	0.6447	0.4025	0.4002
69	0.6072	0.6726	0.7594	0.5706	0.6793	0.5146	0.5120
70	0.4856	0.5068	0.5761	0.5089	0.3970	0.2956	0.2630
77	0.6763	0.7077	0.8044	0.7533	0.7522	0.3982	0.5383
90	0.6763	0.7077	0.8044	0.7533	0.7522	0.5410	0.3955

Table 20. Auxiliary calculations for C3 *Processes*

	R	*C*	*R* + *C*	*R* – *C*
66	3.7832	3.7344	7.5176	0.0488
67	2.1944	3.9541	6.1485	–1.7597
68	3.8261	4.6305	8.4566	–0.8044
69	4.3156	4.2733	8.5889	0.0423
70	3.0330	4.2652	7.2982	–1.2322
77	4.6305	2.7873	7.4178	1.8431
90	4.6305	2.7684	7.3988	1.8621

The main results for C4 (see Tables 21 and 22 and Figure 6) support the conclusion that the most important criterion, with an *R* + *C* score of 4.1593, is 98, which is followed by criterion 97, with an *R* + *C* score of 4.0278. Regarding the cause-effect relationships, the factors that most influence all the others (i.e., positive *R* – *C* values) are, once again, criteria 98 and 97. The effects criteria (i.e., mainly affected by the others) are 101 and 102.

Table 21. Total influence matrix *T*

	97	98	103	101	102
97	0.2625	0.4372	0.5473	0.6689	0.7411
98	0.4958	0.2895	0.5698	0.6436	0.7616
103	0.4137	0.2862	0.2653	0.5844	0.5956
101	0.0636	0.0964	0.1423	0.1236	0.3708
102	0.1352	0.2898	0.2173	0.3175	0.2415

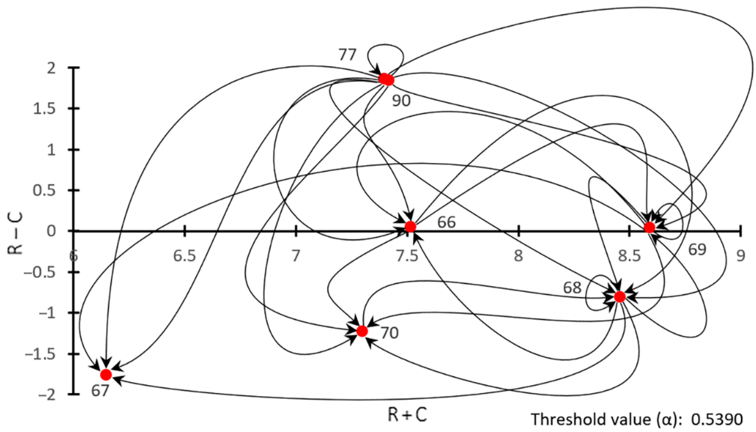

Figure 5. DEMATEL relationships diagram for C3 *Processes*

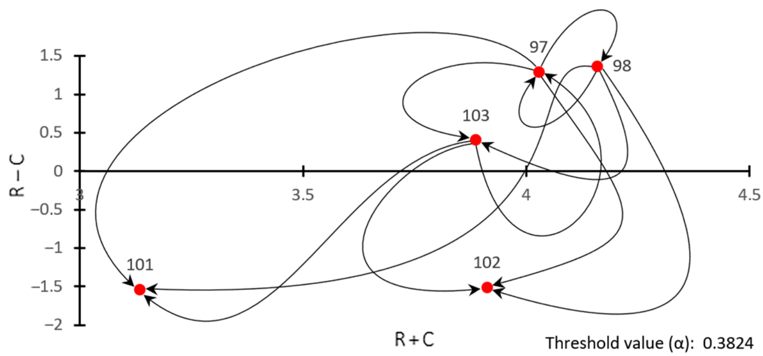

Figure 6. DEMATEL relationships diagram for C4 *Culture*

Table 22. Auxiliary calculations for C4 *Culture*

	R	*C*	*R + C*	*R – C*
97	2.6569	1.3709	4.0278	1.2860
98	2.7603	1.3991	4.1593	1.3612
103	2.1452	1.7419	3.8871	0.4033
101	0.7967	2.3380	3.1347	–1.5413
102	1.2013	2.7105	3.9118	–1.5092

The main results for C5 (see Tables 23 and 24 and Figure 7) indicate that criteria 122 and 111 are the most significant according to the decision-maker panel. In addition, the factors that are the most influenced are 116 and 117, while the criteria that exert more influence on all the others are 122, 111, and 118. After the main results were analyzed, a final session took place to consolidate the findings.

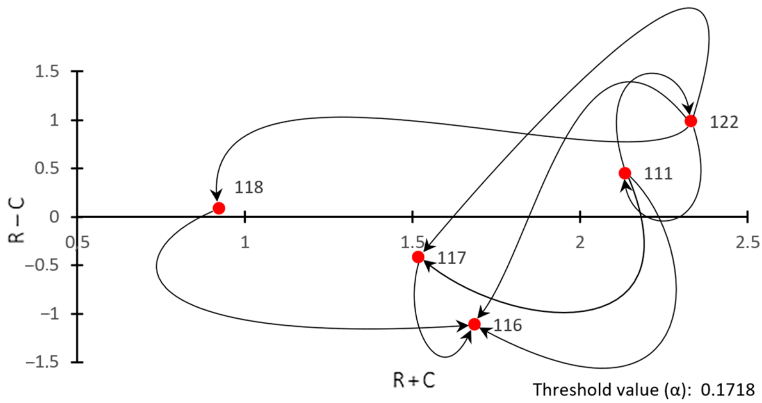

Figure 7. DEMATEL relationships diagram for C5 *Training*

Table 23. Total influence matrix *T*

	111	116	117	118	122
111	0.1494	0.3788	0.3712	0.0789	0.3155
116	0.1437	0.0473	0.0464	0.0099	0.0394
117	0.1218	0.2500	0.0565	0.0245	0.0980
118	0.0576	0.2420	0.0993	0.0211	0.0844
122	0.3681	0.4795	0.3933	0.2836	0.1343

Table 24. Auxiliary calculations for C5 *Training*

	R	*C*	*R* + *C*	*R* – *C*
111	1.2937	0.8405	2.1342	0.4531
116	0.2867	1.3976	1.6843	–1.1109
117	0.5508	0.9667	1.5175	–0.4159
118	0.5044	0.4179	0.9223	0.0864
122	1.6589	0.6717	2.3306	0.9872

3.4. Consolidation, discussion, and recommendations

A consolidation session was held with the CEO of VMLY&R Lisboa. This meeting also took place in the Zoom platform. The session was structured into four parts: (1) overview of the literature on innovation culture and the methodology applied; (2) presentation of the main results; (3) gathering of feedback on the methodological approach; and (4) definition of an action plan based on the findings for VMLY&R Lisboa.

With regard to the methods used, the CEO stated that he was extremely satisfied with the procedures, the collaboration between the panel members, and their contributions to the discussion, which made the process quite active, constructive, and transparent for everyone involved. This decision maker then highlighted the importance of the group sessions' results, such as the clusters and criteria, and the findings that he wanted to share with the entire team as soon as a concrete action plan could be implemented. According to the CEO of VMLY&R Lisboa:

"These results provide very important clues that can serve as a guideline not only for further improvements but also for the prioritization of what needs to be done. So, in that sense, I think the work done is great! Now, there is the next challenge, which is the implementation of this framework" (in his words).

Finally, this decision maker underlined the less positive aspects of the methodological approach, which were, first, the complexity of the DEMATEL technique. In several steps, time-consuming technicalities did not allow the expert panel to discuss innovation culture adequately, which the CEO considered to be essential. Second, the decision maker mentioned the need to include external experts in the panel, who could provide more objective views on and discussions about the topic.

As final note, we should keep in mind that our methodological proposal is constructivist and process-oriented, meaning that it is more focused on process than on specific desired outcomes. As explained by Belton and Stewart (2002) and Franco and Montibeller (2010), although the results are contextualized, the procedures, when correctly applied, can work just as effectively with other decision-makers or in other contexts/countries.

Conclusions and future research

The main results include the need for the multinational advertising agency VMLY&R Lisboa to develop a more strategic focus on business management, human resources, and organizational culture. The DEMATEL technique revealed the most influential clusters with regard to strengthening innovation culture. An interesting connection was found between these clusters and their importance during organizations' post-pandemic period. The latter comprises a deep transformation that has forced companies to rethink their internal and external processes in terms of management, work, business, and human resources, which necessarily includes how their organizational culture affects all these aspects.

The panel members identified the C2 (i.e., *Management/Human Resources*) and C4 (i.e., *Culture*) clusters as the most important. The specific criteria that stood out were 27 (i.e., transparency) and 16 (i.e., young team) from C2 and 98 (i.e., shared and aligned mindset) and 97 (i.e., less reactive, more proactive leadership) from C4. As a multinational advertising agency, the company is going through a series of profound changes, which motivated it to treat the present study's results as the basis for an action plan that will allow the firm to operate smoothly during this transformational restructuring period.

As part of the creative industries, advertising fundamental drivers are innovation and creativity. Thus, an organizational culture must be fostered that provides the conditions for both innovation and creativity to be top priorities in order to ensure a truly lively innovation culture and to improve organizational performance.

The existing literature and the work done by the VMLY&R Lisboa decision-maker panel confirm that the current results are consistent with this firm's intention and/or need to rethink its management, human resources, and organizational culture. The findings include five clusters defined by the expert panel and the corresponding matrixes of total influence *T*.

The panel members identified the top five criteria in terms of greatest influence on innovation culture as transparency, young team, factory mode, more integrated teams, and a shared and aligned mindset.

Transparency is clearly important to the entire process of redesigning VMLY&R Lisboa's organizational culture, and the recruitment of a young team contributes to the success of this process as well. Factory mode is also a significant factor because, according to the panel, this approach has a deep, negative impact on creative output. Factory mode is also a deeply rooted problem affecting internal procedures, time management, and all aspects of relationships established with clients.

Another crucial criterion is the formation of more integrated work teams focused on branding, advertising, and social media. This finding is in line with the DT approach, in which multidisciplinary and collaborative work can produce remarkable results with regard to stimulating innovation and creativity. Finally, a shared and aligned mindset is important since fostering the right mentality and an aggregate approach ensures that every team member is in alignment with organizational goals. These five guidelines can guide VMLY&R Lisboa's efforts to enhance its innovation culture, which was the main focus of the present research.

Future research on this topic could complement the proposed methodological approach with other techniques that may make the findings more empirically robust. In addition, the pandemic has had deep impacts on most of the factors identified in this study. Thus, the present results should be examined with reference to the most thoroughly researched trends triggered by this health crisis in order to understand how different organizations' innovation culture can be affected by these tendencies. Finally, researchers could continue to refine the results of the current DEMATEL application by adopting other methodologies to explore more thoroughly the best way to implement concrete initiatives. These studies would need to consider the barriers to be overcome, bureaucratic and legal constraints due to firms' integration into international networks, and financial, human and technical resources that might constrain the implementation of action plans.

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