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Network learning and interorganizational learning: a theoretical framework of relationship and interdependence

Julieta Kaoru Watanabe-Wilbert [1]
Andrea Valéria Steil [2]
Gertrudes Aparecida Dandolini [1]

[1] Universidade Federal de Santa Catarina (UFSC) / Departamento de Engenharia do Conhecimento, Florianópolis – SC, Brazil

[2] Universidade Federal de Santa Catarina (UFSC) / Departamento de Psicologia, Florianópolis – SC, Brazil

Abstract

"Interorganizational learning" (IOL) and "network learning" (NL) are still frequently interpreted as if they were the same phenomenon, even though Knight (2002) claimed they are different constructs. This study demonstrates the consistency of Knight's claim based on the analysis of both learning processes. Moreover, it highlights their differences in understanding the constructs in the scope of interorganizational networks and organizational transformations. Based on an integrative review, this article describes the subprocesses of IOL and NL through a multilevel learning lens. As a result, the authors develop five propositions and a theoretical framework showing that IOL and NL are indeed different constructs, and the former is an antecedent of the latter. By being aware of the differences between the two constructs, managers may allocate resources and energy easier to achieve organizational change or network-wide transformation. Moreover, the paper presents the network multilevel coordination as a key dynamic for IOL to evolve to NL.

Keywords: Network learning. Interorganizational learning. Strategic change. Multilevel learning.

Aprendizagem da rede e aprendizagem interorganizacional: um framework teórico da relação e interdependência

Resumo

A "aprendizagem inter-organizacional" (AIO) e a "aprendizagem da rede" (ADR) ainda são interpretadas como se fossem o mesmo fenômeno, apesar de Knight (2002) já ter afirmado que são construtos diferentes. O presente artigo endossa consistência na afirmação de Knight, com base na análise de ambos os processos de aprendizagem. Além disso, o artigo destaca suas diferenças para se compreender os construtos no âmbito das redes interorganizacionais e das transformações organizacionais. Baseado em uma revisão integrativa, este artigo descreve os subprocessos da AIO e da ADR por meio de uma lente de aprendizagem multinível. Como resultado, os autores desenvolvem cinco proposições e uma estrutura teórica mostrando que as AIO e ADR são, de fato, construtos diferentes, e que o primeiro é um antecedente do segundo. Estar ciente das diferenças entre os dois construtos pode facilitar a alocação de recursos e energia, seja para alcançar mudanças organizacionais ou para transformação em toda a rede. Além disso, o documento apresenta a coordenação multinível da rede como a principal dinâmica para que a AIO evolua para ADR.

Palavras-chave: Aprendizagem da rede. Aprendizagem interorganizacional. Mudança estratégica. Aprendizagem multinível.

Aprendizaje de la red y aprendizaje interorganizativo: un marco teórico de la relación e interdependencia

Resumen

El aprendizaje interorganizativo (AIO) y el aprendizaje de la red (ADR) se siguen interpretando con frecuencia como si fueran el mismo fenómeno, aunque Knight (2002) ya ha afirmado que son constructos diferentes. El presente artículo demuestra la coherencia de la afirmación de Knight a partir del análisis de ambos procesos de aprendizaje. Además, el artículo destaca sus diferencias para comprender los constructos en el contexto de las redes interorganizativas y las transformaciones organizativas. Basándose en una revisión integradora, este artículo describe los subprocesos del AIO y del ADR a través de una lente de aprendizaje multinivel. Como resultado, los autores desarrollan cinco proposiciones y un marco teórico que muestra que el AIO y el ADR son de hecho constructos diferentes, y que el primero es un antecedente del segundo. Tener conocimiento de las diferencias entre ambos constructos puede facilitar la asignación de recursos y energía, ya sea para lograr cambios organizativos o para la transformación de toda la red. Asimismo, el documento presenta la coordinación multinivel de la red como la principal dinámica para que el AIO evolucione hacia el ADR.

Palabras clave: Aprendizaje de la red. Aprendizaje interorganizativo. Cambio estratégico. Aprendizaje multinivel.

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INTRODUCTION

Learning processes in networked organizations help them to manage complex problems (Dirani et al., 2021), improve competitiveness (Ouro, Olave, & Barreto, 2020; Wegner & Mozzato, 2019), and promote strategic changes (Crossan, Lane, & White, 1999; Wegner & Mozzato, 2019). However, to date, studies associating networks and learning processes are still modest (Cemberci, Civelek, Gürol, & Cömert, 2021; Ouro et al., 2020). This article contributes to the body of studies in the field by highlighting two learning processes related to networks and often considered synonyms: interorganizational learning (IOL) and network learning (NL). Some authors (e.g., Anand, Kringelum, Madsen, & Selivanovskikh, 2021; Costa, Bui, De Schutter, & Dedeurwaerdere, 2022; Knight, 2002; Knight & Pye, 2004, 2005), however, argue that the two constructs are different and recognize networks as a level of analysis as well as a learning entity. Indeed, a closer observation of learning processes related to networks reveals two different outcomes: one that transforms organizations within a network through their individualized learning processes (i.e., IOL) (Halachmi & Woron, 2013; Knight, 2002; Wegner & Mozzato, 2019) and a second phenomenon that transforms the network itself when a group of organizations learns as a group (i.e., NL) (Anand *et al*., 2021; Costa et al., 2022; Gibb, Sune, & Albers, 2017; Knight, 2002; Knight & Pye, 2004, 2005; Wegner & Mozzato, 2019).

Once IOL and NL generate different outcomes, their processes are different, but to date, they have not yet been described. The lack of this elicitation leaves aside the potential of NL as a manageable means to promote strategic changes in activity sectors, which can be viewed as "a network of regime organizations" (e.g., food retail industry within the agri-food system) (Costa et al., 2022, p. 67). Moreover, NL may "influence strategic decisions in interorganizational settings" (Wegner & Mozzato, 2019, p. 173), which highlights the relevance of understanding IOL and NL processes. Besides, once NL and IOL are still perceived as the same phenomenon by many, NL as a separated construct has attracted researchers' little attention. Compared to IOL, the number of studies on NL is scarce (Dietrichson & Bukh, 2021; Leung, Xu, Wu, & Luthans, 2019) being the specificities of NL less noticed, making theory building difficult.

Understanding the need for clarity about the domain of IOL and NL, this article sets two research questions: how do the processes of NL and IOL differ? Since IOL and NL may also happen simultaneously (Gibb et al., 2017; Wegner & Mozzato, 2019), what is the relationship between IOL and NL? To accomplish this task, a multilevel learning lens (Crossan et al., 1999; Jones & Macpherson, 2006; Morland, Breslin, & Stevenson, 2019; Mozzato & Bitencourt, 2014) was adopted to understand the processes related to the two constructs once IOL and NL are both multilevel phenomena (Holmqvist, 2003a, 2003b; Jones & Macpherson, 2006; Knight, 2002; Mozzato & Bitencourt, 2014). Hence, IOL and NL were decomposed into subprocesses at the network and organizational levels aiming to identify specific elements, either for researchers to improve the proposed framework to manage networks or for practitioners to allocate resources and efforts to specific subprocesses. The article starts with theoretical foundations on building the differences between IOL and NL. Next, the employed method is described. Then, the findings and their implications for the academy and practical applications in the field of interorganizational networks are discussed.

THEORETICAL FOUNDATION

Organizational learning as a multilevel process

It is widely accepted that organizations learn (Easterby-Smith, Crossan, & Nicolini, 2000; Örtenblad, 2005) and the learning process generates organizations' transformation (Costa et al., 2022; Knight, 2002). For instance, organizational transformations in interpretations (cognitive) (Huber, 1991), practices (behavioral) (Easterby-Smith et al., 2000; Fiol & Lyles, 1985), or both (Knight, 2002) denote organizational learning (OL).

Crossan et al. (1999) introduced to the OL studies the multilevel 4i Framework as a continuous learning process across the individual, group, and organizational levels, and identified four subprocesses (intuiting, interpreting, integrating, and institutionalizing). Jones and Macpherson (2006) improved the 4i Framework and added the fifth "i" to the interorganizational learning process, identifying the "intertwining" between organizational and interorganizational or network levels. More recently, some authors (e.g., Costa et al., 2022; Eiriz, Gonçalves, & Areias, 2017; Mozzato & Bitencourt, 2014; Wegner & Mozzato, 2019) explored a fourth learning level: the network level. These authors contributed to the theoretical bases of the multilevel learning approach adopted in this research. They are presented in the course of this paper.

Interorganizational learning (IOL) in networks

Interorganizational learning (IOL) is a process by which organizations learn during mutual interactions and share knowledge across their borders (Cemberci et al., 2021; Seo & Park, 2022) through alliances with organizations (Halachmi & Woron, 2013), or by joining interorganizational networks (Knight, 2002). IOL occurs when one or more organizations adopt knowledge produced outside its boundaries (Dirani et al., 2021; Holmqvist, 2003a, 2003b; Jones & Macpherson, 2006; Seo & Park, 2022) and integrate it into their organizational learning cycle (Dirani et al., 2021; Leung et al., 2019; Oh & Kim, 2022; Wegner & Mozzato, 2019).

A network is a structured group of autonomous organizations based on common visions (Dirani et al., 2021) to achieve a competitive advantage by operating through mutual exchange and relationships (Cemberci et al., 2021; Knight & Pye, 2005; Ouro et al., 2020). One of the reasons for organizations to join a network is to actively learn from their peers (Cembersi et al., 2021; Lane & Lubatkin, 1998; Mozzato & Bitencourt, 2014; Yström, Ollila, Agogué, & D. Coghlan, 2019). In a network, the core of the learning process lies in interorganizational social relationships, which are influenced by the context in which the network is embedded as well as the organization's characteristics (Knight, 2002; Mozzato & Bitencourt, 2018; Mozzato, Grzybovski, & Fritz, 2022).

Considered a related phenomenon to OL (Peronard & Brix, 2019), IOL in a network involves the acquisition of knowledge from other organizations (Halachmi & Woron, 2013; Knight, 2002; Mariotti, 2012), the transfer of knowledge between organizations (Larsson, Bengtsson, Henriksson, & Sparks, 1998; Mariotti, 2012), as well as the creation of new knowledge through their interactions (Mariotti, 2012; Peronard & Brix, 2019). IOL requires from an organization a willingness to share knowledge, receptivity to absorb external knowledge (Cohen & Levinthal, 1990; Rajala, 2018; Yu, Yang, Sun, & Lin, 2021), and sense-making within the network and among organizations (Morland et al., 2019). Interorganizational relationships may have competition or collaboration features, which are not mutually excluding (Leung et al., 2019; Wegner & Mozzato, 2019; Yu et al., 2021). The present study focuses on collaboration and cooperation among network members. For IOL, the learning entity is still the organization, whereas, for NL, the learning entity is the network: the next section focuses on this differentiation.

Network Learning (NL): when a network learns as a single entity

Larsson *et al.* (1998) tackled the possibility of learning by a group of organizations as a unique entity and recently some scholars published studies presenting this issue (e.g., Cemberci et al., 2021; Yström et al., 2019). Knight (2002) was the first to posit that when this phenomenon occurs, the network transforms itself. According to Knight and Pye (2005), NL occurs through broad and lasting changes in the network structure, interpretations, and practices shared by the network organizations as proposed by the Network Learning Model (NL Model). This model has been disseminated among NL scholars generating new research under the umbrella of different epistemological lenses (e.g., Costa et al., 2022; Dyer & Nobeoka, 2000; Knight & Pye, 2004; 2005; Wegner & Mozzato, 2019). The NL Model presents three factors concerning NL: Context, Content, and Process (Knight & Pye, 2005).

"Context" refers to the external environment in which the network locates (e.g., customers pressure, government regulatory issues, etc.) and to the network's internal constraints (e.g., employee strikes, management policy, etc.) that push the network to learn (Knight & Pye, 2005; Wegner & Mozzato, 2019). "Context" answers the question "why to learn?" (Wegner & Mozzato, 2019). "Content" refers to the goals the network aims to achieve with the learning process and represents "what to learn" (Wegner & Mozzato, 2019).

"Process" relates to the question "how to learn?" (Wegner & Mozzato, 2019). It contains three sub-processes that promote NL (Knight & Pye, 2005): developing shared meaning among the organizations (SH-MEAN), developing joint commitment (JO-CMIT), and developing specific methods (SP-MTHD) at the network level, at the organizational level, or both of them. SH-MEAN is about collective sense-making enabling joint learning processes (Morland et al., 2019). JO-CMIT reflects closer, value-adding, engaging, nurturing, and productive exchanges (Carmeli, Zivan, Gomes, & Markman, 2021). SP-MTHD emerges from the collective knowledge creation and shapes the learning outcomes through changes in network practices and routines (Dietrichson & Bukh, 2020; Knight, 2002; Knight & Pye, 2004, 2005). These NL sub-processes (Knight & Pye, 2005) enable a network to mimic a single learning entity.

The sub-processes SH-MEAN and JO-CMIT are associated with the foundation of the network's social capital (e.g., norms, cultural environment, values) (Cunha, J. L. Passador, & C. S. Passador, 2012), which enable SP-MTHD. The subprocesses are not necessarily sequential or occur only at the network level (Knight & Pye, 2005): they may also occur at the organizational level. Therefore, NL is a multilevel process, which indicates the multilevel learning approach (Crossan et al., 1999; Jones & Macpherson, 2006; Morland et al., 2021) as a suitable theoretical lens to investigate the factor Process of the NL Model.

To summarize this section, this study lies in the extended field of OL beyond organizations' boundaries. It focuses on learning processes experienced by the organization as learning entities in IOL, and by the network in NL. Individual and group learning processes inside organizations and networks, as well as a network composed of networks, are outside the scope of this study.

METHOD

Logical synthesis of prior studies' findings enables the development of theoretical frameworks, advancing the understanding of a given research field (Paul & Criado, 2021). Following this rationale, an integrative review (Cronin & George, 2020) was carried out.

The integrative review was conducted in three stages. The first and second stages consisted of two-structured literature searches, one for IOL and the other for NL. Scopus and Web of Science were the selected databases. At the third stage, specific publications on the 4i Framework lens (Crossan et al., 1999) were sought to extend it to the network level, as described later. Box 1 presents the search strategies and eligibility criteria for the first and second stages.

Box 1

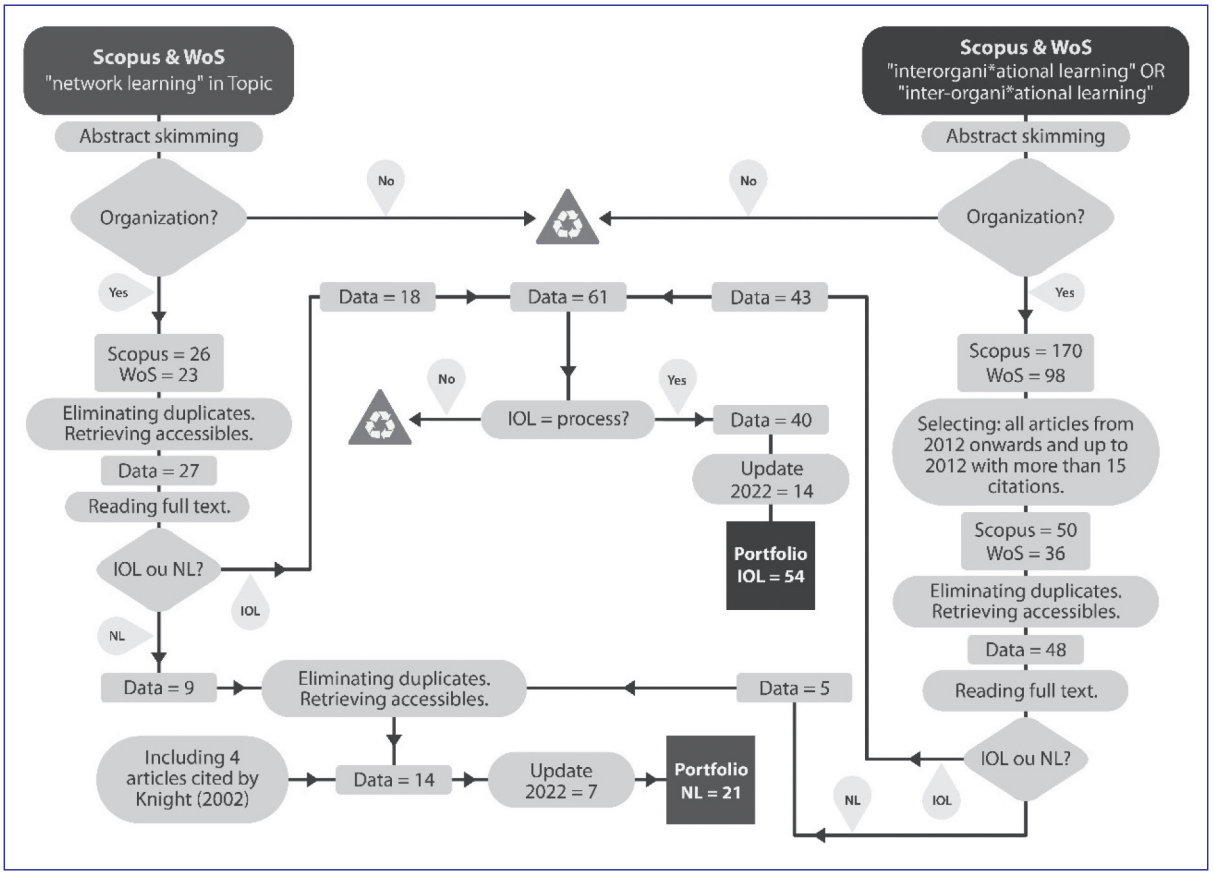
Search strategies in Scopus and Web of Science databases

Construct	String	Eligibility criteria
IOL	SCOPUS: TITLE-ABS-KEY ("interorgani*ational learning" OR "inter-organi*ational learning") AND DOCTYPE (ar OR re) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "DECI") OR LIMIT-TO (SUBJAREA, "PSYC").	All articles from 2012 to 2018 were considered. Articles prior to 2012 considered when more than 15 citations were mentioned. Update in 2022: All articles from 2018 to April 2022 were considered.
	WoS: TOPIC: ("interorgani*ational learning" OR "inter-organi*ational learning"); artigos de revisão. Refined by: WEB OF SCIENCE CATEGORIES: (MANAGEMENT OR BUSINESS OR PSYCHOLOGY APPLIED OR BEHAVIORAL SCIENCES OR SOCIAL SCIENCES INTERDISCIPLINARY OR PUBLIC ADMINISTRATION OR ENGINEERING MULTIDISCIPLINARY OR PLANNING DEVELOPMENT OR EDUCATION EDUCATIONAL RESEARCH). Timespan: All years. Indexes: SSCI.	
NL	SCOPUS: TITLE-ABS-KEY ("NETWORK LEARNING") AND DOCTYPE (ar OR re) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "MULT") OR LIMIT-TO (SUBJAREA, "DECI") OR LIMIT-TO (SUBJAREA, "Undefined").	
	WoS: TOPIC ("network learning") Refined by: DOCUMENT TYPES: (ARTICLE) AND WEB OF SCIENCE CATEGORIES: (BUSINESS OR MANAGEMENT OR EDUCATION EDUCATIONAL RESEARCH OR PSYCHOLOGY MULTIDISCIPLINARY OR SOCIAL SCIENCES INTERDISCIPLINARY) Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.	

Source: Elaborated by the authors.

The process depicted in Figure 1 was carried out in 2018 and updated in April 2022. For NL, the broad descriptor "network learning" in the topic was chosen due to the scarcity of articles about the subject in organizational studies (inclusion criterion). For IOL, the abstracts revealed that more than 100 articles were eligible for possible analysis in full. To cover the most meaningful ones for this study, another criterion was set: all articles from 2012 to 2018 were considered, and up to 2012 only articles with more than 15 citations were included. Figure 1 summarizes the search flow of the integrative review.

Figure 1
Search method and eligibility criteria of the Integrative Literature Review on IOL and NL



Source: Elaborated by the authors.

After the application of eligibility criteria, the suitable remaining articles (theoretical and empirical) formed the basis for the study. The final portfolio at the end of 2018 consisted of 54 articles: 40 articles for IOL and 14 for NL. For IOL, the 40 articles were included for clarifying the studied phenomenon as an extension to OL to achieve organizational goals (e.g., Eiriz et al., 2017; Seo & Park, 2022, among others of IOL portfolio).

For NL, the selection criterion was the definition of network learning adopted in this paper, i.e., articles showing evidence of networks' properties changes generated by a process of "a group learning as a group" (Knight, 2002, p. 22). Ten articles from the reviews fulfilled the criterion. To the ten documents, four articles (Dyer & Nobeoka, 2000; Nathan & Mitroff, 1991; Paton, Johnston, & Houghton, 1998; Spender, 1989) cited by Knight (2002) as argumentation for the distinction between NL and IOL were added. The 14 articles built the conceptual understanding of NL's phenomenon. Six among them presented empirical evidence of NL as a means of changing activity sectors as presented in the health sector in England (Knight & Pye, 2004, 2005), the dairy sector in New Zealand (Gibb et al., 2017), or the automotive sector in Japan (Dyer & Nobeoka, 2000). They were employed as NL investigation cases in this research and named C1, C2, ..., C6. Patterns concerning the NL Model in these cases were identified through thematic analysis (Braun & Clarke, 2012).

To update the literature review, on 14th April 2022, the original strings (Figure 1) were once more set on Scopus and Web of Science considering the period of 2018-2022. Following the procedures of Figure 1, for IOL 14 new articles were added to the updated portfolio. For NL, seven were included in the new portfolio. Among them, three new empirical cases were added to the six retrieved in 2018.

The third stage of the literature review consisted of building the multilevel learning lens to observe IOL and NL, as follows: from the portfolio of IOL, four articles were selected due to their explicitation of the multilevel nature of IOL: Holmqvist (2003a); Knight (2002); Jones and Macpherson (2006); Mozzato and Bitencourt (2014). The seminal article by Crossan et al. (1999), adopted as a parameter, was added to them as the beginning of the evolving knowledge about multilevel learning according to the 4i Framework and contributed to the construction of the lens of analysis employed in this study (Figure 2 in the next section). Through this lens, IOL was decomposed into subprocesses: extension, interaction, and internalization at the organizational and network levels (details in the next section) and generated twelve IOL codes. Codes that emerged from the NL Model (a sample in Box 2) were integrated into the IOL codes to guide the study of the nine empirical NL cases and to build the theoretical framework to differentiate IOL and NL with their multilevel dynamics and subprocesses, presented in Figure 4.

Box 2
Categories, Sub-categories, and Codes for the Multilevel Process Analysis (Sample)

THEME: NETWORK LEARNING			
Category: PROCESS			
Subcategory	Constitutive definition	Theoretical base	Codes
DEVELOPING COMMINTMENT	Subprocess with activities, practices, and actions to develop commitment at the network or organizational level.	Knight and Pye (2004, 2005)	JO-CMIT
DEVELOPING MEANING	Subprocess with activities, practices, and actions to develop meaning at the network or organizational level.	Knight and Pye (2004, 2005)	SH-MEAN
DEVELOPING METHOD	Subprocess with activities, practices, and actions to develop methods and standards at network or organizational level.	Knight and Pye (2004, 2005)	SP-MTHD

Source: Elaborated by the authors.

To clarify the differences between the two constructs, the twelve codes concerning multilevel IOL were assessed on the selected empirical cases and integrated into the NL Model. In this step, the mentioned codes fit completely into the NL Model, which could explain the difficulty to distinguish the two constructs as earlier mentioned in the paper. However, eight specific codes emerged for NL pointing out its distinction from IOL. The results revealed that NL derives from IOL and enabled the conception of multilevel NL with its sub-processes at the organizational and network levels.

Next follows the presentation of the results and discussion.

RESULTS AND DISCUSSION

Some main findings emerged from the research. First, the integrative review endorsed Knight´s (2002) claims that IOL and NL are different constructs, and the present research clarified that the first is an antecedent to the second. Second, in the NL process occur supplemental dynamics and subprocesses to IOL. That means an additional effort to accomplish NL is needed. Third, NL as a strategy for network transformation requires intentionally established goals at the network level. Fourth, multilevel coordination dynamics (permeating both organizational and network levels) are mandatory for NL aiming at network changes, which is not the case in IOL. Hereafter these points will be developed and discussed.

NL as a set of synchronized IOL

The nine empirical cases (C1, C2, C3, ..., C9) described in the selected articles add evidence concerning the factors of the NL Model (Context, Content, and Process). As can be seen in Box 3, the context surrounding the networks promoted their change, and not only for some of their organizations. From the analyzed cases, a pattern was identified: goals were intentionally set at the network level. The three NL sub-processes (Knight & Pye, 2005) were identified in the cases as the main promoters for the engagement of the group of organizations' joint learning aiming the network goals, as described as follows:

- Developing shared meaning (SH-MEAN): it concerns the effort to build meaning for members to commit to network goals. Goals at the network level are attained only if each organization engages in them and works in synchronization with the others (Wegner & Mozzato, 2019). The cases demonstrated that this happens when the goals are meaningful to them. Thus, shared meaning is the first key subprocess to NL.
- Developing joint commitment (JO-CMIT): it follows SH-MEAN (Wegner & Mozzato, 2019) and refers to the organizations' commitment toward the network and vice-versa. Organizations commit themselves by sharing and creating knowledge in the network and being receptive to adopting it at the organizational level. The network, in its turn, may support organizations to accomplish their individualized learning in the network (e.g., the network sends consultants to organizations), as presented in the cases.
- Developing specific methods (SP-MTHD): it is about creating or modifying procedures and practices to attain the network's goals. The cases demonstrated that changes in methods occurred at the network and organizational levels due to the learning process.

Box 3
Evidence of NL

ARTICLE	CONTEXT (Motivation for changes)	PROCESS (One example)	CONTENT (One example of learning outcome)
C1 – Dyer and Nobeoka (2000)	Toyota needed high-performance suppliers aligned with Toyota's goals.	SH-MEAN: Dissemination of Toyota Philosophy. JO-CMIT: Knowledge sharing practices (e.g., workshops) among the suppliers. SP-MTHD: Support from Toyota Consulting Division to the suppliers to promote procedural changes.	Change in interpretations: Adoption of Toyota Group Identity. Change in structure: Implementation of Operations Management Consulting Division. Change in practices: Institutionalization of Toyota Production System in the network.
C2 – Knight and Pye (2004)	The British government launched public policies in the 1990s to improve the role of prosthetists.	SH-MEAN: Prosthetics course at university. JO-CMIT: Legal requirements implemented in the network's organizations. SP-MTHD: Changes of procedures in the organizations according to new regulations.	Change in interpretations: Prosthetists have the same status as physical therapists. Change in structure: Unification of prosthetic and orthotic associations. Change in practices: Attribution of prescribing and clinical auditing activities to prosthetists.
C3 – Knight and Pye (2005)	Prosthesis users pressured the British government to fund cosmetic prostheses through the public system.	SH-MEAN: NHS rethinks the current paradigm. JO-CMIT: Each entity in the network invested its resources to implement the changes. SP-MTHD: Development of methods and procedures appropriate to a new reality.	Change in interpretations: Understanding that prostheses must be esthetic, besides being functional. Change in structure: Integration of new suppliers. Change in practices: Establishment of procurement and prescription of cosmetic prostheses.

Continuation

ARTICLE	CONTEXT (Motivation for changes)	PROCESS (One example)	CONTENT (One example of learning outcome)
C4 – Van Herk, Rijke, Zevenbergen, Ashley, and Besseling (2015)	The floods of 1993 and 1995 in the Netherlands motivated the National Ministry of Infrastructure and Environment to implement a national program to prevent further disasters.	SH-MEAN: Participation of regional governments in the national program. JO-CMIT: Adoption of co-management between national and regional government. SP-MTHD: National government support to regional governments (Q-Teams).	Change in interpretations: Change from centralized management to shared management in the network. Change in structure: Implementation of a polycentric management system, with central supervision. Change in practices: Integration of national and regional practices.
C5 – D. Coghlan and P. Coughlan (2015)	DRS (a transportation company) created and developed a network with suppliers to maintain competitiveness.	SH-MEAN: Holding meetings to align expectations. JO-CMIT: Conducting knowledge-sharing workshops. SP-MTHD: Developing differentiated dyadic practices.	Change in interpretations: Change from hierarchical management to co-management. Change in structure: Creation of learning networks of suppliers. Change in practices: Shared decision in changing procedures.
C6 – Gibb et al. (2017)	Companies in the New Zealand dairy industry decided to act together to improve the sector.	SH-MEAN: Awareness among dairy farmers of the need for change. JO-CMIT: Hiring a coordinating body (DairyNZ) through the engagement of all companies. SP-MTHD: Changing technical methods and procedures under the guidance of DairyNZ.	Change in interpretations: Raising the self-esteem of farmers and valuing the class. Change in structure: Creation of DairyNZ and learning networks. Change in practices: Adoption of joint solutions and shared practices throughout the dairy sector.
C7 – Ytström et al. (2019)	Large automotive companies formed the ABC network to jointly develop automated vehicles.	SH-MEAN: Interest in the development of automated vehicles. JO-CMIT: joint application by a public funding agency. Three researchers in the network management team. SP-MTHD: implementation of the KCP method guided by the researchers.	Change in interpretations: The network changed from a strategic network (focus on economic efficiency) to a transformational network (focus on learning and transforming). Change in structure: Not mentioned in the article. Change in practices: Agreement on aspects related to automated vehicles of the ABC network. Cocreation is a novelty.
C8 – Dietrichson and Bukh (2020)	Six heat companies in Denmark decided to develop a benchmark model for price cap regulation to fulfill regulatory authorities.	SH-MEAN: To prepare themselves for government regulation by creating a benchmark model. JO-CMIT: Working on building trust among members in meetings. SP-MTHD: Creating a new model for the price cap to be adopted by all heat companies.	Change in interpretations: Joint new way to interpret the results of the indicators. Change in structure: Not mentioned in the article. Change in practices: Adoption of the created model by regulatory authorities.
C9 – Costa et al. (2022)	A group of local production (LP) food retailers in Belgium sought jointly responding societal demands (e.g., sustainable behavior) for the food sector.	SH-MEAN: To adopt a "local anchor" to joint actions and make them stronger in the market. JO-CMIT: Setting rules and new roles. Working on trust. SP-MTHD: Changing contracts, establishing exchange channels.	Change in interpretations: New meaning of LP for retailers and customers. Change in structure: Establishment of the LP network, new roles in organizations. Change in practices: Establishment of store-producer partnership for the offer of innovative products.

Source: Elaborated by the authors.

The nine studies presented evidence of NL outcomes, as described in the right column in Box 3. To obtain these results, each organization in the network changed its properties from what it had learned in the network. To exemplify, C6 aimed to launch the dairy sector to the global market. Workshops and training programs were conducted to promote individualized organizational learning to fulfill the network goal. This phenomenon describes a set of IOLs as the outcome of each organization. At the end of the process, the whole dairy industry changed. This result substantiates NL derived from the set of synchronized IOLs.

Thus, for NL to occur, IOL must previously occur in a sufficient number of organizations to generate network changes. However, IOL might not happen in all organizations simultaneously (Dietrichson & Bukh, 2020; Morland et al., 2019), as each one acts independently and has a different knowledge absorption speed (Yu et al., 2021). In such cases, the set of IOLs should occur in a time frame to show evidence that a group of organizations learned as a group (Knight, 2002).

Considering the aforementioned arguments a first proposition states a general distinction between NL and IOL:

Proposition 1: NL is a set of synchronized IOLs that changes network properties and concerns both organizational and network levels.

This proposition is an initial broad answer to the first research question but remains abstract. A procedural answer – which offers a potential practical application – was sought by decomposing IOL and NL in subprocesses offering a better understanding of its parts to manage them. The building of the multilevel learning lens applied to both constructs and the resulting outcomes are presented next.

The multilevel learning at the network level

Studies in the OL field encompass learning processes moving across the individual, group, and organizational levels (Crossan et al., 1999; Mokhtarzadeh, Mahdiraji, Jafarpanah, Jafari-Sadeghi, & Cardinali, 2020; Scipioni, Russ, & Niccolini, 2021). The network is the fourth level (Crossan *et al*., 1999; Knight, 2002; Leung et al., 2019; Mozzato & Bitencourt, 2014). From five studies dealing with the multilevel learning process, Box 4 presents the studies that described the multilevel learning process.

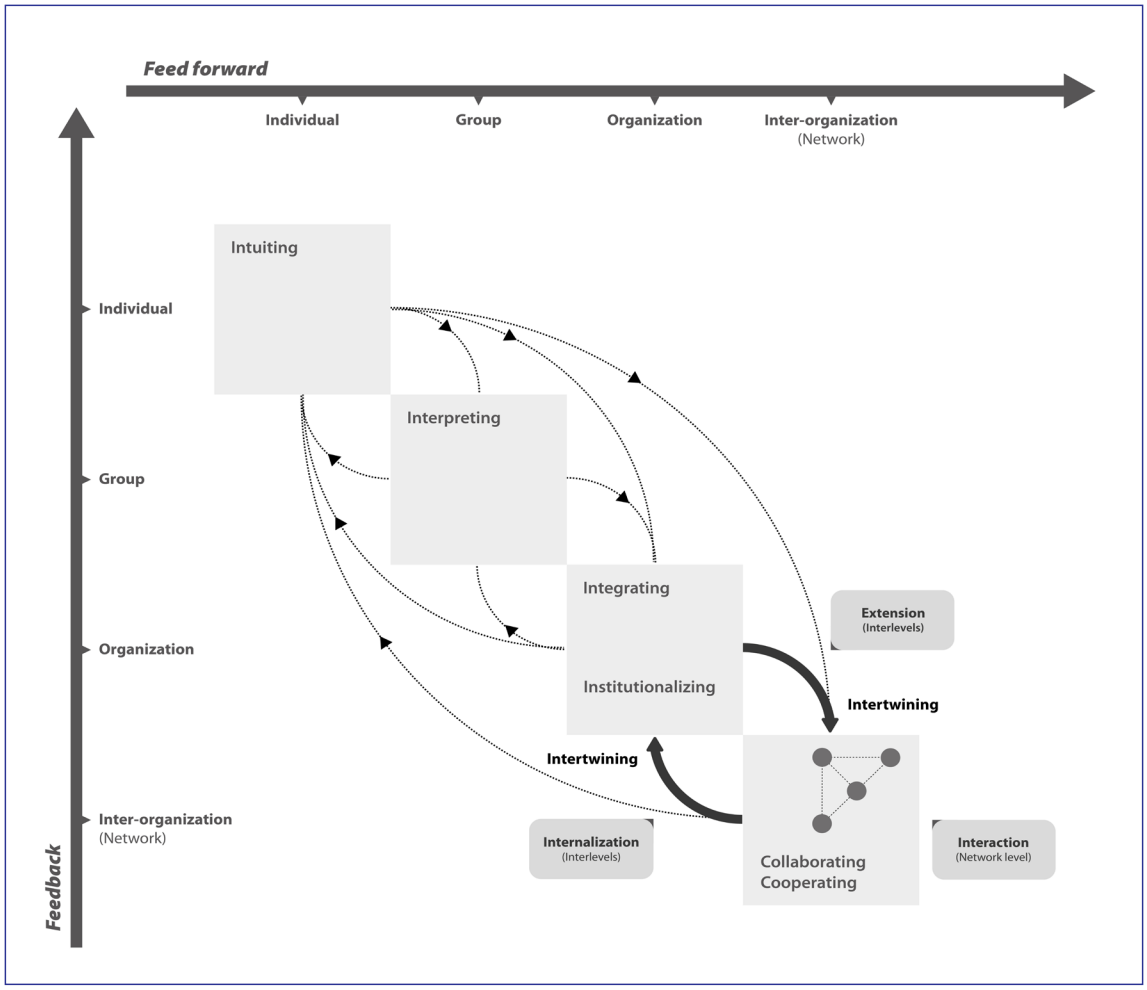
Box 4
An Evolutionary View of a Multilevel Learning Process

Year	Author(s)	Article Title	Contributions
1999	Crossan et al.	An organizational learning framework: from Intuition to Institution.	Organizational learning process is multilevel: individual, group, and organization.
2002	Knight	Network learning: exploring learning by interorganizational networks.	Network level is the fourth level of learning after individual, group, and organization.
2003(a)	Holmqvist	A dynamic model of intra and interorganizational learning.	Two dynamics occur between the organizational and external levels: extension (organization-outside) and internalization (outside-organization).
2006	Jones and Macpherson	Interorganizational learning and strategic renewal in SMEs: extending the 4i Framework.	The knowledge intertwining between levels is the learning subprocess that occurs between the intra- and interorganizational levels.
2014	Mozzato and Bitencourt	Understanding interorganizational learning based on social spaces and learning episodes.	Cooperation among the network's organizations is the main learning subprocess at the network level.

Source: Elaborated by the authors.

The multilevel IOL process presented in Figure 2 is based on the contributions of the authors cited in Box 4. It indicates a continuous flow of feed-forward and feedback experienced by different learning entities: individuals, groups, and organizations. As presented in Figure 2, the network locates at a level above the organization. This didactic resource shows that IOL is a process with a set of subprocesses – here termed as 'dynamics' (Holmqvist, 2003a) - performed by the organization (learning entity) at the organizational and the network level, and between them. Thus, IOL is a process with three dynamics: two vertical ones that occur between the organization and network levels (extension and internalization), and one horizontal (interaction) that occurs at the network level (Jones & Macpherson, 2006; Mozzato & Bitencourt, 2014) (Box 5).

Figure 2
IOL as a Multilevel Process



Source: Based on Crossan et al. (1999), Holmqvist (2003a), Jones and Macpherson (2006), and Mozzato and Bitencourt (2014).

The vertical dynamics called 'extension' consists of the intertwining of the organization with the network (Holmqvist, 2003a). It begins at the organizational level when organizations prepare to actively engage with the network and proceed at the network level with the organization's readiness to share knowledge with peers (Jones & Macpherson, 2006; Yu et al., 2021). The extension dynamics concerns the feed-forward process when the organizations seek knowledge beyond their boundaries (Jones & Macpherson, 2006; Rajala, 2018).

The dynamics termed 'interaction' refers to the organizations' mutual knowledge exchange and learning process in collaboration (active engagement) or cooperation (agreement) (Kozar, 2010; Mozzato & Bitencourt, 2014). Interaction dynamics depicts the horizontal shape, as it occurs at one level: the network. Interaction operates in "structured or non-structured social spaces"

(Mozzato & Bitencourt, 2014, p. 286), where IOL's core subprocesses of cooperation and collaboration occur due to a collective consciousness (Cunha et al., 2012).

The vertical dynamics named 'internalization' after Holmqvist (2003a) consist of the intertwining of the network with the organization, concerning the readiness at the organizational level to receive and internalize the network knowledge into the organization (feedback process) (Jones & Macpherson, 2006; Rajala, 2018; Yu et al., 2021). Similar to extension, internalization encompasses two levels of analysis: organization and network.

Box 5
Dynamics and Subprocesses of IOL

Dynamics	Subprocess	Direction
Extension	Intertwining	Vertical from organizations to network.
Interaction	Collaboration and or Cooperation	Horizontal at the network level.
Internalization	Intertwining	Vertical from network to organizations.

Source: Elaborated by the authors.

Once IOL aims to achieve organizational goals through individualized organizational absorption of knowledge (Mokhtarzadeh et al., 2020), each organization conducts its learning process at its pace (Knight, 2002). Some organizations may even not complete the process when they do not internalize the knowledge from the network (Bye, Rosness, & Royrvik, 2016). Whether internalization dynamics occur or not in all organizations does not affect the individualized IOL that were enabled through interorganizational interactions (Knight, 2002). However, concerning NL, the internalization dynamics of most organizations are crucial: this should occur in a way that a change in network properties may be perceptible to evidence NL.

NL under the multilevel perspective

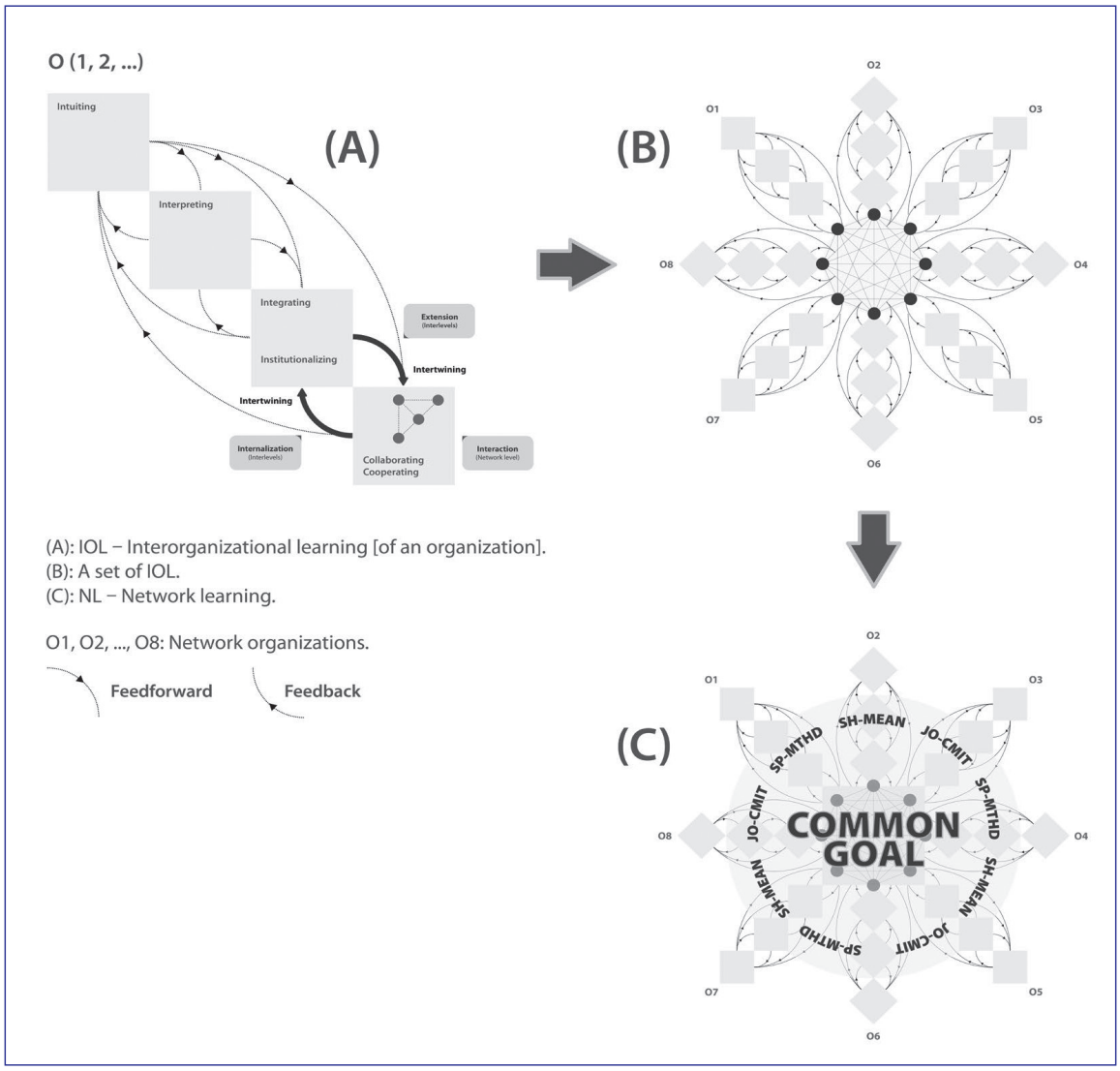
The authors, in Box 4, suggested that establishing goals at the network level enabled the synchronized IOLs, which generated NL and induced the following proposition in this article:

Proposition 2: *NL requires purposes established at the network level.*

Concerning proposition 2, interdependent relationships of networks' organizations like customer-supplier-relationship (e.g., C1, C3, and C5) or organizations of the same sector under hierarchical management that proposes the goals (e.g., C2, C3, C4, and C8) facilitate NL. In the cases without such interdependence (C6, C7, and C9), an initial common goal was the reason for building a network.

To attain the network goals, the subprocesses of NL (developing shared meaning - SH-MEAN, joint commitment – JO-CMIT, and specific methods – SP-MTHD at the organizational or network level) acted as driving forces that enabled the set of synchronized IOL to take place, evolving IOL into NL (Figure 3).

Figure 3
IOL as an Antecedent of NL



Source: Elaborated by the authors.

Picture (A), in Figure 3, depicts a simplified replication of Figure 2, representing the multilevel IOL of one organization. Picture (B) depicts a set of (A) occurring in the same social space, with eight organizations (O1, O2, ..., O8) experiencing IOL. Thus, picture (B) represents a set of individualized IOLs in a network.

A ring embracing all the organizations of picture (B) appears in picture (C). The ring represents connecting elements – the subprocesses SH-MEAN, JO-CMIT, and SP-MTHD around a common goal at the network level, which enables the synchronized set of IOLs. Picture (C) highlights that it comes after (B), i.e., NL results from joint IOLs.

One could expect that all three subprocesses represented by the connecting ring occur at the network as well as at the organizational levels. However, in the case studies, some of them occurred mostly at one or another level.

Dynamics and their sub-processes: a theoretical framework connecting IOL and NL

Once the difference between IOL (Figure 3B) and NL (Figure 3C) lies in building or not the connecting ring (Figure 3C), it is possible to figure out how to manage the learning process of organizations in a network, according to the objectives, whether organization's (IOL) or network's (NL). For IOL, the subprocesses SH-MEAN and JO-CMIT occur in interaction dynamics at the network level, but not necessarily at the organizational level. Thus, SP-MTHD, in IOL, occurs only at the organizational level. SP-MTHD reflects changes in organizational practices and routines for the sake of the organization's goals and not the network's.

As for NL, all the three subprocesses become central elements to bring together the organizations for the sake of the network and not only for the organizations' individualized objectives. It means that SH-MEAN and JO-CMIT concerning the network goals may generate change in practices and routines at the network level, which may also change practices and routines at the organizational level. It implies that, in NL, changes at the organizational level may occur because of changes at the network level, and not all members might willingly do it (Benson-Rea & Wilson, 2003; Wegner & Mozzato, 2019). In this context, multilevel coordination emerges as a decisive element in NL. In the studied cases, coordination dynamics take action at the network and the organizational levels to keep organizations moving as they were a sole entity.

Thus, the existence of multilevel coordination dynamics is presented as an essential requirement distinguishing NL from IOL. Coordination dynamics in IOL – when existing – mainly facilitate the interaction dynamics in administrative tasks at the network level (Leung et al., 2019), but it is not concerned with the organizational level. As for NL, coordination dynamics are in charge of developing SH-MEAN, JO-CMIT, and SP-MTHD at the network level, but also perform at the organizational level by supporting the extension and internalization dynamics in the organizations. This means, that for NL, the multilevel coordination dynamics may even step into the organizations (e.g., training in organizations managed by the network) to keep the joint moving of the set of organizations to learn as a single entity.

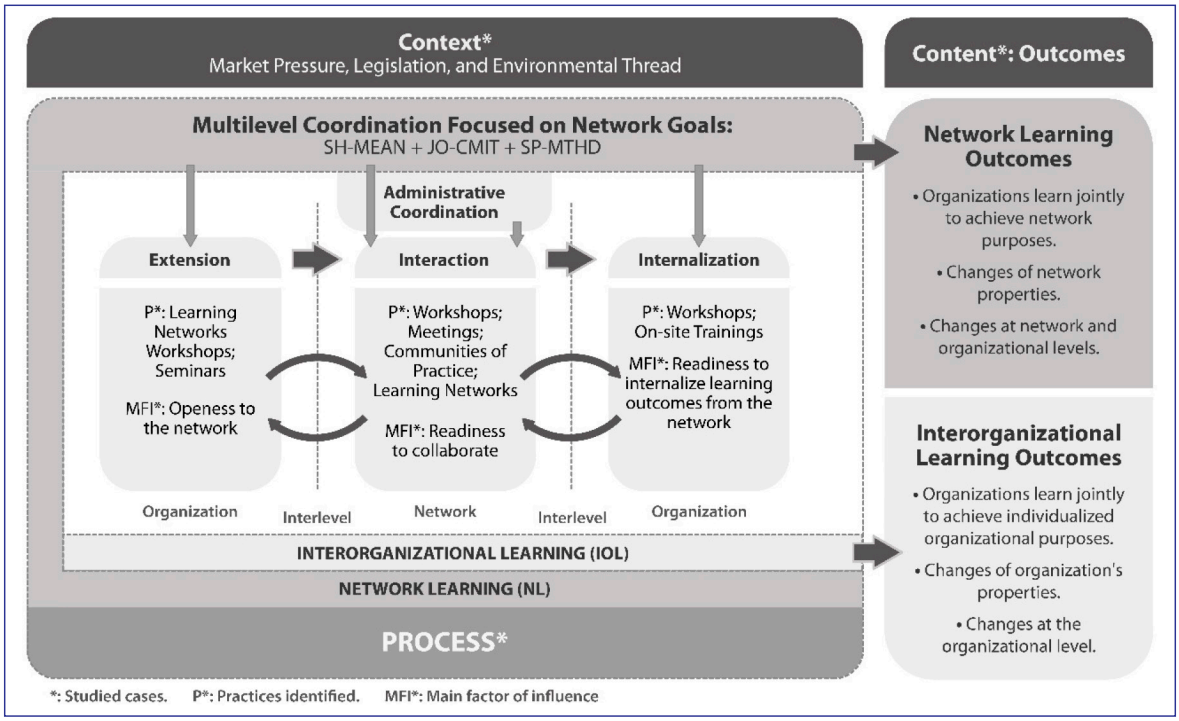
Hence, for NL, multilevel coordination dynamics might require entities (structures) to perform the above-mentioned tasks. For instance, six of the nine studied cases reported formal network coordinators (C1 - Toyota, C4 - Ministry of Infrastructure, C5 - DRS, C6 – DairyNZ; C7 - managers and three consultants, and C9 - an external organization). They conducted the development of shared meanings (SH-MEAN), joint commitment (JO-CMIT), and specific methods (SP-MTHD) toward networks' goals. They worked on synchronizing the individualized IOL processes to evolve them to NL. In cases C2, C3, and C8, explicit coordinators were not identified. Nevertheless, in these cases, governmental policies acted as virtual multilevel coordinators by guiding the joint and synchronized learning processes. The multilevel coordination dynamics identified in the studied cases inspired the third proposition:

Proposition 3: For IOL, it may exist administrative coordination dynamics performing mainly administrative tasks at the network level. As for NL, a multilevel coordination dynamics is essential, and it performs beyond administrative tasks at the organizational and network levels.

The nature of the tasks that coordination dynamics fulfills in IOL and NL needs more investigation. For the NL, besides administrative activities at the network level, the cases suggested that multilevel coordination dynamics play a supportive role for the organizations. For instance, the networks' coordinators participated actively in decisions related to the organizations (C1, C4, C5, C6, C7, and C9).

A framework "denotes a structure, overview, outline, system, or plan consisting of [...] concepts, constructs or variables, and the relations between them that are presumed to account for a phenomenon" (Nilsen, 2015, p. 2). To better describe the two phenomena presented in the literature case studies, Figure 4 presents a theoretical framework relating IOL to NL.

Figure 4
Theoretical framework for IOL and NL: relationship and interdependence



Source: Elaborated by the authors.

The proposed theoretical framework (Figure 4) lies in the NL Model factors (Context, Content, and Process) and also in the organizational and network levels (Figure 2). Content as the outcome for individualized organizations, represents IOL (light grey color), while content as the outcome for the network represents NL (deep grey color). By focusing on Process, the framework portrays that NL embeds IOL and gives visibility to the latter as an antecedent of NL. From this answer to the second research question emerges another proposition:

Proposition 4: IOL is an antecedent to NL.

It means, NL depends on IOL, which might explain the polysemy in the definition of the constructs. The dependency of NL on IOL points to the importance of the internalization (Figure 2), i.e., the dynamics from the network toward the organizations to assure IOL (Benson-Rea & Wilson, 2003). In this context, multilevel coordination dynamics as mandatory for NL and as the main distinction between the constructs deserves attention. For instance, in NL the multilevel coordination should care about the success of each organization's IOL and offer support (e.g., training, workshops, indicator assessments...) to internalize the network knowledge in it.

Based on the research journey described in this paper, the fifth proposition as a complementary and procedural answer to the first research question is developed:

Proposition 5: IOL and NL are processes composed of horizontal dynamics at the network level (interaction) and vertical dynamics that connect the organizational to the network level (extension and internalization). NL differs from IOL by the existence of the multilevel dynamics (coordination), which synchronize the other three dynamics (extension, interaction, and internalization) to evolve from IOL to NL.

The main task of the multilevel coordination for NL consists in implementing the three subprocesses SH-MEAN, JO-CMIT, and SP-MTHD at the network and organizational levels, when required. It implies, that when the learning process aims for network changes, special attention to multilevel coordination is essential.

In most cases (C1, C2, C3, C4, C5, and C7), the coordinator acted as a persuading force for the organizations to engage in the network's goal. An amount of effort to bring the organizations to learn together is required and concrete support from the multilevel coordination might be crucial.

IOL or NL: some implications

Both IOL and NL may achieve strategic changes, either in organizations (Crossan et al., 1999; Jones & Macpherson, 2006) or in networks (Knight & Pye, 2004, 2005; Wegner & Mozzato, 2019). Changes may occur as a natural outcome of learning processes due to interorganizational social interactions in daily practices (Gherardi, 2001; Mozzato & Bitencourt, 2014, 2018), but organizational or network management may promote favorable conditions for IOL or NL. To this purpose, the multilevel subprocesses described in this paper might help to guide managerial efforts.

For instance, to accomplish IOL, organizations need, at the organizational level, to prepare to be ready to share their knowledge (extension) and to receive collective knowledge (internalization) (Holmqvist, 2003a ; Jones & Macpherson, 2006). Interorganizational exchanges demand coordination of administrative activities to organize the interaction at the network level (e.g., Eiriz et al. 2017; Leung et al., 2019), which can be led by one of the organizations or by an external entity (Cunha et al., 2012).

For NL, the nature of the coordination activities is multilevel, as the learning process of a group of organizations as a single entity requires the connecting subprocesses SH-MEAN, JO-CMIT, and SP-MTHD that permeate organizational and network levels. Therefore, multilevel coordination performs much more tasks than administrative coordination in IOL and might even "enter" the organizational level. For instance, when one organization has a problem with internalization dynamics, the multilevel coordination may intermediate help from another organization sending its experts (D. Coghlan & P. Coughlan, 2015; Dyer & Nobeoka, 2000; Gibb et al., 2017; Van Herk et al., 2015). If the problem is the low absorptive capacity (Cohen & Levinthal, 1990) of one organization, support may also come from the network.

Hence, as practical suggestions to accomplish NL, it should be considered the establishment of a multilevel coordination entity (a coordinator) from the very beginning of the emergence of the interorganizational network. The coordinator must have a good reputation, trust, respect, and authority with the organizations (Gibb et al., 2017; Ystrom et al., 2019) and not be seen as an intruding outsider.

Compared to IOL, NL is more complex because sense-making, goals, and interpretations have to be shared by all (or by the majority of) network organizations (Knight & Pye, 2004, 2005; Wegner & Mozzato, 2019). Therefore, NL often implies spending more energy and financial resources to keep a group of organizations learning as a group. For such reasons, the studied cases suggest that NL emerges mainly from intentional willingness to change the whole network.

The multilevel learning lens applied in this study depicted a view of the phenomena at the organizational and network levels and within their levels. However, a different lens might be more suitable for interaction dynamics, which concern mainly a "socially-constructed phenomena" (Mozzato & Bitencourt, 2014, p. 291). The practice-based learning approach (Gherardi, 2001; Mozzato et al., 2022) might help managers to build appropriate social spaces (Mozzato & Bitencourt, 2014, 2018; Scipioni et al., 2021) for IOL and NL. The multilevel learning lens adopted in this paper and the practice-based learning approach are complementary to understanding the phenomena as a whole as well as in their parts.

CONCLUSION AND AVENUES FOR FUTURE RESEARCH

This study investigated NL and IOL to identify their distinctions through a multilevel learning lens by assuming IOL and NL as part of a continuum of OL (Crossan et al., 2014; Holmqvist, 2003a, 2003b; Knight, 2002; Jones & Macpherson, 2006; Mozzato & Bitencourt, 2014). Supported by an integrative review, the research endorsed Knight (2002), who advocated that IOL and NL are not the same phenomena. As theoretical implications, the authors argue that NL derives from IOL, but NL stands for itself as a construct. The study also develops five propositions and a theoretical framework presenting the relationship between IOL and NL. As a practical contribution, the research shows that IOL decomposed in subprocesses may help managers to concentrate efforts on extension, interaction, or internalization investing resources where needed. And for NL, the establishment of a multilevel coordination should be considered, with its implications for resource investments.

A limitation to this research lies in the scarcity of publicized articles dealing with NL as the main research object: it might exist articles that tackle the phenomenon without mentioning the selected research strings.

For future investigations, this paper suggests the assessment of the proposed theoretical framework on empirical research to validate it. Factors that influence NL might also be an issue to be studied: several authors have been recently dealing with factors that affect IOL (e.g., Morland et al., 2019; Mozzato & Bitencourt, 2018; Ouro et al., 2020), while for NL remains the opportunity to explore them. Assuming that NL derives from IOL, specific factors of influence on NL could be researched. For instance, types of networks could be an issue for NL, as transformational networks (Ystrom et al., 2019) or strategic networks (Wegner & Mozzato, 2019) seem to feature suitable types of network for NL, once they seek transorganizational development based on collective purposes (Ystrom et al., 2019).

Due to the central role of multilevel coordination in NL, further studies on this subject appear as an important issue. For instance, the studied literature cases suggest that multilevel coordination performs through social relationships with network organizations and should be based on mutual interorganizational trust, willingness to cooperate, and to learn (Dyer & Nobeoka, 2000; Larsson et al., 1998; Mozzato & Bitencourt, 2018). Therefore, investigating how the multilevel coordination dynamics may act in NL for different contexts remains an issue to be researched.

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Julieta Kaoru Watanabe-Wilbert
ORCID: https://orcid.org/0000-0003-1522-5504

Doctor in Engineering and Knowledge Management; Associate researcher at the Center for Studies in Intelligence, Management and Technology for Innovation (IGTI), Federal University of Santa Catarina (UFSC). E-mail: researcher.wilbert@protonmail.com

Andrea Valéria Steil
ORCID: https://orcid.org/0000-0001-7853-6532

Doctor in Production Engineering; Professor of the Post Graduate Programs: 1) Psychology and 2) Engineering and Knowledge Management, both at the Federal University of Santa Catarina (UFSC). E-mail: andrea.steil@ufsc.br

Gertrudes Aparecida Dandolini
ORCID: https://orcid.org/0000-0003-0867-9495

Doctor in Production Engineering; Professor of the Post Graduate Program in Engineering and Knowledge Management at the Federal University of Santa Catarina (UFSC). E-mail: gertrudes.dandolini@ufsc.br