



ORGANIZATIONAL MATURITY FOR COLLABORATIVE NETWORKS

MATURIDADE ORGANIZACIONAL PARA REDES COLABORATIVAS

ABSTRACT:

Collaborative networks are partnerships between autonomous, geographically distributed, and heterogeneous actors in terms of operational, cultural environment, social capital, and objectives, rather than collaborating to achieve common or compatible goals. These relationships are important for organizations because they make it possible to share competencies and resources among themselves, which would not be possible in this case in an isolated way. There are many advantages, there are stories of partnerships between organizations that are not successful, which are due to late involvement of interested parties, lack of clarity about roles, responsibilities, and expectations, lack of trust, and lack of basic infrastructure that allows transactions to be carried out. This causes more than half of the efforts in collaborative networks to fail. Efforts of researchers have been directed in recent years to understand this problem, considering that organizational maturity is the factor that can improve this scenario, providing elements for the preparation of organizations to participate in these inter-organizational arrangements. This paper aims to present an instrument for measuring organizational maturity for participation in inter-organizational collaborative networks.

Keywords: Collaborative Networks; Maturity; Readiness; Preparedness; Cooperation.

RESUMO:

As redes colaborativas são parcerias entre atores autônomos, geograficamente distribuídos e heterogêneos em termos de ambiente operacional, cultural, capital social e objetivos, mas que colaboram para alcançar objetivos comuns ou compatíveis. Estas relações são importantes para as organizações, pois possibilita compartilhar competências e recursos entre si para atingir objetivos que não seriam possíveis caso agissem de modo isolado. Embora existam muitas vantagens, há relatos de parcerias entre organizações que não foram exitosas, quer seja pelo envolvimento tardio das partes interessadas, falta de clareza sobre os papéis, responsabilidades e expectativas, falta de confiança e inexistência de infraestrutura básica que permita realizar transações. Isso faz com que mais da metade dos esforços em redes colaborativas fracassem. Esforços de pesquisadores foram direcionados nos últimos anos para entender este problema, considerando que a maturidade organizacional é o fator que pode melhorar este cenário, fornecendo elementos para a preparação das organizações com intuito de participar destes arranjos interorganizacionais. Este artigo objetiva apresentar um instrumento de mensuração da maturidade organizacional para participação em redes colaborativas interorganizacionais.

Palavras-chave: Redes Colaborativas; Maturidade; Prontidão; Preparação; Cooperação.

RESUMEN:



As redes colaborativas são parcerias entre atores autônomos, geográficamente distribuídos e heterogéneos em termos de ambiente operacional, cultural, capital social y objetivos, mas que colaboram para alcançar objetivos comunes, o compatíveis. Estas relaciones son importantes para las organizaciones, ya que es posible compartir competencias y recursos entre sí para alcanzar objetivos que no se pueden lograr en modo aislado. Embora existam muitas vantagens, há relações de parcerias entre organizações que não foram exitosas, quer seja pelo envolvimento tardio das partes interessadas, falta de clareza sobre los papeles, responsabilidades e expectativas, falta de confianza e inexistencia de infraestructura básica que permita realizar transacciones. Isso faz com que mais da metade dos esforços em redes colaborativas fracassem. Esforços de pesquisadores foram direcionados nos últimos años para entender este problema, considerando que a madurez organizacional é o fator que pode melhorar este cenário, fornecendo elementos para a preparação das organizações com intuito de participar destes arranjos interorganizacionais. Este trabajo presenta objetivamente un instrumento de medición de la madurez organizacional para participar en redes colaborativas interorganizacionales.

Palabras clave: Redes Colaborativas; Madurez; Preparación; Cooperación.

1 INTRODUCTION

The organizations have sought to get closer to others to form an organizational structure capable of meeting demands that they could not meet in an isolated way. These structures are called inter-organizational networks, which can be configured as strategic alliances, networks, inter-organizational cooperation, inter-firms, partnerships, collaboration and consortia (Balestrin, Verschoore, and Junior 2010), virtual organizations (OV), virtual corporations (CV), virtual networks, collaborative networks, virtual companies (Durugbo, 2016), Virtual Breeding Environment (VBE) (Graça and Camarinha-Matos 2017a), joint ventures, outsourcing.

The initiatives to form collaborative networks between organizations have the potential to develop lasting and successful partnerships, in a mutually beneficial relationship between organizations. Sharing skills and resources enhances these relationships, as organizations miss opportunities because they do not have all the necessary skills.

The integration between organizational competencies via collaborative networks allows for meeting demands and obtaining new opportunities, as well as sharing resources, which can be physical (physical infrastructure, equipment), technological (knowledge, know-how, patents), financial (sources of financing, capital



contributions), and reputation (Abreu and Camarinha-Matos, 2008; Abreu and Urze, 2014; Bodin and Nohrstedt, 2016; Xue et al. 2018).

The low maturity in managing relationships between organizations does not create an adequate context for exchanging resources between companies (Tomás-Miquel et al. 2018). Collaborating is evidence of this maturity reflected in the provision of personnel, budget, training, technology, and other resources based on the quality and effectiveness of collaborative activities across organizational boundaries, including the following elements: preparedness, readiness, promptness, aptitude and willingness (Romero, Galeano, and Molina, 2009).

From the company's perspective, the study of maturity is important to identify the requirements met and the gaps to be addressed to be ready. From the aspect of business ecosystems, it is important to identify organizations that meet certain requirements for the success of projects. Even for a geographic region, it helps with the purpose of public policies to meet these types of arrangements based on the characteristics of the organizations that make them up, such as business ecosystems.

Among the advantages of inter-organizational networks, the following stand out: greater visibility; greater negotiating power; access to a greater variety of suppliers; exchange of information and learning; reduction of expenses with inputs and management structure; large marketing campaigns; annual distribution of (residual) financial values (Carvalho et al. 2018).

The formation of a collaborative network is difficult to implement, where more than fifty percent of efforts end in failure and the assumed objectives are not always achieved (Sienkiewicz-Małýjurek, 2019). Other evidence regarding the effectiveness of collaboration for innovation has been inconsistent and often contradictory (Rojas, Solis, and Zhu 2018).

To form collaborative networks, organizations need to be able to participate in these inter-organizational arrangements, these conditions are related to their level of maturity for participation in collaborative networks.

Approximately 90% of new ideas never convert into deliveries of new products or services due to a lack of organizational readiness (Lokuge et al. 2019). Maturity, trust, experience, and a sense of belonging in inter-organizational relationships generate an appropriate context for the exchange and flows of knowledge between companies (Tomás-Miquel et al. 2018).



The effects of partnerships tend to vary according to factors related to the company's maturity, orientation towards open and radical innovations, industry sectors, and innovation categories (Rojas, Solis, and Zhu, 2018). Maturity can also lead to the organization's competence as it compares it with other companies in the same sector (Chandra and Kumar, 2018).

The research question of this study is whether the development of a measurement instrument, with indicators, criteria, dimensions, and categories, can measure the maturity of an organization to participate in collaborative networks.

The objective of this paper is to present an instrument for measuring organizational maturity for participation in collaborative networks.

This paper is divided as follows: from this introduction, it continues with a review of the literature, then the methodology, then the research results, and finally presents the main conclusions of this study.

2 LITERATURE REVIEW

This chapter intends to present the main theoretical frameworks of this research, starting with collaborative networks, a relevant aspect to understanding one of the main benefits in the formation of inter-organizational arrangements, and then presenting the theoretical aspects of organizational maturity.

2.1 COLLABORATIVE NETWORKS

There is big empirical knowledge about collaborative networks, therefore it is necessary to consolidate this knowledge and build the foundations for the development of this area. Reference models and the establishment of a scientific discipline for collaborative networks are strong instruments to achieve this objective (Camarinha-Matos and Afsarmanesh 2007). The understanding of this requires contributions from various disciplines, such as computer science and engineering, administration, economics, sociology, industrial engineering, law (Camarinha-Matos and Afsarmanesh 2011), accounting, mathematics, etc.

The collaborative network is a type of network that consists of a variety of entities (e.g., organizations and people) that are autonomous, geographically



distributed, and heterogeneous in terms of operating environment, culture, social capital, and objectives, yet collaborate to achieve objectives common or compatible, supported by ICTs (Graça and Camarinha-Matos 2017b; Romero, Galeano, and Molina 2009; Camarinha-matos and Afsarmanesh 2006).

It refers to a process of interactions to build relationships with many actors outside the organization, increasing their capabilities, acquiring and co-creating value, and aligning their capabilities with other actors. They become part of an ecosystem where actors collaborate, develop, and build competence and strategic businesses with participating partners (Widjojo et al. 2020).

The logic of collaborative networks can be discussed from four points of view: 1. Pool of resources; 2. Electronic business initiatives; 3. Innovation cluster; and 4. Industrial symbiosis (Durugbo 2016).

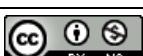
With sharable, tangible, and intangible resources, it excludes unnecessary elements, and makes the best assets available, reducing costs and increasing the efficiency of the collaborative network (Romero, Noran, and Afsarmanesh 2015). The presence of such resources allows companies to identify and realize innovations quickly (Durugbo 2016).

The lack of effective models to support the management of collaborative networks is one of the main factors preventing organizations from engaging more frequently in collaborative network models. Among the challenges that organizations need to face when working in collaboration networks, several authors argue that the management of three different dimensions of collaborative risks: 1. Behavioral risks; 2. Risk of assigning tasks to partners; and 3. Risk from non-cooperative partners (Nunes and Abreu 2020).

Innovative business models can be improved to support collaborative networks, which must combine their partnerships for this purpose (Loss and Crave 2011). The literature analysis points out that the management of collaborative networks is linked to four main strategies: complementarities of skills, intelligence for interoperable infrastructures, resource orchestration, and performance reliability (Durugbo 2016).

3 ORGANIZATIONAL MATURITY

A maturity model is a conceptual framework used to define maturity in the area





of interest (PMI, 2017). Through it, it is possible to assess whether or not the organization has the necessary skills to achieve the desired results, observe opportunities to improve productivity and reduce costs, and plan and monitor actions for continuous improvement of business processes.

The maturity models are a guide to gaining greater control of processes and can be used as an informative approach to increase a specific area of capability within the organization (Pault et al., 1993).

The main criticisms of maturity models converge on the fact that there is no global standard, a consensus on the model, which can be justified because it is a new concept that requires greater attention from researchers and companies (Khoshgoftar and Osman, 2009).

De Bruin et al. (2005) identified 150 different types of maturity models, aimed mainly at the areas of project management, innovation, information technology, and knowledge management.

Regarding organizational maturity for the composition of collaborative networks, there is considerable divergence in the criteria, like the general theory, Baldo and Rabelo (2010) use a questionnaire with a scale of values to classify organizations, using the scale, excellent, good, nothing good, and bad. Romero, Galeano, and Molina (2009) seek to know the level of readiness for collaboration using the weights and qualifications of each component, which can be: low, medium, or high level. Jackson and Klobas (2008) establish criteria for evaluating the functioning of virtual teams, based on a five-point scale: none, ad hoc, basic, standardized, and optimized.

While Rosas and Camarinha-Matos (2009) propose ten definitions for assessing organizational maturity and Rosas, Macedo, and Camarinha-Matos (2011) present another twelve definitions for establishing competency profiles (Gall and Burn, 2006, 2007) developed two different instruments.

The Arcon RTD project as a reference model had three stages, namely motivation, readiness assessment, and interoperability, and also considered three time levels, short, medium, and long-term (Cannas et al. 2007).

The ICoNOs project aimed to establish business alignment maturity with information technology with five levels, incomplete, isolated, standardized, quantitative, and optimized management, in four different domains (Bukhsh, Daneva, and Weigand, 2012). Albinsson, Perera, and Sautter (2016) also contributed to the scale called DART, which establishes the dimensions of dialogue, access, risk





assessment, and transparency as evaluation parameters. However, it is not possible to use it as a reference for the development of a new instrument, current and considering everything that has been studied to date.

4 METHODOLOGY

This research follows the guidelines established by Schardosin and De Rolt (2021), its nature is prescriptive, proposing solutions, as a direct response to the problem presented, prescribing an ideal theoretical model that delimits the concepts (Bonat, 2009), and can be applied to practical cases. The study follows the Design Research methodology, which presents the necessary steps to develop an artifact or research product, according to Van Aken and Romme (2009):

- (1) Definition and understanding of the problem to be solved;
- (2) Systematic review;
- (3) Research summaries;
- (4) Design proposals; It is
- (5) Testing for development.

The systematic review approach, in line with Tranfield, Danyer, and Smart (2003), consists of three main steps: planning, execution, and reporting. Planning involved developing a review protocol (Torgerson, 2003) that details the research plan, questions, and scope of the review.

Four databases were consulted: 1. Scopus, which covers approximately 19,500 titles from more than 5,000 publishers, including coverage from 16,500 journals; 2. Web of Science (WoS), which brings together 216 journals and 70 publishers; 3. Ebsco, which has 375 full-text databases; and 4. Science Direct which covers approximately 2,500 scientific journals and more than 26,000 e-books. These bases present the largest universe of research in the area of this topic.

The bibliographic portfolio resulted in 95 studies in total, among the types of publications, they are classified as follows: 58 papers in journals; 27 book chapters; 8 conference proceedings; and 2 books.

As an investigation strategy, this research uses qualitative and quantitative approaches. Qualitative aspects were necessary to develop the constructs that would





be explored and, the construction of dimensions and categories. On the other hand, quantitative aspects needed to be implemented to establish criteria for differentiating between the constituent elements and determining the resulting impacts, adopting specific methods for each approach, mixed methods enable a better understanding of a problem or research question (Creswell, 2014).

The sequential exploration strategy was used, which is used when a researcher needs to develop an instrument, because the instruments are not available or, when available, they are inadequate or there are differences between the instruments, which justifies the adoption of a new model. To achieve this, a three-phase approach is used: 1. Gather qualitative data and analyze it; 2. Uses analysis to develop an instrument; and 3. Applies to a sample of a population (Creswell, 2014).

A research was carried out with a focus group, which is a form of research that capitalizes on communication between group members to generate data, it is a convenient way of collecting data such as beliefs, opinions, and views from several people simultaneously, focus groups they use group interaction as part of the method (Kitzinger, 1995).

The focus group was made up of 12 members in total, with 2 professors as moderators and 10 components, who are characterized as postgraduate students and professionals. The objective of this stage was to develop criteria for organizational maturity for participation in collaborative networks.

The measurement model was developed based on the criteria raised by the focus group, dividing them into analysis categories, and grouped into dimensions. Based on these criteria, narrative reviews of the literature were prepared, to find works that addressed the topic, preferably in collaborative networks.

The choice for the narrative review method is due to four factors: 1. Previously carrying out a systematic review of the topic with appropriation of the main works in the exploratory study; 2. Systematic searches, for the established criteria, did not present consistent and sufficient results; 3. In addition to scientific works, other sources of information were added, such as legislation, technical reports, and manuals; and 4. Appropriation of debates from different areas to compose the study portfolio for collaborative networks.

Thus, the main study references were defined to integrate the organizational maturity measurement instrument to compose collaborative networks. For each criterion, four levels were established, aligned with multilevel criteria of three to five,



for this theme, recommended by Venkatraman and Henderson (1998), Cannas et al. (2007), Jackson and Klobas (2008), Romero, Galeano, and Molina (2009), Baldo and Rabelo (2010), and Bukhsh, Daneva, and Weigand (2012).

Level zero corresponds to the complete absence of measurement, in other words, organizations that cannot score in the respective item because they do not have the minimum assessment conditions that could qualify them for the other levels.

Level one is the lowest level of measurement and corresponds to the lowest maturity indicator for the criterion. While level two is the intermediate indicator and level three corresponds to the indicator of greater maturity for the composition of collaborative networks within the established criteria.

For this research, interviews were carried out with experts, from which 19 individuals were chosen to compose a non-probabilistic convenience sample. The criteria elaborated in the measurement instrument were subject to analysis by experts, intending to establish parameters for measuring each aspect. In this way, experts were invited to first assess the degree of importance of each of the dimensions for the composition of collaborative networks, then they were invited to assess the degree of importance of each of the categories in each dimension. After collecting this data, a simple arithmetic average of the experts' responses was created, and then these averages were transformed into a percentage index explaining the theme or dimensions, using equation (2), the sum of the percentages of each criterion formed the entire aspect studied.

$$x = \frac{n_i}{\sum_{i=1}^n n} \times 100 \quad (1)$$

The items in the equation represent the percentage rate (x); mean value of the criterion (n); and average value of the criterion to be converted into percentage rate (ni). A scale from 1 to 6 was established, taking into account the linearity between them, considering point 6 (100%), point 5 (80%), point 4 (60%), point 3 (40%), point 2 (20%) and point 1 (0%). Thus, aware of the percentages of each criterion, it is possible to measure the maturity of an organization to participate in collaborative networks, whose indicator is established according to equation (2), proposed by Ensslin, Montibeller Neto, and Noronha (2001).

$$V(a) = W_1 \cdot V_1(a) + W_2 \cdot V_2(a) + W_3 \cdot V_3(a) + \dots + W_n \cdot V_n(a) \quad (2)$$



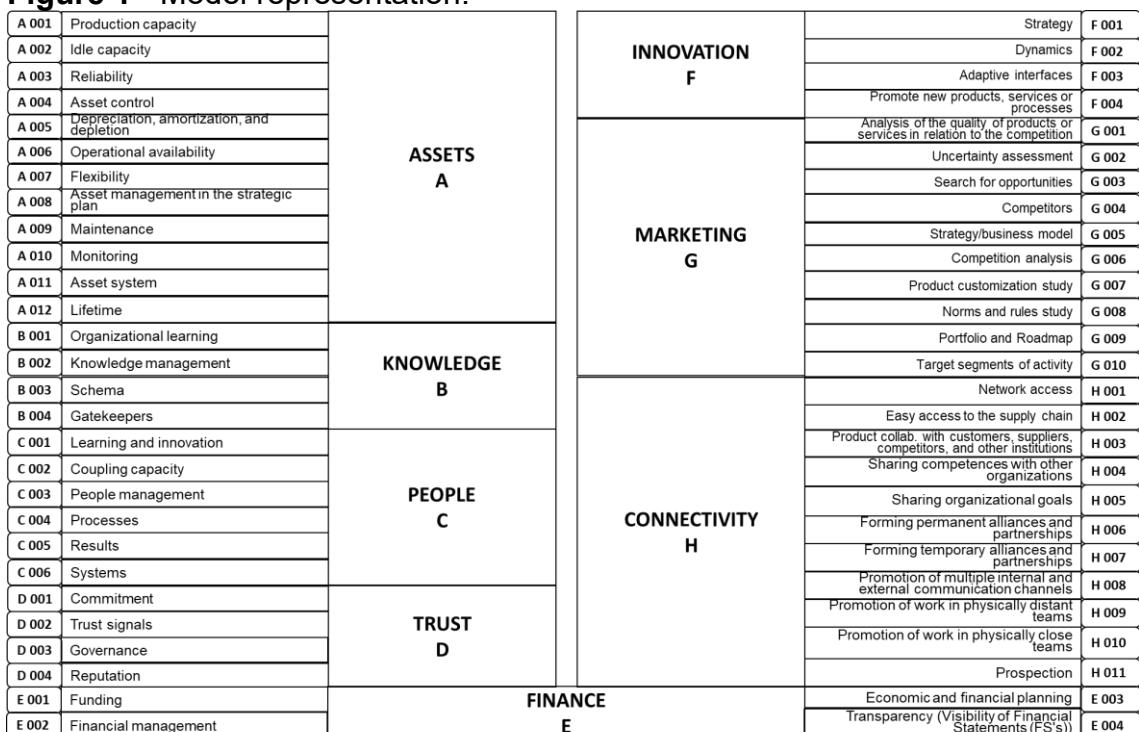
The items in the equation represent: the value of the maturity indicator ($V(a)$); indicator value in criteria 1,2, ..., n ($V_1(a), V_2(a), \dots, V_n(a)$); criteria rates 1,2, ..., n (W_1, W_2, \dots, W_n); the number of model criteria (n).

Three companies present in a business ecosystem were also chosen to apply the pilot test and validate the instrument. The representativeness of elements for a population is unnecessary, in this case, for two main reasons: 1. Each company has its behavior and resources with different configurations, so statistical generalization would be ineffective; 2. The instrument deals with identifying the level of maturity of the organization and not the population of which it is part. A data collection form was created in the form of a matrix, in which the first column corresponds to the category code, while the first line corresponds to a scale from 1 to 6.

This scale was defined to adjust the levels, from 0 to 3, within the scale, the levels are transformed into the scale, considering that point 1 (level 0) corresponds to the absence of conditions for the company to score in the criterion, point 2 corresponds to the level 1, point 4 corresponds to level 2 and point 6 corresponds to level 3. The criteria in which the company is located between one level and another, that is, it has elements from both levels, could be point 3 or point 5 of the scale. The complete model can be viewed at the link: <https://bit.ly/organizationalmodel>. Below we present a summary figure of the evaluation criteria.



Figure 1 - Model representation.



Source: Elaborated by the authors (Brazil, 2024).

5 RESULTS

To validate the organizational maturity assessment model for the composition of collaborative networks, the objective was submitted in real cases from three large companies from different areas of activity.

Company A was founded in the second half of the 1970s, operating in the manufacture of electronic equipment for security, networks, and devices for communications and energy. With products intended for homes, condominiums, small and medium-sized businesses, large companies and projects, as well as communication service providers. It has units in four Brazilian states with more than four thousand employed employees. Company A's best performance is in assets, with an average of 5.33 points, followed by trust and finances with 5.25 points on average, then people with 5 points on average, marketing, with 4.6, connectivity with 4.54, knowledge with 4.25 and innovation with 4 points on average.

Given these data, transformed into percentages and after applying equation (2), as presented in the methodology, it results in a maturity of 0.756 for company A.



Considering the different weights for each criterion and the score obtained by the company, it is possible to carry out a sensitivity analysis, considering the improvement in some indicators and the consequent increase in the maturity index obtained, for example, company A obtained its lowest scores in the categories G001 (Analysis of the quality of products or services in relation to competition) and G009 (Portfolio and roadmap) with 3 points in each of these criteria. If it is possible to improve these indicators by increasing from 3 to 6, the maturity index would increase from 0.756 to 0.774, an increase of 2.38% in maturity.

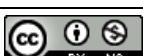
Company B was founded in the second half of the 1970s, just like company A, however, this company is in another area of activity, it produces tiles and flooring for civil construction, with an estimated production of 30 million square meters per year and revenue of almost 1.5 billion reais per year, it has the services of more than 3 thousand employees.

After applying the structured model, it is observed that company B's best performance is in finance, with an average of 5.75 points, followed by trust and innovation with 5 points on average, then marketing with 4.8 points on average, people, with 4.67, assets with 4.58, connectivity with 4.27 and knowledge with 3.75 points on average.

As a result, company B's maturity index is 0.744. For sensitivity analysis, it is possible to consider the improvement in some indicators and the consequent increase in the maturity index obtained, for example, company B obtained its lowest scores in categories A006, A008, A009, B004, and H003 with 2 points in each one of these criteria. If it is possible to improve these indicators by increasing from 2 to 6, the maturity index would increase from 0.744 to 0.804, an increase of 8.06%.

Company C specializes in custom computer program development services, transforming knowledge and technology into solutions for the market, in three spheres: public management; justice; and the construction industry. The company was founded at the beginning of this century and already has more than 2000 employees.

After applying the structured model, it is observed that company C's best performance is in finance, with an average of 5.5 points, followed by assets with an average of 5.17 points, then knowledge with an average of 4.75 points, marketing with 4.7 points, followed by people with 4.67 points and innovation with 4.5 points on average, finally trust and connectivity appear in the last position with 4 points on average.





As a result, Company C's maturity index is 0.729. For sensitivity analysis, company C obtained its lowest scores in categories A002, H002, H003, and H008 with 2 points in each of these criteria. If it is possible to improve these indicators by increasing from 2 to 6, the maturity index would increase from 0.729 to 0.763, an increase of 4.66%.

As demonstrated, the companies that participated in this research come from different areas of activity, the electronic equipment industry, the ceramic industry, and software development services. Even in different areas, the model applied to the three companies and presented solid results, no criteria were left unapplied and there was no positioning at point 1 on the 6-point scale. Furthermore, this model enables predictive analysis that different action decisions can result in the maturity of the organization.

The organizational maturity indices for participation in collaborative networks calculated for the three organizations resulted in 0.76 for company A, 0.744 for company B, and 0.729 for company C. This index can vary from 0 to 1, considering 0 as minimum maturity and 1 as maximum maturity.

Table 1 presents the averages calculated for each dimension and the general average for each company, demonstrating that company A has higher averages than the other two in five of the eight dimensions and the general average.

Table 1 - Case averages for each dimension.

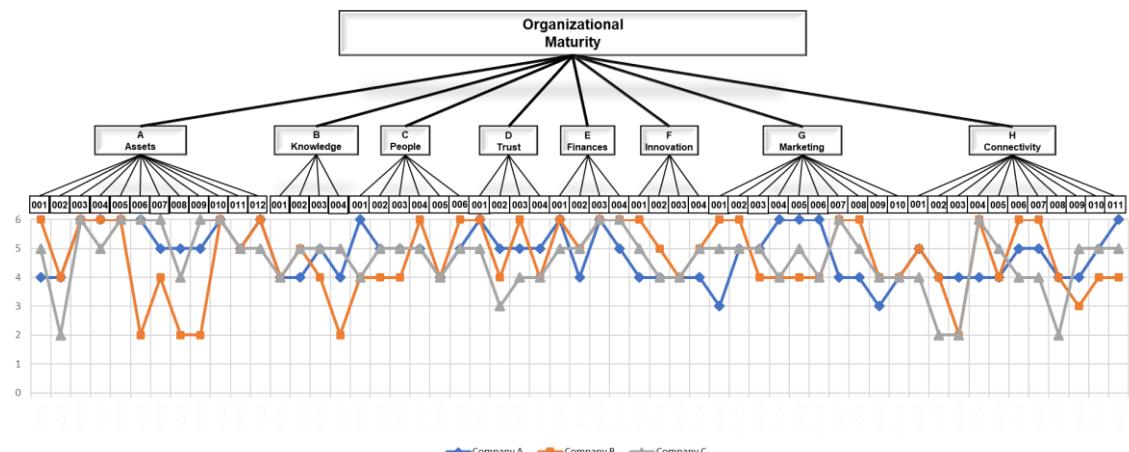
	Company		
	A	B	C
A – Assets	5.33	4.58	5.17
B - Knowledge	4.25	3.75	4.75
C – People	5.00	4.67	4.67
D – Trust	5.25	5.00	4.00
E – Finance	5.25	5.75	5.50
F- Innovation	4.00	5.00	4.50
G – Marketing	4.60	4.80	4.70
H - Connectivity	4.55	4.27	4.00
Global average	4.82	4.65	4.65

Source: Elaborated by the authors (Brazil, 2024).

These data are important to understand the averages of the criteria adopted in the study, but the indication of maturity could only occur using the weights assigned to each criterion. Figure 2 presents the model applied, with the lines demonstrating the scale notes for each criterion in the companies studied.



Figure 2 - Maturity assessment model applied.



Source: Elaborated by the authors (Brazil, 2024).

By observing figure 2, it can be seen that company B obtained more "2" results than other companies, and company A has a smaller range between the highest and lowest scores, which justifies the index results. But company B, despite having more "2" results than company C, has a higher maturity index, this is explained by the fact that the company scored well in more reputable criteria and scored less in criteria with less reputation compared to company C, as is the case with the criteria for the trust dimension, which is the dimension that has the greatest weight among all the others.

6 CONCLUSION

The objective of this paper was to present an instrument for measuring organizational maturity for participation in collaborative networks. This was possible through systematic literature reviews that demonstrated the main scientific advances on the topic to date, different models of maturity, readiness, and organizational preparation in networks, as well as the main divergences in the concepts adopted by different authors.

The preparation concept, which in some cases was treated as similar to the concept of readiness itself, diverged from a precondition for membership, passing through an internal process of the organization until being treated as a step towards the desired readiness. The concept of readiness also had several meanings,





sometimes treated as virtuality, it was also understood as the relationship between the organization and its external environment, and as the result of a sequence of steps.

This paper contributed to the literature by unifying these concepts, to enable the necessary progress, to the point of proposing a maturity model to evaluate organizations that are part of or intend to join collaborative networks.

Another contribution of the systematic reviews was the identification of several different models for identifying organizational readiness to be part of collaborative networks, as well as their use, limits, and potential.

In this way, this paper went beyond the understanding proposed by this objective, providing a greater understanding of this new science and the various concepts that are addressed within its scope. From the clear definition of the concepts, it was possible to carry out a focus group to help in the work of identifying the criteria to evaluate the condition of an organization to participate in a collaborative network, with each member of the group instructed about all the elements that make up this topic, based on studies already carried out.

The focus group participants contributed to the composition of these criteria, both in the individual proposition about dimensions and categories and in the debates that were held during the period, which enabled the construction of a unique evaluation model, including organizational preparation or readiness to compose collaborative networks, which in this paper were identified as a set of criteria.

The positioning of the organizations researched in the measurement model provided their readiness to participate in collaborative networks and not their maturity. Therefore, to identify the maturity of the organization to form collaborative networks, it was necessary to establish parameters that make it possible to evaluate the current state of the organization, considering the what, how, and where to make interventions to improve. Thus, the method was welcomed into the proposed maturity model and provided the necessary methodological parameters for this purpose, which enabled analysis and transitivity between the different criteria of the model, identifying where a decision could cause the greatest impact and what is the effect of this decision.

This resulted in a measurement instrument with methodology and indicators that made it possible to measure the level of maturity of companies for participation in collaborative networks, identifying the organization's potential, needs for improvements, and the impact of these improvements.





This research has the potential to contribute to the environments in which organizations are inserted, providing technical and scientific criteria to measure and improve the maturity of organizations to be part of collaborative networks, as an important aspect for the prosperity of these environments, because networks Collaborative organizations contribute significantly to the development not only of companies, but also of the environment that surrounds them.

Thus, managers of these environments will be able to evaluate current and incoming companies using these criteria, aiming to work together to make better use of the resources existing in the environment and organizations.

Companies also have these criteria in place to evaluate themselves, thinking about developing partnerships with other organizations to share resources and skills to achieve goals together. This reference model has already proven to be suitable for the companies studied and should be replicated in a larger number of companies for the statistical study of organizational maturity for the participation of collaborative networks across all companies.

For use in other environments, it may be necessary to recalibrate the model, that is, apply the instrument to many actors present in the business environment, to identify the importance of each criterion for the reality of the environment where you intend to apply it.

This model can also be used to develop new maturity models, even if they are not in collaborative networks, such as assessing the organization's maturity concerning any of the criteria presented here, in these cases there is a need to adapt the model. The degrees of importance of each criterion can also be used for other areas, as a reference.

New studies are possible in the development and implementation of resource-sharing platforms between organizations, promoting the simultaneous development of companies and the platform, innovating in products and processes, and promoting the development of regions and countries.

This study could support new research in networks of professionals, researchers, institutions, NGOs, and disaster prevention, to use elements of this research for other areas of investigation. Other studies can be carried out to identify the need for improvements in the business environment and to promote network formation initiatives between companies.



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