

# Capitalizing online knowledge networks: from individual knowledge acquisition towards organizational achievements

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## Abstract

**Purpose** – This paper aims to explore the relationships among several key constructs which link the individual's motivation for knowledge acquisition to his affiliation with online knowledge networks, to further access the intellectual capital of the network as a prerequisite for organizational achievement.

**Design/methodology/approach** – An online survey with 227 members of higher education and research centers from 30 countries was carried out between July and September 2021. The data were analyzed by means of partial least squares structural equation modeling technique, using the statistics software package SmartPLS 3.0.

**Findings** – Individual motivation to acquire knowledge has a significant influence on the affiliation with online academic networks approached as online knowledge networks. Further, active engagement with the network's intangible resources leads to a significant harnessing of the three-component intellectual capital, that is, human, structural and relational capital. Human and relational capital is proven to exert a significant effect on organizational achievements, whereas structural capital falls short of reporting a meaningful influence on the dependent variable.

**Research limitations/implications** – This research adds new knowledge to the capitalization of online knowledge networks and its influence on organizational achievements via intellectual capital.

**Originality/value** – A novel perspective is advanced in which online knowledge networks are acknowledged as a pivotal bond and nonlinear integrator between the individual level of knowledge fields and organizational knowledge leveraged into organizational achievements.

**Keywords** Knowledge acquisition, Intellectual capital (IC), Organizational achievements, Online knowledge networks (OKN), Online academic networks

**Paper type** Research paper

## Introduction

Networks are dynamic structures of interconnected elements, having a common purpose and some well-defined emergent characteristics (Borgatti and Halgin, 2011; Westaby *et al.*, 2014). When the common purpose is knowledge cocreation, and the main emergent characteristic is knowledge sharing, such networks spring up as *knowledge networks* (Bedford and Sanchez, 2021; Phelps *et al.*, 2012). Furthermore, when the interconnected elements represent academics and researchers interacting on online specialized platforms, the envisaged networks can be defined as *online knowledge networks* (OKN) (Ovaidia, 2014; Vătămănescu *et al.*, 2018a). They can be composed of individuals, teams, universities, research centers, funding agencies for research or any combination of these.

Network theory (Borgatti and Halgin, 2011; Westaby *et al.*, 2014) shows that the fundamental components of a given network are nodes, links and holes. *Nodes* are sources and targets of the knowledge flow; *links* represent connections between nodes; and *holes* are the result of the links configuration. The centrality of a node is important with respect to

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other nodes because it characterizes the knowledge distribution within the network, meaning the knowledge entropy (Bratianu, 2019) and knowledge deficit between nodes. Also, centrality shows the control level of knowledge flow through the OKN. Based on the theory of information entropy developed by Shannon (1948), Bratianu (2019) introduced the concept of *knowledge entropy* to measure the knowledge distribution within an organization. Knowledge entropy is computed via the same mathematical formula derived from Shannon (1948) as a logarithmic function of the probability distribution of knowledge within an organization. If organizational knowledge can be represented by a continuous field, network knowledge is a distributed knowledge system composed of the network nodes. Because the nodes represent different levels or stocks of knowledge, we can compute the knowledge entropy of the whole network. This is an important indicator of knowledge heterogeneity (Tsai, 2016) and of the potential need for knowledge sharing and knowledge flow within the network.

*Links*, on the other hand, show the paths of knowledge flow between nodes. They can represent strong or weak ties between nodes, which reveal different flow dynamics. Knowledge flows are a metaphor used to explain the motion of knowledge in time and space within an organization or a network. "To the extent that organizational knowledge does not exist in the form needed for application or at the place and time required to enable work performance, then it must flow from how it exists and where it is located to how and where it is needed. This is the concept of *knowledge flows*" (Nissen, 2006, p. 20). Considering the analogy with fluid mechanics, knowledge flows from the node with a higher level of knowledge toward the node with a lower level of knowledge. However, unlike the flow of fluids in the physical world, knowledge flow is a result of human action that makes the whole process much more complex (Zieba, 2021). Knowledge flows between the two nodes as a result of knowledge sharing and knowledge hiding dynamics, and the psychological climate in the knowledge network (Massingham, 2020; Vătămănescu et al., 2016). *Network holes* are the direct result of the links' architecture. When there is an absence of a link between two nodes which are both linked to a third one, the resulting configuration is called a *structural hole* (Brass et al., 2004; Burt, 1992; Liu and Zhu, 2021). Structural holes play an important role in the control of knowledge flow distribution.

In multicultural contexts (Lewis, 2018; Meyer, 2015; Paiuc, 2021), knowledge network dynamics depends on the cultural background and cultural intelligence of the individuals who represent the nodes. Ang and Van Dyne (2015) define this new construct as "an individual's capability to function effectively in situations characterized by cultural diversity with relevance not only to individuals but also to organizations" (p. 15). Cultural intelligence is a catalyst in the process of knowledge sharing, especially when the links are between people coming from cultures with significant differences in their risk acceptance. When the perception of knowledge risk is high, the tendency of people is for knowledge hiding (Connelly et al., 2012; Peng, 2013).

In the OKN, the strength of the ties depends on the motivation of academics to get actively involved in the network processes and on their absorptive capacity for receiving and processing knowledge. The complexity of such behavior can be understood and analyzed in terms of nonlinear and systems thinking (Bratianu and Vasilache, 2009; Gharajedaghi, 2006; Senge, 1999). Online academic networks "emerge as knowledge brokers, especially in their capacity as mediators, bridging structural holes" (Vătămănescu et al., 2018a, p. 3). Structural holes reveal some psychological or organizational barriers between two nodes in the process of knowledge sharing, and their analysis can stimulate solutions for optimizing knowledge flow distribution within the whole network (Abualqumboz et al., 2021; Bedford and Sanchez, 2021; Burt, 1992).

Understanding the dynamics of networks, especially of academic knowledge networks necessitates learning about the five principles which govern their behavior (Gharajedaghi, 2006): openness, purposefulness, multidimensionality, emergent property and counterintuitiveness.

*Openness* means that the network's interface with the environment is permeable to the knowledge transfer between the individual and the network, the network and the environment. This characteristic is essential for OKN functioning, as such networks absorb individual knowledge and convert it into a higher-level collective knowledge which, in its own right, will be further harnessed by other organizational and societal actors. *Purposefulness* is the driving force of the whole OKN construction and is deeply related to the shared vision (Nonaka and Takeuchi, 1995; Senge, 1999) of all components of the network. Comprehending purposefulness requires understanding of the complexity of knowledge dynamics based on rational, emotional and spiritual knowledge and the underlying motivation (i.e. knowledge acquisition) of the actors to exploit the network potential and capital (Bratianu and Bejinaru, 2020; Baron, 2000; Bratianu et al., 2021; Vătămănescu et al., 2016). *Multidimensionality* is one of the specific principles of systems thinking revealing the capacity to see complementary relations in opposing tendencies. In this respect, it is important to understand the multidimensional architecture of the OKN with a view to better perceive its underlying catalyzers and dynamics, what the varied intangible resources are and how they could be optimally exploited. *Emergent property* principle refers to the integration process of all the parts into a system, a process that generates new properties which cannot be found within the parts. For the OKN, the most relevant emergent properties are those of knowledge sharing and knowledge cocreation via the integration of personal knowledge into collective knowledge understood as the network's intellectual capital (Vătămănescu et al., 2015, 2016, 2018a, 2018b, 2018c). *Counterintuitiveness* refers to our inability to grasp the complexity of phenomena (Kahneman, 2011; Taleb, 2007), which subsequently challenges scholars to dig deeper into intricate systems and processes.

Knowledge networks have different life cycles in accordance with their initial statute. Many OKNs have a life cycle designed for a couple of years based on the purpose of the financing program or the objectives defined by the founders. Because of this short life network, the knowledge sharing and cocreating processes are quite intensive and under pressure to achieve the proposed objectives within the established deadlines. Other OKNs are designed with long life cycles, which make them significant contributors to value creation. Therefore, the life cycle span becomes a moderator in the intensity of the knowledge sharing and learning processes (Bedford and Sanchez, 2021; Brass et al., 2004).

Based on these principles which pertinently encompass our vision of OKN from academia, the current paper aims to explore the relationships among several key constructs which link individual motivation for *knowledge acquisition* to the *affiliation with OKN*, to further access the *intellectual capital* of the network as a prerequisite for *organizational achievement*. In so doing, a novel perspective is advanced, where knowledge networks are acknowledged as a pivotal bond between the individual level of knowledge fields (Bratianu and Bejinaru, 2020) and the organizational knowledge level (Davenport and Prusak, 2000; Tsoukas, 1996; Tsoukas and Vladimirou, 2001). In this sense, networks act as nonlinear integrators (Bratianu, 2013) of individual knowledge into network knowledge while fostering the main premises for organizational achievements as derived from the newly accessed and acquired collective knowledge. As demonstrated by Kianto et al. (2014), organizational value creation is "a function of both possessing valuable intangible assets as well as being able to manage these assets" (p. 362). Therefore, by accessing knowledge networks, researchers and academics gain new knowledge and increase their level of intellectual capital, which, in turn, will contribute to stimulating new achievements for their organizations.

By integrating all these facets, the study complements previous similar endeavors focusing on the intellectual capital harnessed by online academic networks (Vătămănescu et al., 2016, 2018a), bringing added value on several levels. First, online academic networks are approached through the lens of knowledge networks, the whole argumentation revolving around this frame of reference. Second, the considered independent variable refers to

personal motivation in terms of knowledge acquisition and not to the organizational formal or informal drivers as discussed in the aforementioned investigations. Third, organizational achievements cover a wider range of indicators relevant for such analysis, integrating the main layers measured in prior explorations. To test the inferred relationships among variables, the empirical study relied on a questionnaire-based survey of over 200 academics from 30 different countries, most of them (almost 95%) from Europe. The research instrument addressed multiple interconnected issues, but within the scope of the current research, a six-construct model was tested.

The remainder of the paper is organized as follows: the literature review and hypotheses development are introduced; next, the materials and method, and the measurement model assessment are described, followed by discussion of the findings. The last section encompasses a summary of the findings, the theoretical and organizational implications and the research limits and future avenues.

## Literature review and hypotheses development

*Knowledge acquisition* is an integral part of individual and organizational learning (Argote, 2013; Bereiter, 2009; Knud, 1999; Kolb, 2015). It is the best strategy for obtaining the knowledge one “knows that one does not know,” as suggested in the knowing-unknowing matrix (Bolisani and Bratianu, 2018; Dalkir, 2005). For academics, knowledge acquisition is the opportunity to learn about new potential research grants, publications of interest and a variety of events from webinars and workshops to top international conferences, etc. (Vătămănescu *et al.*, 2015, 2016; Elezi and Bamber, 2018a, 2018b, 2018c; Bamber and Elezi, 2020). The focus of knowledge acquisition has traditionally been on rational knowledge, but now there is also a tendency to increase the role played by experiential learning and tacit knowledge sharing (Shafait *et al.*, 2021). Nonaka and Takeuchi (1995, 2019) developed the SECI – socialization, externalization, combination and internalization – model that places tacit knowledge sharing and acquisition in the initial phase. The SECI model was developed to show how individual knowledge can be extended and scaled up to group or organizational level through a progressive integration process. From an epistemological point of view, tacit knowledge is transformed into explicit knowledge through the externalization process. Also, explicit knowledge can be transformed into tacit knowledge through the internalization process. From an ontological point of view, individual knowledge is extended through the combination to group level, and thence to the level of the whole company, creating organizational knowledge. “The SECI Spiral occurs as knowledge creation is carried out repeatedly over time. In the SECI Spiral, knowledge is ceaselessly created, expanded and practiced, and increasingly, more people become involved in knowledge creation and practice, expanding the knowledge creating/practicing community” (Nonaka and Takeuchi, 2019, p. 59). The SECI model can be extended to a knowledge network focusing particularly on the combination process. Externalization and internalization are individual processes, while socialization and combination are social processes. Attention should be paid to socialization because in a knowledge network, tacit knowledge sharing is rather restricted by online communication. However, knowledge sharing and development through combination are catalyzed by the network exponential power. Going beyond the individual’s interests, the impact of knowledge acquisition is felt mostly on the innovation process (Kodama, 2011; Vătămănescu *et al.*, 2014; Papa *et al.*, 2020) and organizational performance (Holden and Glisby, 2010; Shin and Perez-Nordtvedt, 2020; Hao *et al.*, 2020; Elezi, 2019, 2021).

On this front, the affiliation of academics to OKN creates an opportunity to discover valuable intellectual capital potential and to benefit from it through the knowledge sharing and knowledge acquisition processes (Gerbin and Drnovsek, 2020; Han *et al.*, 2020). Knowledge sharing is limited by the absorptive capacity (Balle *et al.*, 2020; Cohen and Levinthal, 1990; Easterby-Smith *et al.*, 2008; Mariano and Walter, 2015) of each participant

in the process. Absorptive capacity is a multidimensional construct that shows the individual or organizational capability for “the acquisition, assimilation, transformation and exploitation of knowledge” (Zahra and George, 2002, p. 1945). Thus, the affiliation of academics to OKN offers an opportunity to gain new knowledge and develop their own intellectual capital, but only within the limits set by their absorptive capacity at any given time and within a certain organizational context. Absorptive capacity is not a fixed threshold of knowledge assimilation but a dynamic interface depending on the learning progress (Balle *et al.*, 2020). The absorptive capacity increases with the new knowledge integrated into the state of “knowing what someone is knowing.” The intangible resources availed by such networks constitute an opportunity for knowledge acquisition and a strong attraction for academics to become affiliated (Vătămănescu *et al.*, 2015, 2016, 2018a, 2021). Based on these arguments, the following hypothesis is formulated:

*H1.* Knowledge acquisition has a positive influence on the online knowledge network affiliation.

For organizations, intellectual capital can be defined as “all nonmonetary and nonphysical resources that are fully or partially controlled by the organization and that contribute to the organization’s value creation” (Roos *et al.*, 2005, p. 19). Intellectual capital can be considered as a stock, a flow or a stock-and-flow potential (Edvinsson, 2002; Edvinsson, 2013; Dumay, 2016; Dumay and Garanina, 2013; Kianto, 2007; Kianto *et al.*, 2017; Ricceri, 2008).

Within the scope of knowledge networks, we consider the *stock-and-flow* model because nodes represent stocks of intellectual capital, while the links represent the flow of knowledge. From a different perspective, we may consider intellectual capital as being composed of a static part that represents the potential of the intellectual capital, and a dynamic part that represents the operational component. The potential is continuously transformed into the operational intellectual capital that contributes to an organization’s performance (Bratianu, 2013). This interpretation explains very well knowledge flow as being generated by the difference between two nodes with distinctive intellectual capital potential. Revolving around OKN, this interpretation helps us understand the dynamics of intellectual capital and its strategic orientation (Roos and Marr, 2005). While there is continuous knowledge transformation within each node because of knowledge creation, acquisition and consumption, there is knowledge flow between two adjacent nodes when there is a difference between their intellectual capital levels generating the driving force for the flow (Elezi, 2019, 2021). Metaphorically speaking, it is like the fluid flow where there is a difference between the pressure levels of two adjacent points. The flow of knowledge has different velocities and rates through the network because of the nonhomogeneous distribution of intellectual capital between the nodes, a process moderated by the centrality of each node.

Although there are several models representing the intellectual capital of an organization (Andriessen, 2004), the generic model adopted by most researchers is composed of three fundamental components: human capital, structural capital and relational capital (Bontis, 1998; Bontis, 1999; Garcia-Perez *et al.*, 2020; Ricceri, 2008). *Human capital* consists of the integrated contributions of individual rational, emotional and spiritual knowledge, including tacit knowledge in all its forms, such as experience, skills and intuition. Also, we may consider individual intelligence which is necessary when processing information and knowledge (Andriessen, 2004; Bontis, 1999; Bratianu, 2014; Damasio, 2012; Edvinsson, 2002; Nussbaum, 2001; Roos *et al.*, 2005). It is important to underline the fact that human capital does not represent the integration of every individual’s intellectual capital, but only that part resulting from individual contribution. The explanation comes from the fact that human knowledge is not owned by the organization or network. Human knowledge is created and owned by everyone, and only a part of it constitutes the individual’s contribution to the network-based intellectual capital. Shared knowledge depends on many contextual factors, trust and reward systems being the most relevant (Bedford and Sanchez, 2021; Bratianu and Bejinaru, 2020; Nonaka and Takeuchi, 2019;

Nussbaum, 2001; O'Dell and Hubert, 2011). Because intellectual capital represents a nonlinear structure of knowledge, it is important to underline the fact that human capital is not the result of a *summation* process applied to all individuals comprising a group or network but of an *integration* process, which is totally different (Andriessen, 2004; Bratianu, 2013; Edvinsson, 2002; Ricceri, 2008).

*Structural capital* represents the knowledge that is inherent in the structure of a network and in its functionality (Bontis, 1998; Phelps *et al.*, 2012; Ricceri, 2008). The network structure is represented by the architecture of the connections between nodes and the holes created within the framework. Network functionality is governed by rules established by the founders and a set of values and principles. Academic knowledge networks have common values with those shared in universities, and principles which recognize and protect intellectual property and reward those researchers who contribute to knowledge creation and knowledge sharing. Ethical principles should govern the whole functionality of online academic networks. Although human capital represents the kernel of the networked-based IC and the knowledge creation engine, it is structural capital which drives that capital. If shared vision, values and principles do not stimulate the whole dynamics of knowledge integration and knowledge exchange, the finality of the network will be very low (Curado and Bontis, 2007; Secundo *et al.*, 2017a, 2017b; Vătămănescu *et al.*, 2016). Structural capital plays a key role in the knowledge network because it is the operational framework through which human capital is transformed into operational capital (Bratianu, 2013). The life cycle of a knowledge network is much shorter than that of a company, and from this perspective, structural capital is the determining factor in knowledge exploitation, sharing and exploration within an academic knowledge network. Structural capital also contains knowledge sharing gates and barriers. For instance, individuals cannot share works for which they do not have the necessary copyright, and universities cannot share their specific internal database if that generates knowledge risks (Durst and Zieba, 2020; Durst *et al.*, 2016). Further, *relational capital* represents the knowledge associated with the multilevel relationships developed within and across various organizational structures, and which allows members to enhance their personal acumen (Vătămănescu *et al.*, 2015, 2021).

Focusing on the academic environment and surpassing the intraorganizational perspective, Vătămănescu *et al.* (2016) introduced the concept of *network-based IC* to underline the relevance and uniqueness of such a form of intellectual capital. The network-based IC can be described as the “configuration and process of value creation from the individual’s micro-universe to the entire social system, by linking people, knowledge, information, expertise, competence and know-how within complex and dynamic social networks” (Vătămănescu *et al.*, 2016, p. 601). The network-based IC answers to multiple theoretical and practical needs, among which is the individual’s aspiration to connect to a higher IC level to access new concepts, ideas and theories and the network gravity force for attracting new knowledge and increasing its entropy. The network-based IC has a different distribution of knowledge than organizational-based IC due to the configuration of links between nodes and to the specific knowledge dynamics of these nodes. In a generic knowledge network, nodes can be individuals, teams or organizations. It is thus possible to create intra- and inter-organizational network-based IC, bringing together professionals willing to share their experience and expertise (Fang *et al.*, 2013; Ferguson and Taminiu, 2014).

Building on this logic, the knowledge network affiliation (Bedford and Sanchez, 2021; Mariano and Walter, 2015; Nonaka and Takeuchi, 2019; Phelps *et al.*, 2012; Vătămănescu *et al.*, 2016) has three important consequences:

1. access to valuable network-based intellectual capital;
2. opportunity to enhance individual intellectual capital level; and

3. opportunity to share experience and expertise in all forms of knowledge with network members.

Based on the above arguments, we can formulate the following hypotheses:

- H2.* The online knowledge network affiliation has a positive influence on scholars' access to its highly qualified human capital.
- H3.* The online knowledge network affiliation has a positive influence on scholars' access to its structural capital.
- H4.* The online knowledge network affiliation has a positive influence on scholars' access to its relational capital.

From a holistic perspective, knowledge networks create the necessary mechanisms to stimulate knowledge dynamics between the individual level of knowledge fields (Bratianu and Bejinaru, 2020) and the organizational knowledge level (Davenport and Prusak, 2000; Tsoukas, 1996; Tsoukas and Vladimirou, 2001). Networks act as nonlinear integrators (Bratianu, 2013) of individual knowledge into network knowledge, following the ontological dimension of the knowledge spiral creation (Nonaka and Takeuchi, 1995, 2019; Nonaka *et al.*, 2008). Nonlinear integration extends to individual intelligence to yield collective network intelligence (Albrecht, 2003; Briskin *et al.*, 2009; Vătămănescu *et al.*, 2018a). Both network knowledge and network intelligence can be greater than the total sum of all nodes' knowledge and intelligence because of nonlinearity and synergy if, and only if, there is genuine knowledge sharing and knowledge flow without structural barriers. The resulting network knowledge constitutes valuable *knowledge capital* (Bedford and Sanchez, 2021). Knowledge capital is better known in the literature as *intellectual capital*, a concept developed through the seminal works of Stewart (1997), Sveiby (1997), Edvinsson (1997) and Edvinsson and Malone (1997).

The first studies on intellectual capital focused on companies aiming to develop their core competencies (Prahalad and Hamel, 1990) and increase their competitive advantage (Porter, 1985). Intellectual capital represents "knowledge that can be converted into profits" (Sullivan, 1998, p. 38) within a strategic perspective. "Strategic value extraction by knowledge companies is typically focused more on the firm's future than on its immediate needs. The firm's strategic vision and positioning are usually based on the current or intended capital capabilities" (p. 39). The next wave of research opened the door to public organizations and made valuable efforts to transfer the lessons learned within private companies to public organizations, although they may have different contextual boundary conditions and stakeholder requirements (Amayah, 2013; Massaro *et al.*, 2015; Mcadam and Reid, 2000; Valaskova *et al.*, 2020).

Later, universities and research institutes also attracted the attention of scholars interested in the IC field (Bejinaru, 2017; Bratianu, 2014; Perez *et al.*, 2015; Habersam *et al.*, 2013; Secundo *et al.*, 2017c). Universities are among the oldest institutions in society, and their role is to preserve, critically evaluate, create and disseminate knowledge not only to their students but also toward their communities. As Secundo *et al.* (2017c, p. 610) remarked, "knowledge produced in universities can spur business innovation, foster competitiveness and promote economic and social development."

Many attempts have been made to apply the intellectual capital models used in companies to the university environment, but not all yielded the expected results due to the specificity of the university vision, mission and learning environment (Habersam *et al.*, 2013; Leitner *et al.*, 2014; Ramirez and Gordillo, 2014; Sánchez *et al.*, 2009). There is too much focus on "metrics and measurements" (Edvinsson, 2013, p. 166), ignoring the strategic role of intellectual capital and knowledge dynamics within a university (Bratianu *et al.*, 2011). The experience of the implementation of the knowledge balance sheet system in Austrian universities to increase their autonomy demonstrated clearly that business models cannot

be applied directly to the university environment (Habersam *et al.*, 2013; Piber and Pietsch, 2006). “In the Austrian case, fifty-three indicators (for which additional subcategories were defined) are too difficult to be controlled deliberately, and thus, universities need to define the most relevant measures for their specific goals and strategies and to have the strongest possible impact on the output” (Perez *et al.*, 2015, p. 159).

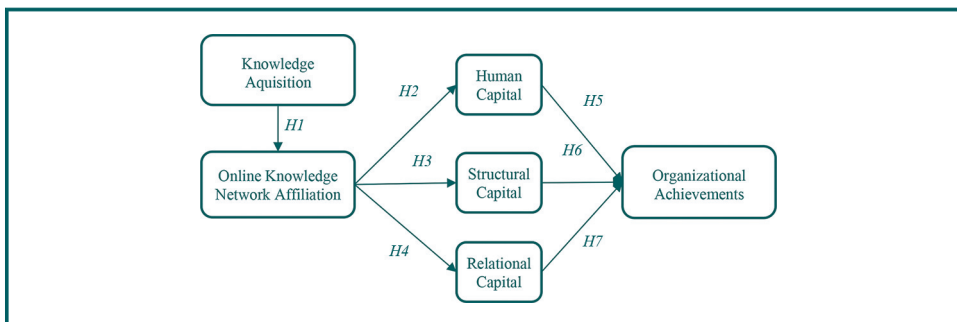
According to the microfoundations theory (Foss and Linder, 2019; Foss and Lindenberg, 2013), increasing the level of individual intellectual capital of an organization’s members creates the necessary conditions for increasing the organizational capital. In the case of academics, we discuss how universities activate knowledge in the form of professors and researchers, whereas online networks rise as knowledge wells and springs of IC (Vătămănescu *et al.*, 2016). With proper support, integrating all academics’ contributions to increase the value of the university intellectual capital becomes very likely (Bratianu, 2013, 2014). The university can hence enrich its organizational achievements and enhance its competitiveness (Lee, 2010; Lu, 2012; Piber and Pietsch, 2006; Ramirez and Gordillo, 2014; Bryson, 2017; Secundo *et al.*, 2017c). In this light, organizational achievements are operationalized as the attainment of relevant organizational goals which support an organization’s development, innovation and growth (Vătămănescu *et al.*, 2016; Bryson, 2017).

Intellectual capital is important in transferring knowledge toward various stakeholders, contributing to their multidimensional development (Bisogno *et al.*, 2018; Lee, 2010; Secundo *et al.*, 2017c; Secundo *et al.*, 2015). From this perspective, online academic networks demonstrate behavior similar to that of knowledge brokers (Hargadon, 1998; Kidwell, 2013; Pawlowski and Robey, 2004). “Knowledge brokers refer to the individuals or organizations that yield benefits from transferring ideas from where they are well-known and developed to where they engender innovative opportunities” (Vătămănescu *et al.*, 2018a, p. 2). In a similar vein, Vătămănescu *et al.* (2016) contend that there are significant relationships among network-based human, structural and relational capital and organizational competitiveness, understood via professional and organizational achievements (i.e. top-ranked publications and university ranking within national classifications). Based on all these findings, we, thus, infer that:

- H5. Scholars’ access to highly qualified human capital of online knowledge networks has a positive influence on their organizational achievements.
- H6. Scholars’ access to the structural capital of online knowledge networks has a positive influence on their organizational achievements.
- H7. Scholars’ access to the relational capital of online knowledge networks has a positive influence on their organizational achievements.

Conflating all the inferred relationships, the following conceptual model was proposed (Figure 1).

**Figure 1** Conceptual model



## Materials and method

### *Research design*

The aim of the research was to determine the factors that lead to organizational achievements of universities via the mediation effect of the intellectual capital harnessed from OKN (i.e. the access to highly qualified human capital, to structural capital and to relational capital). The assumption was that access to this type of IC is dependent on academics' intention to acquire knowledge and subsequently affiliate with specialized online academic networks perceived as knowledge networks. Based on the theoretical developments, we proposed a model able to capture the mediated impact of online knowledge network affiliation on organizational achievements via the three-dimensional IC (i.e. human, structural and relational capital).

### *Sampling and data collection*

The research was based on an empirical investigation that relied on a quantitative survey through online interviews administered between July and September 2021. A convenience sample was chosen, e-mails being sent out by the authors to scholars in their networks, to various online academic communities of which the authors were members, via e-mail distribution groups from the publishers where the authors were guest/associate editors. They were also posted on social media and online academic platforms such as ResearchGate and [Academia.edu](https://www.academia.edu). The research instrument addressed multiple interconnected issues, but within the scope of the current research, a six-construct model was tested.

A total of 227 responses from academics ( $M = 45$  y.o.,  $SD = 10.72$ ) residing in 30 different countries were collected. Given the fact that the invitation to complete the questionnaire was posted on various online platforms, a specific response rate could not be calculated as such. Almost 85% of participants in the study served as professors, associate professors and lecturers, while 75% had business or management backgrounds.

Asked whether there had been any changes in their behavior regarding the usage of online academic networks since the outbreak of the COVID-19 pandemic, most respondents (55.1%) reported no change, while 41.0% had increased their use of such networks. The majority (45.8%) of respondents admitted to engagement with three or four different online academic online networks, whereas 12.4% were affiliated to five or more academic networks and 34.8% actively used only one or two such networks. In this regard, 7.0% reported as not actively engaging with any online academic networks.

### *Questionnaire design and measures*

The items of the questionnaire were taken from different scales identified in the relevant literature (as specified in [Table 2](#)). We used a five-point Likert scale (ranging from 1: to a very small extent to 5: to a very great extent) and adapted the scales to the research context, which envisaged OKN. Seven main constructs were delimited, namely, *Knowledge Acquisition* (reflective construct comprising four items), *Online Knowledge Network Affiliation* (reflective construct comprising four items), *Human Capital* (reflective construct comprising three items), *Structural Capital* (reflective construct comprising five items), *Relational Capital* (reflective construct comprising four items) and *Organizational Achievements* (formative construct comprising six items).

## Findings

### *The evaluation of the measurement models*

The proposed model and the developed hypotheses (see [Figure 1](#)) were analyzed via partial least squares structural equation modeling (PLS-SEM) with the help of SmartPLS 3.0.

PLS-SEM was selected, given its suitable application to structural models which cover both composite and reflective constructs, as in the present context (Henseler *et al.*, 2016). All reflective constructs were checked for validity and internal consistency, the item loadings, average variance extracted (AVE), reliability indicators and discriminant validity being computed and presented in Table 1. All loadings are above the minimum threshold of 0.70, suggesting that all measured items have convergence validity (Hair *et al.*, 2010). In the current study, the minimum and maximum values range between 0.773 and 0.902, fulfilling the preestablished thresholds. Reliability was tested using Cronbach's  $\alpha$ , which must exceed the threshold of 0.7 to be acceptable for confirmatory purposes (Henseler and Sarstedt, 2013). All reliability values are above 0.7, confirming the internal consistency of the model. Likewise, all AVE values are above 0.5, which indicates an adequate model (Chin, 1998) and supports the convergent validity of the constructs. The composite reliability (CR) also suggests the reliability of the constructs, the composite values being greater than 0.7 (Hair *et al.*, 2010).

To test the discriminant validity of each construct, the Fornell–Larcker (Fornell and Larcker, 1981) and Heterotrait–Monotrait (HTMT) criteria (Henseler *et al.*, 2016) were used (Table 2). Based on the Fornell–Larcker criterion, for each latent variable AVE value is higher than the correlation coefficient between the competent and all the distinct variables.

To avoid the possibility that the constructs are conceptually similar, the HTMT criteria were taken into consideration. According to Henseler *et al.* (2014), the threshold value is 0.9 – in the present study, all constructs values are below 0.9, indicating the discriminant validity of the constructs (Table 3).

The level of collinearity of the items in the measurement model for the data set was further addressed. The variance inflation factor (VIF) value of all indicators is below 5, which is considered the threshold in the collinearity analyses (Sarstedt *et al.*, 2017). The highest value is 3.068 (OA2 item) for the data set, indicating there is no multicollinearity. Next, a bootstrap procedure with 5,000 subsamples was applied to test the hypotheses and the relationships between the latent variables (Hair *et al.*, 2017). Six hypotheses were accepted with a significant, positive relationship based on *t*-statistics.

### *The evaluation of the structural models*

To thoroughly assess the structural model, we have also analyzed the collinearity of the constructs. The highest VIF value of the inner model is 1.944 (SC→OA); thus, below the threshold value indicated that there is not any multicollinearity between constructs. The goodness of fit of the saturated model is also acceptable. The square root mean residual (SRMR) has a value of SRMR = 0.069 which fulfills the recommended criteria <0.08.

*Human Capital*, *Structural Capital* and *Relational Capital* explain 25.9% of the variance of *Organizational Achievements* ( $R^2 = 0.259$ ), while *Online Academic Network Affiliation* explains 38.4% of the variance in *Human Capital* ( $R^2 = 0.384$ ), 34.1% of the variance in *Structural Capital* ( $R^2 = 0.341$ ) and 34.4% in the variance of *Relational Capital* ( $R^2 = 0.344$ ). *Knowledge Acquisition* explains 42.9% of the variance in *Online Academic Network Affiliation* ( $R^2 = 0.429$ ), defining a moderate predicting power of the structural model (see Figure 2). Further, Table 4 exhibits the results of testing the inferred relationships among constructs, contending that six out of the seven hypotheses are statistically significant in the context of the current research.

As illustrated in Table 4, there is a positive significant effect between knowledge acquisition and online knowledge network affiliation, i.e. scholars' motivation and intention to find out more about their field of interest determine them to join OKN ( $\beta = 0.655$ ; *t*-value = 12.945 and  $p < 0.001$ ). Therefore, *H1* is supported.

**Table 1** Constructs and items

Construct	Item	Measure	Loading	Cronbach's alpha	AVE	CR	Source (adapted from)
Knowledge Acquisition (KA)	KA1	Acquiring knowledge on research grants or projects	0.802	0.857	0.698	0.903	Gerbin and Drnovsek (2020); Han <i>et al.</i> (2020); Vătămănescu <i>et al.</i> (2015, 2016, 2021)
	KA2	Accessing recent publications	0.820				
	KA3	Finding out about important academic events	0.850				
	KA4	Acquiring up-to-date knowledge for self-improvement	0.869				
Online Knowledge Network Affiliation (OANA)	OANA1	Joining online academic networks which gather active scholars in the field	0.844	0.843	0.680	0.895	Vătămănescu <i>et al.</i> (2015, 2016, 2021)
	OANA2	Closely following the information provided online by active scholars	0.868				
	OANA3	Closely following online the researchers cited in previous works	0.810				
	OANA4	Looking into the profiles of scholars in the field	0.775				
Human Capital (HC)	HC1	International visibility of network members for their expertise in the field	0.885	0.864	0.787	0.917	Andriessen (2004); Bedford and Sanchez (2021), Bratianu and Bejinaru (2020); O'Dell and Hubert (2011); Vătămănescu <i>et al.</i> (2015, 2016)
	HC2	Reputation of network members for developing innovative research in the field	0.873				
	HC3	High qualification supported by publications in top-ranked journals	0.903				
Structural Capital (SC)	SC1	Access to interesting and compelling research	0.773	0.876	0.667	0.909	Phelps <i>et al.</i> (2012); Secundo <i>et al.</i> (2017a, 2017b); Vătămănescu <i>et al.</i> (2015, 2016)
	SC2	Access to information about research projects and grants	0.837				
	SC3	Access to information about conferences and academic events	0.833				
	SC4	Access to the latest call for papers in the field	0.836				
	SC5	Access to new research ideas and direction(s)	0.805				
Relational Capital (RC)	RC1	Contacting network members to propose different research/academic collaborations	0.828	0.845	0.683	0.896	Fang <i>et al.</i> (2013), Ferguson and Taminiau (2014); Bedford and
	RC2	Contacting network members to ask for full papers or additional materials	0.800				

(continued)

**Table 1**

Construct	Item	Measure	Loading	Cronbach's alpha	AVE	CR	Source (adapted from)
	RC3	Developing online collaborations with network members	0.874				Sanchez (2021), Mariano and Walter (2015); Nonaka and Takeuchi (2019), Phelps <i>et al.</i> (2012); Vătămănescu <i>et al.</i> (2016)
	RC4	Fostering a collaborative environment with network members	0.802				
Organizational Achievements (OA)	OA1	Personal research achievements contribute to the affiliation of the university to important international networks	0.368	–	–	–	Bratianu (2013, 2014); Bisogno <i>et al.</i> (2018), Lee (2010); Secundo <i>et al.</i> (2015, 2017c); Bryson (2017); Vătămănescu <i>et al.</i> (2016, 2018a, 2021)
	OA2	Personal research achievements contribute to attracting public funds for the university	–0.273				
	OA3	Personal research achievements contribute to attracting private funds for the university	0.358				
	OA4	Personal research achievements contribute to winning important research grants for the university	0.209				
	OA5	Developing top-ranked articles with scholars from online networks	0.390				
	OA6	Developing successful collaborative projects with scholars from online networks	0.463				

Notes: Factor loading > 0.7; Cronbach's alpha > 0.7; average variance extracted (AVE) > 0.5; composite reliability > 0.7

**Table 2** Discriminant validity analyses (Fornell–Larcker)

Construct	HC	KA	Fornell–Larcker			
			OA	OANA	RC	SC
HC	0.887					
KA	0.523	0.836				
OA	0.620	0.655	0.825			
OANA	0.390	0.279	0.354			
RC	0.540	0.601	0.587	0.482	0.826	
SC	0.632	0.573	0.584	0.302	0.588	0.817

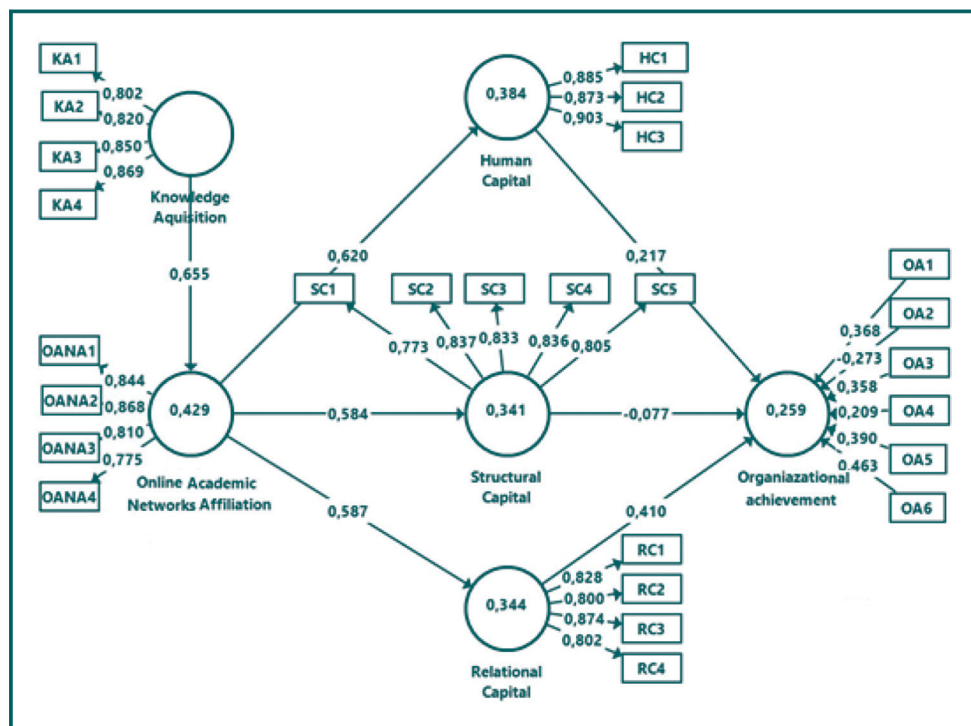
**Notes:** KA: knowledge acquisition; OANA: online academic network affiliation; SC: structural capital; HC: human capital; RC: relational capital; OA: organizational achievements

**Table 3** Discriminant validity analyses – Heterotrait–Monotrait (HTMT)

Construct	HC	Heterotrait–Monotrait (HTMT)			
		KA	OA	RC	SC
HC					
KA	0.609				
OA	0.720	0.757			
RC	0.629	0.709	0.692		
SC	0.715	0.665	0.665	0.680	

**Notes:** KA: knowledge acquisition; OANA: online academic network affiliation; SC: structural capital; HC: human capital; RC: relational capital; OA: organizational achievements

**Figure 2** Structural model



**Table 4** Path coefficients of the structural equation model

Paths	Path coefficients	SD	t-value	CI <sup>1</sup>	P-value	Hypotheses
KA → OANA	0.655	0.051	12.945	0.544–0.746	0.000***	H1-supported
OANA → HC	0.620	0.048	12.924	0.513–0.712	0.000***	H2-supported
OANA → SC	0.584	0.055	10.634	0.460–0.681	0.000***	H3-supported
OANA → RC	0.587	0.055	10.679	0.472–0.680	0.000***	H4-supported
HC → OA	0.217	0.085	2.567	0.046–0.388	0.011**	H5-supported
SC → OA	−0.077	0.100	0.770	−0.275–0.548	0.409n.s	H6-not Supported
RC → OA	0.410	0.070	5.858	0.282–0.548	0.000***	H7-supported

Notes: \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; n.s not significant; KA: knowledge acquisition; OANA: online academic network affiliation; SC: structural capital; HC: human capital; RC: relational capital; OA: organizational achievements. <sup>1</sup>CI: confidence interval (2.5%–97.5%)

Focusing on the relationships between the online knowledge network affiliation and the three dimensions of intellectual capital availed by the networks (i.e. human, structural and relational), *H1*, *H2* and *H3* were all validated. *H2* assumed that the online knowledge network affiliation has a positive influence on scholars' access to highly qualified human capital. The results ( $\beta = 0.620$ ;  $t$ -value = 12.924;  $p < 0.001$ ) confirm that there is a meaningful relationship between online knowledge network affiliation and human capital; therefore, *H2* is supported. *H3* presumed that online knowledge network affiliation exerts a positive influence on scholars' access to structural capital. The results ( $\beta = 0.584$ ;  $t$ -value = 10.634;  $p < 0.001$ ) prove that the relation is positive and significant, allowing us to accept *H3*. *H4* assumed that online knowledge network affiliation has a positive influence on scholars' harnessing of relation capital. The obtained results ( $\beta = 0.587$ ;  $t$ -value = 10.679;  $p < 0.001$ ) show the positive and significant influence of online knowledge network affiliation on relational capital; thus, *H4* is supported by the empirical data.

Further, *H5* presumed that scholars' access to highly qualified human capital impacts positively on their organizational achievements. Although at a lower level, the results ( $\beta = 0.217$ ;  $t$ -value = 2.567;  $p < 0.011$ ) show that there is indeed a positive and significant impact of human capital on scholars' organizational achievements; hence, *H5* is accepted. *H6* assumed that scholars' access to structural capital availed by knowledge networks has a positive influence on their organizational achievements. In this front, the results ( $\beta = -0.077$ ;  $t$ -value = 0.770;  $p = 0.409$ ) show that there is no meaningful relation between these constructs; hence, *H6* is rejected. Finally, *H7* presumed that scholars' harnessing of relational capital has a positive influence on their organizational achievements. The results ( $\beta = 0.410$ ;  $t$ -value = 5.858;  $p < 0.001$ ) prove a positive and significant relation, thus, allowing us to accept *H7*.

## Discussion

The testing of the research hypotheses in the context of the current study brought to the fore that six out of the seven presumed relationships were supported by the empirical findings.

In this vein, the first considered relationship – i.e. scholars' motivation to acquire new relevant knowledge and their affiliation to OKN – proved to be statistically meaningful, thus supporting the influence of personal drivers (e.g. acquiring knowledge on research grants or projects, accessing recent publications, finding out about important academic events, acquiring up-to-date knowledge for self-improvement) on the decision to join specialized knowledge networks which are accessible in the online environment. The evidence complements previous studies (Vătămănescu *et al.*, 2015, 2018a, 2021; Gerbin and Drnovsek, 2020; Han *et al.*, 2020), which have either addressed the role of individual motivation and intention to affiliate with online academic networks or rather focused on the organizational incentives to exploit the potential of knowledge networks.

Revolving around the relationships between online knowledge network affiliation and the three dimensions of intellectual capital (i.e. human, structural and relational), the findings

indicated that all the formulated hypotheses (*H1*, *H2* and *H3*) were meaningful. To start with, online knowledge network affiliation has a positive influence on scholars' access to highly qualified human capital (i.e. international visibility of network members for their expertise in the field, reputation of network members for developing innovative research in the field, high qualifications supported by publications in top-ranked journals). Within the scope of the present investigation, affiliation to knowledge networks was operationalized via active involvement indicators (i.e. joining online academic networks which gather active scholars in the field, closely following the information provided online by active scholars, closely following online the researchers cited in previous works, looking into the profiles of scholars in the field) consistent with the approach of [Vătămănescu et al. \(2016, 2018a\)](#).

Further, online knowledge network affiliation exerts a positive influence on scholars' access to structural capital and harnessing of relation capital, two IC dimensions which cover open access to the intangible resources aggregated within knowledge networks (e.g. compelling research, information about research projects and grants, conferences and academic events, new research ideas and directions) and dynamic knowledge-driven interrelationships (i.e. contacting network members to propose different research/academic collaborations, to ask for full papers or additional materials, developing online collaborations and fostering a collaborative environment). In this light, the findings are indicative of previous investigations on knowledge network affiliation ([Bedford and Sanchez, 2021](#); [Mariano and Walter, 2015](#); [Nonaka and Takeuchi, 2019](#); [Phelps et al., 2012](#); [Vătămănescu et al., 2016](#)) which have tackled the opportunity to enhance individual intellectual capital level within networks and to share experience and expertise in all forms of knowledge with the network members.

Exploration of the relationships between the three IC dimensions and organizational achievements pointed to two meaningful hypotheses supporting the influence of scholars' access to highly qualified human capital, respectively, of harnessing relational capital on the dependent variable. No significant relationship was retrieved between the network's structural capital and its translation to the organizations to which academics were affiliated. The evidence partially contrasts prior research in the field ([Vătămănescu et al., 2016](#)), which concluded that all three types of IC are conducive to organizational competitiveness. Nevertheless, within the scope of the present study, the operationalization of the dependent variable, namely, organizational achievement, relied on the measurement of more indicators able to capture the entire spectrum of the construct (i.e. the affiliation of the university to important international networks, attracting public and private funds for the university, winning important research grants for the university, developing top-ranked articles and successful collaborative projects with scholars from online networks), thus advancing a more intricate multilayered approach toward organizational achievement. The structure of the network must also be highlighted as being different to the structure of the organization, in which case the structural intellectual capital associated with the knowledge network cannot contribute to the performance of an organization. Thus, this hypothesis should be understood within a probabilistic mode of thinking, which yields that partial acceptance.

Concerning human and relational capital, knowledge networks have confirmed their role in the creation of the proper mechanisms to stimulate knowledge dynamics between the individual level of knowledge and organizational knowledge level in their capacity of nonlinear integrators. The findings are in line with previous undertakings affirming the integration of academics' contributions to increase the value of university intellectual capital, and standing for a pivotal process in the way of achieving better organizational results ([Bratianu, 2013, 2014](#); [Vătămănescu et al., 2016, 2018a, 2018b, 2018c](#)). In this context, intellectual capital is important in transferring knowledge toward the actively involved network members, subsequently contributing to their multidimensional (i.e. personal and professional) development.

## Conclusions

### *Summary of the findings*

The current study has shown that individual motivation to acquire knowledge has a significant influence on the affiliation with online academic networks approached as knowledge networks. Further, active engagement with a network's intangible resources leads to a significant harnessing of the three-component intellectual capital, that is, human, structural and relational capital. Human and relational capital proved to exert a significant effect on organizational achievements, whereas structural capital fell short of reporting a meaningful influence on the dependent variable. Overall, the model explains 25.9% of the variance of *Organizational Achievements* ( $R^2 = 0.259$ ), thus providing a compelling outlook on the influence posed by the knowledge capital of OKN on organizations' (i.e. universities and research centers) positive results.

### *Theoretical and managerial contributions and implications*

From a theoretical point of view, the study explores online academic networks in their capacity as knowledge networks, focusing on a multidimensional perspective on the intellectual capital availed by such social structures. The conceptual model extends the boundaries of prior similar research endeavors, bringing forward the role of personal motivation for knowledge acquisition in capitalizing the intangible resources of OKN as a key factor conducive to organizational achievement. As previously mentioned, most of the extant studies in the field have revolved around organizational formal or informal drivers of network affiliation, leaving aside the intrinsic motivation of academics.

Moreover, the present study contributed to the advancement, measurement and validation of a conceptual model which comprehensively covered the underlying relationships among personal, organizational and transorganizational (i.e. network) knowledge by assuming the nonlinear and integrative function of online academic networks. The knowledge capital of networks was assessed at different levels pertaining to the three-dimensional approach of intellectual capital (human, structural and relational), thus facilitating a more thorough insight into their specific influences. The organizational achievements construct was hereby designed to cover a wider range of indicators relevant for such analysis, also considering the main layers measured in prior explorations. Although the research model is presented in a linear mode, the real processes are nonlinear, and thus our findings reflect the synergy effect. Decomposing the knowledge network intellectual capital into its three basic components is accomplished using standard practice, but we should be aware that human capital, structural capital and relational capital are not completely independent variables. Therefore, the complexity of the real phenomena and their nonlinearity should be understood through the synergy effect.

Given the fact that the research sample comprised over 200 academics from 30 different countries, the study may be considered as descriptive of a transnational perspective on OKN. By limiting contextual factors, the conceptual and structural models can be considered as a reference point for further studies interested in depicting the state-of-the-art regarding the usage of online academic networks by academics worldwide. Moreover, our findings reveal the dynamics between the motivation for affiliation of new members with some knowledge networks and the need for their contribution in cocreating online network intellectual capital. OKN represent a paradigm shift from organizations conceived as well-defined knowledge systems to the paradigm of knowledge ecosystems and cross-border knowledge flow.

Concerning the organizational and managerial implications, the findings of the empirical investigation are indicative of the influence of harnessing network-centric intellectual capital to attain the envisaged organizational results. University management and academics are expected to better comprehend that significant knowledge stocks and flows are often

boundary-spanning and that they should properly engage in OKN in pursuit of personal and organizational achievements. Innovation, competitiveness and performance are dependent on knowledge sharing at multiple levels, starting with the individual toward the entire ecosystem and academics (as knowledge workers) should exploit opportunities to access highly qualified human capital and to leverage relational capital. This emerges as a paved way yielding multifold benefits for both members and organizations. The acumen stemming from such networks is expected to impact the overall quality of the teaching process; therefore, managerial strategies should be articulated to develop formal policies regarding the enhancement of the research infrastructure and practices. Higher education representatives should be aware of the fact that capitalizing on transorganizational knowledge springs has a substantial and multifold impact on the entire academic community and is prone to underscore value creation in the long-term.

Furthermore, online academic networks have proved to be relevant wells of knowledge through their capacity to garner collective intelligence, to stimulate interorganizational exposure and learning, to transform tacit knowledge into shared explicit knowledge and to simultaneously propel generative learning resulting in individual and organizational achievements. In this sense, university managements should define and apply articulate policies encouraging academics to access and harness the knowledge capital and potential of such interactive social aggregations. A strategic approach is thus recommended to purposefully favor a collaborative intercultural climate within the knowledge-based environment, to enhance cultural intelligence and intercultural learning, thus systemically assuming the transformative role of higher education institutions as value creation and innovation pioneers.

### *Research limitations and future directions*

The first limitation of this research endeavor lies in the usage of a convenience sample. Even though the participants in the study came from 30 different countries, the great majority were from Europe, occupying positions such as professor, associate professor and lecturer. PhD candidates and postdoctoral researchers were hereby under-represented. Future studies might investigate a better representation of countries and positions when defining their final research sample.

The second limitation refers to the advanced conceptual model, which only considered personal motives for knowledge acquisition, leaving aside the inclusion of formal organizational policies in this respect. Future studies would benefit from extending the scope of the model to include the latter, thus favoring comparisons between their specific influences on the other constructs. Related to the conceptual and structural model, the research instrument relied on the reviewed literature but had to be adapted to capture the idiosyncrasies of online academic networks, which have rarely been investigated through the lens of IC components. Consequently, further research in this area is expected to confirm or challenge the extant findings.

Connected in part to the previous limitation, the third one concerns the self-reported measures used in the questionnaire, as personal ratings are often subject to bias. To overcome this drawback, further undertakings might take into consideration the inclusion of more objective measures or the employment of mixed research methods to round off the analysis.

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