Knowledge management, intellectual capital and entrepreneurship: a structured literature review

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Abstract

Purpose – The purpose of this paper is to analyze within the knowledge management (KM) stream the relationship between KM and intellectual capital (IC) and entrepreneurship (E). IC is a pivotal intangible resource to firms to generate knowledge. Knowledge and information are strategic for today's company life. IC is generated and dynamically recombined by knowledge, produces knowledge and is feed by knowledge itself, both codified and tacit. For those reasons, the paper is motivated to understand how IC can represent valuable knowledge and how it can turn into innovation, through KM and practices. It is also voted to stimulate literature on understanding how innovation can serve E capabilities for firms' business models, as innovation is not necessarily linked to a technological breakthrough. IC is functional to KM practices, as entrepreneurs can use IC and knowledge as a strategic management toolbox to innovate.

Design/methodology/approach – The main aim of the paper is to understand the state of the art on these central issues in KM literature. The paper uses a structure literature review (SLR) methodology, gathering papers by Scopus database for the period 2000–2019, on the relationship between KM and IC and E. The second aim is to understand for future research how do managers use IC as an opportunity to innovate and as a vehicle to transfer knowledge. The authors wondered about the qualification/quantification of ''knowledge'' as a crucial component of IC, which is in turn the riskier, but the more representative, a component of intangibles assets in the era of knowledge.

Findings – As for the first research question, the findings show that, actually, as the research has been started, IC, KM and E are still engaged separately by scholars, even if few efforts to match them together have been performed. The results depict a general fragmented and unsystematic vision of the relationship between the three topics. As for the future of the research about these topics, the authors found that scholars should catch the opportunity to go beyond the traditional theoretical mainstream on these issues. There is an urge to move the focus of KM and IC research toward new models of their interconnection, by including the social capital, namely, knowledge capabilities (explicit or not), etc., which are able to turn knowledge in innovation and competitive advantage, from an accounting perspective (recognizing IC's components affecting the performance of firms, among which knowledge is the most important) and from a theoretical point of view (reducing the misalignment between the epistemological concept of KM requirements and the effective perception of organizational KM activities to extract value from KM initiatives).

Research limitations/implications – The results, even if suffering from some limitations due to the performing of the methodology, offers several implications for academic research. The future of KM of the IC resources is clearly likely to lie on the recognition of the component of knowledge, as well as on the recognizing of new forms of social capital such as entrepreneurial capital, which is connected to innovation and creativity and firm value. An integrative framework of IC measurement should be built to link IC with KM and E. This is to guarantee that the measurement of IC does contribute to the efficiency and effectiveness of KM.

Practical implications – Practical contribution to accounting perspective. In fact, the relations between these three topics could be highly beneficial to validate, in the dynamic societies and organizations, how it is important the entrepreneur's learning process and its content is fundamental in the quest for new business opportunities/innovations, stated that learning is a crucial factor for entrepreneurial activity and has a structural impact on business models of industrial organizations. The difficulty to recognize in the balance sheet human capital relation could be limited by the introduction of the component of KM

practices codification and E attitude and influence to operate this transformation of human capital in organized structural capital. The authors would not give the solution to that problem. The authors just want to address the discussion.

Social implications – *The inspiring conclusion from previous studies is to think in a new way at the role of knowledge-based IC in organizational E. Starting from the assertion that knowledge-based process of innovation and E are linked, it can be tested, also from case studies help or empirical application that organizations with a pleasant level of IC are more likely to be more innovative and in conclusion, have a higher market value.*

Originality/value – *The main contribution of this paper is to afford for the first time, to the best knowledge, an SLR on the interaction in literature among KM, IC and E, simultaneously, to understand where literature research actually is focusing and to lead future thoughts, at a managerial level, toward the interacting implications of KM and IC on value creation by innovation, which is one stream E literature. Although recently scholars have been concerning more empirically about the relationship between KM, IC and E, they are more focused on theoretical aspects than about new ways to look at IC. The future of KM and IC research is clearly likely to lie on the recognition of the component of knowledge, as well as recognizing new forms of social capital such as entrepreneurial capital, which is connected to innovation and creativity. An integrative framework of IC measurement through KM should be built to link IC measurement with KM. This is to guarantee that measurement of IC does contribute to the efficiency and effectiveness of KM practices.*

Keywords *Intellectual capital, Knowledge management, Entrepreneurship, Literature, Innovation*

Paper type *Research paper*

1. Introduction

In a knowledge-based economy, for their adaptation and survival to changes, organizations shall reshape the way they manage information and knowledge, learning processes, human resources, entrepreneurial and leadership functions, their business model indeed (North and Kumta, 2014). Intellectual capital (IC) (Grant, 1996) is generally accepted as one of the most pivotal intangible resources to firms to generate knowledge, which in itself is a complex of intangible assets. Nowadays, knowledge and information are strategic for company life (Marr and Spender, 2004; Santoro et al., 2019), much more than land, capital or labor in the production function (Bontis et al., 1999). Companies use internal and external knowledge sourcing to create IC and to improve innovation and a firm's performance (Ferraris et al., 2017; Santoro et al., 2018).

In its turn, IC is generated and recombined by knowledge. It is not a static concept of assets. As Galbraith first assumed in his conceptualization of intellectual actions, IC is a dynamic system of an element, which evolves over time, and which produces knowledge and which is feed by knowledge, both codified and tacit (Latilla et al., 2019). For those reasons, the concept can be suitable for different groundings and perspectives, which are voted to understand how IC can represent valuable knowledge and how it can turn into innovation (Al-Jinini et al., 2019; Ardito et al., 2018; Roone, and Dumay, 2018; Santoro et al., 2020).

As Edinsson and Sullivan (1996) demonstrated, IC is the core asset of new knowledge-intensive and high-tech firms. The market premium of "knowledge firms" is in their IC and in their ability to leverage and manage it.

As IC is the engine of knowledge creation and as IC is a dynamic system that continuously evolves, it is necessary to manage it to capture the tacit knowledge created and to switch it in explicit knowledge. In this sense, on one side, the knowledge management (KM) becomes a tool to guarantee the right evolution of IC to reach innovation and the improvement of the firm performance; on the other side, IC can be used to act KM strategies, by looking at the advantage from an entrepreneurial perspective to successfully improve the financial and operational performance of firms. KM and IC become the drivers for entrepreneurs to improve their performance.

In this way, interesting insights could derive from grounding the two concepts of IC and KM in the field of entrepreneurship (E) as to better understand the way organizations should

adapt their strategy to innovate, also using creativity and maintain a competitive advantage in changing environment/context (Matricano, 2016).

New knowledge always comes from a brilliant entrepreneur that develops and improves his tacit knowledge. If KM works, the tacit knowledge will become explicit knowledge at the beginning for the organization and then also for the stakeholders. In this way, knowledge can develop in IC and can improve a firm's performance.

As we said, in a knowledge economy knowledge creation could ensure the achievement of competitive advantage. The ability to identify, collect and disseminate new knowledge throughout the organization can represent the most relevant challenge for the "E" (Nonaka et al., 2000).

Indeed, there is a general acceptance that IC is functional to KM practices, as entrepreneurs can use IC and knowledge as a strategic management toolbox to improve their results.

So the "good entrepreneur" is one who manages to implement effective KM tools capable of identifying, processing and disseminating new knowledge and of creating IC.

In this dynamic environment (transition from the industrial society to the information society), E, KM and IC management and measurement are considered acceleration tools for sustainable development and growth process and economic well-being. The concept of efficiency in this term can explain how to be successful, organizations are forced to establish rational connections between scarce resources and managerial and entrepreneurial capabilities of its human resources that is E. One of the most significant resources and attributes in this dynamic scenario of E are, to our little opinion, knowledge and IC. Today, E is the essence of economic development. In addition, all countries try to develop E in their lands because KM makes values by transforming human capitals into organized intellectual assets (Sayadi, 2013).

The three concepts KM, IC and E, therefore, inevitably appear connected in the context of organizations operating in a dynamic environment in which successful companies are those that generate new knowledge.

The aim of this paper is, therefore, to verify how KM, IC and E have been analyzed by literature, as now, also to understand how these topics have been matched together and which field has been mainly studied.

According to the above-mentioned premises, the main aim of this paper is to answer the following research question (RQs):

RQ1. Is academic literature research developing the topics of "IC," "KM" and "E" systematically?

RQ2. What are the future lines of research regarding the interactions between IC, E and KM?

To reply our RQs, we propose – through a structured literature review – to study what and how extant literature has developed the topics of IC, KM and E, to understand how much it has been studied and what it can still be studied by academics

The main contribution of this paper is to afford for the first time, to our best knowledge, a structure literature review (SLR) on the interaction in literature among IC, KM and E. The paper shows how literature developed these topics, the evolution of the studies over the time and the main areas investigates and the prevalent method applied by the research to understand where literature research actually is focusing. Simultaneously, to lead future thoughts, we propose to identify how literature will be able to evolve in the future, to fill the existing gaps.

To develop this theme, we will use an SLR methodology classifying the following scientific works on the basis of:

- *Article focus*;

- *Research area*;

- *Geographic area*; and

- *Research method*.

To better outline the *RQ* and the result achieved, the present work is structured as follows: in Section 2 we will make the state of the art about the literature existing on the general issue of IC and KM with reference to E. This action will help us to understand the reason why we attempt to match different approach existing in literature, giving them a new perspective and what is the general common sense in literature existing on these topics. Then, in the next Section 3, we will detail the research methodology through a specific identification and description of the taxonomy used for each field of our SLR. Afterward, Section 4 mentions the results and the related analyses will be exposed. Finally, In Section 5 a special discussion will be voted on each theme of our work; data on literature review on IC, KM and E (*RQ1*) and future roots of research (*RQ2*).

2. Literature framework

Academic research, as a long time, has been involved in IC and KM as two separate literature streams, as they both deal with the topics related to the knowledge-based competitive advantage of the firm. IC has provided a base to evaluate the strategic key intangible resources of the firm to competitive advantage (human, relational and structural capital, which all are all of them related to knowledge-based resources). KM, in its turn, has focused on the managerial processes and practices, which can be used to improve and moderate the effect of IC to competitive advantage.

Recently, some scholars (Hussinki *et al.*, 2017) have attempted to merge IC and KM to demonstrate their mutual and beneficial contribution to firms' performance, as until that moment, several research gaps persisted on their effect on firms performance. Youndt *et al.* (2004) summarize IC as all knowledge that can be used by organizations to gain financial performance.

At the same time, some efforts attempted to combine them into strategy (Wang *et al.*, 2016). According to such streams, IC can be used to act KM strategies, by looking at the advantage from an entrepreneurial perspective and by fitting the two approaches to successfully improve the financial and operational performance of firms.

Other studies step forward into the relation between IC and KM by empirically demonstrating that KM influences the three dimension of IC (relational, structural and human) and that IC dimensions, in turn, leads to innovation processes (Allameh, 2018) and performance (Han and Li, 2015).

The clear common assumption is that IC poses as valuable knowledge for knowledge-based companies, which address the market value of firms over the book value of equity. So that the concept of IC has lots to do with the concept of knowledge (Kiang *et al.*, 2016) and innovation (Buenechea-Elberdin, 2017).

Among IC literature, one other direction focuses on the relationship between IC and innovation. In fact, according to Zang and Wang (2011), IC underlies knowledge concepts, as for its four different aspects (human, structural, social and innovation capital). Human capital is the competence knowledge of the labor force. Structural capital includes organizational culture, business process and development strategy. Social capital poses as relational capital, which affects the relationship between firms and their external stakeholders. Innovational capital is the result of such a combined knowledge (R&D, the results of technology-innovation and policies of innovation incentive).

Very recently, furthermore, the development of this stream of literature has been addressing researches to deal with IC and E characteristics as drivers of innovation that means that there is a stream on grounding the concept of IC in the field of E (Ugalde-Blinda *et al.*, 2014). Actually, the term "intellectual entrepreneurship" has been starting to get *consensus* from academia among management and strategic literature, by collecting intangible assets, etc. innovation, human creativity and knowledge.

On the other side, among KM literature, scarce efforts were voted to match KM and E. In particular, very poor researches focus on the relationship between KM and E, although KM is widely considered a way to foster innovation through new knowledge. In this sense, it could be very interesting to understand whether entrepreneurial activities can enable the knowledge-creation cycle (Bandera *et al.*, 2017) and conversely how knowledge improves E activities.

To our opinion, given the mutual exchange between IC, KM and E, a very interesting insight could emerge by matching and grounding the two different approaches (IC and KM) on E research stream, to view how IC could affect the processes of creation, transfer and managing of knowledge and decline it in profitable matters, to create value in the long term, namely, in a sustainable way. The linkages could also be reversed, to comprehend how KM processes can improve IC (entrepreneur's IC and human capital's IC) within and outside organizations. In fact, KM theory suggests that flows of knowledge (tacit or not) can be incorporated within organizations and transferred out of them, in different ways. In an open environment, IC seems to represent a good proxy to identify internal knowledge, embedded in human capital and external knowledge coming from externalities, e.g. relational capital. An inspiring thought derives from the transposition of KM to an upper level, moving from KM to "knowledge society." The first condition of building knowledge society is building knowledge organizations and within the building such culture, which will support these intentions, hence changing it into knowledge culture. In particular, it means creating such environment and conditions that will enable people doing a job they are skilled for, they enjoy and at the same time the job that satisfies them, so they can achieve results above standard. The so-called "learning organization" expresses the capacity to learn, adapt and change through people within the organization, improving "corporate culture." However, individual education does not guarantee a learning organization. In the organization, the change in culture is inevitable. KM implementation is not possible if there is no mutual exchange, using and handling the knowledge.

It could be highly beneficial to validate, in the dynamic societies and organizations, how it is important the entrepreneur's learning process is fundamental in the quest for new business opportunities/innovations, stated that learning is a crucial factor for entrepreneurial activity and has a structural impact on business models of industrial organizations (Franco and Haase, 2009). In a few words, scholars should shed light on the effect of KM in transforming Human capital (which is impossible to take into accounting rules) in structural and organized asset capital, among entrepreneurial capabilities.

However, as now, poor literature exists on grounding IC and KM on E capabilities.

After this preliminary overview of the literature, we decided to structure our *RQ*s to give an alternate insight into the interrelation between IC, KM and E and to see if and how much literature has already been dealing with this topic.

3. Methodology

In the present work, we selected and analyzed 717 articles on IC, KM and E, published in the past 20 years (2000–2019). The selection of the period is due to the opportunity to highlight the recent evolution of the literature on the topic and allows us to perform an overall analysis of the research trend over time. Papers were gathered if they contain the three words (IC, KM and E) in the abstract and/or in the text. We decided to enlarge the field

of the research of the three keywords because of the restricted focus of the present paper, which combines simultaneously three different research areas from management, accounting and strategic literature. Furthermore, to better reply to our research questions, we had to expand the field of the research, also to the text of papers and not to limit it to only their abstract.

The articles were all gathered from Scopus database. The database is useful to measure the scientific impact of the articles. By evaluating the number of mentions, we measured the impact of each article on the scientific community and the major topics that guide the prevailing thinking on the topic of IC, KM and E (Massaro *et al.*, 2017).

3.1 Defining the analytical framework

In this paper, our SLR process is inspired by the paper by Paoloni and Demartini (2016). We made several adjustments to fit categories and their characteristics to our sample and to make them compliant and relevant to our *RQ*s. For those reasons, for example, we add the category "other," which includes paper or editorial or commentary, which do not fit our research questions.

The process of identification is presented in Table 1.

3.1.1 Article focus/topic. In this section, we defined the taxonomy of each class (topic) that allowed us to observe jointly the topics of IC, KM and E among previous scholars. We developed seven classes (Table 2) that deal with the main topics covered by academics and which represent the "state of the art" to our opinion on this issue as follows:

1. A1 – *Public sector*. In this class there are collected all papers related to the public sector and institutions, in general, without any regard to other identified topics.

2. A2 – *Technology/innovation*. In this class there are all papers about technology and innovation (also open innovation) as processes fostered by KM and IC and/or E.

3. A3 – *Performance*. In these classes are collected all the papers whose topic are focused on the effect of KM, IC and E on measuring the performance of firms (financial, environmental, organizational, etc.).

4. A4 – *Human resource*. In this classes the topic is voted to the organization characteristic in KM and IC processes or to the organizational aspect of E (specifically we refer to the labour force and employees within organizations).

5. A5 – *Governance/strategy*. In this category are collected papers related to the strategy and management aspect of KM and IC and E processes.

Table 1 Analytical framework		
A Topic/focus	C Geographic area	D Research methods
1 – public sector	1 – Middle East	1 – literature review
2 – technology/innovation	2 – South America	2 – qualitative
3 – performance	3 – North America	3 – quantitative
4 – human resource	4 – North Europe	4 – mixed methods
5 – governance/strategy	5 – South Europe	5 – narrative
6 – university	6 – Asia	6 – case study
7 – other	7 – Africa	7 – other
B Research area	8 – UK	–
1 – business, management and accounting	9 – Oceania	–
2 – economics, econometrics and finance	10 – Russia	–
3 – psychology	11 – mix	–

Table 2	Numbers of papers over time
Time	No. of papers
2000	2
2001	1
2002	2
2003	2
2004	4
2005	11
2006	9
2007	11
2008	22
2009	29
2010	25
2011	46
2012	39
2013	57
2014	63
2015	67
2016	73
2017	98
2018	127
2019	29
Total	717

6. A6 – *University*. We considered in this category papers related to the education system (mainly university education system), without any regard to other issues of the content of papers.

7. A7 – *Other*. This is a residual class, which includes articles and papers, proceedings and working conference/papers, which contain the taxonomy given (so that papers are given as the result of the content analysis) but do not fit our *RQ*s, namely, to understand the linking between innovation, E and KM from an accounting and management perspective.

We decided to separate A1 and A6 (respectively, "public sector" and "university") because of the fact that literature, recently, has been deepening the focus of IC and KM ad E among universities as they provide plenty of opportunities to develop entrepreneurial capability and innovative knowledge.

3.1.2 Research area. With reference to the research area, we identified three main research fields, which are directly linked to the research on the Scopus database as follows: business, management and accounting (B1); economics, econometrics and finance (B2); and psychology (B3). The latter category is voted to classify articles according to a recent research stream whose focus draws on the psychology behind E and innovation processes (Frese and Gielnik, 2014). Gorgievski and Stephan, 2016). B1 and B2 areas represent the traditional mainstream on which literature draws its theoretical background.

In the present project, we decided to directly examine the areas identified by applying the filters on the database on which the researches were put.

3.1.3 Geographic area. The geographic variable identifies the area of affiliation of the author/authors of papers, without any regard to the geographic context in which the research is put. This criterion can help us to understand, which areas are more involved in studying IC, KM and E jointly and the focus-related by area, disregarding the country origin of authors, nor the environmental context of the researches. If there are all different affiliation between different categories among authors, the paper is classified as C11 (mix). If an

author has more than one affiliation, we selected the first one given by Scopus. Starting from the taxonomy by Paoloni and Demartini (2016), we identified the following areas.

- C1 Middle East (Iran, United Arab Emirates, Jordan, Saudi Arabia, Oman, Turkey, Kuwait, Qatar and Israel);

- C2 South America (Barbados, Brazil, Mexico, Chile, Argentina and Uruguay);

- C3 USA and Canada;

- C4 North Europe (Lithuania, Norway, Czech Republic, Slovenia, Nederland, Sweden, Belgium, Germany, Hungary, Austria, France, Poland, Switzerland, Denmark, Finland, Ireland, Liechtenstein and Croatia);

- C5 South Europe (Italy, Spain, Portugal, Greece, Serbia, Bulgaria and Romania);

- C6 Asia (Malaysia, China, Taiwan, Japan, India, Pakistan, Singapore, Indonesia, Hong Kong, South Korea and Sri Lanka);

- C7 Africa (Rwanda, Ghana, Nigeria, South Africa and Uganda);

- C8 UK;

- C9 Oceania (Australia and New Zeland);

- C10 Russia; and

- C11 mix (all different affiliation).

Category C8 and C11 are apart from others. The former C8 area, due to the fact that we found that a great number of results refer to the UK, which could have affected the weight of North of Europe papers. Therefore, we decided to consider the UK as a separate geographic class separated by others. The latter C11 area is apart from others because we classify as "mix" papers by different and non-homogeneous affiliations of authors among selected categories.

3.1.4 Research methodology. To analyze how the use of the different methodologies changes over time, we have chosen the following categories: a literature review (D1); qualitative research (D2); quantitative research (D3); research mix (D4) narrative (D5), case study (D6), other (D7). In "other" we gathered all papers where authors did not define a specific and structured methodology used in the research. This category includes generic papers and researches where the methodology is not clearly explained, too.
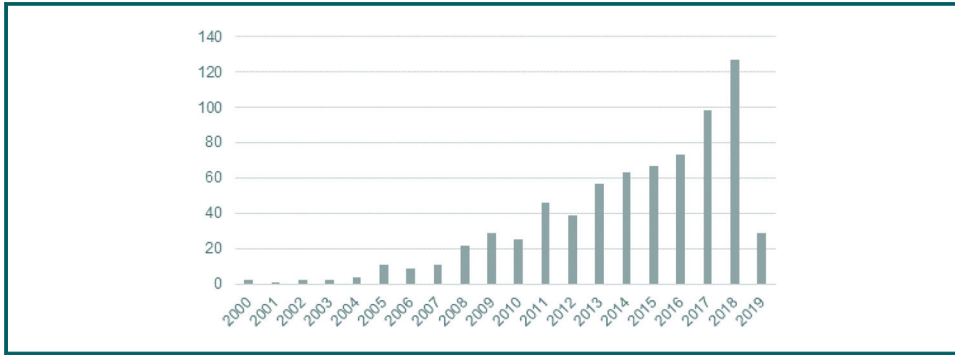
4. Results

4.1 Overview of results

Table 2 and Figure 1 show the general trend, over time, of the papers on the topics of KM, IC and E.

As for this result, we can notice that only starting from 2010, research on these topics has been receiving growing attention from academic literature. In fact, from the 2008 year research on KM, IC and E have become more structured. Just to see that number of papers became twice the 2007 year. Furthermore, from the year 2009, the growth becomes more stable, up to 2015, when papers grow 30% more than the year before. It is the case to precise that we did not consider the year 2019, where the paper is relatively scared at the date of our analysis.

If we take a look into the general and average over time overview of the results of the observation per each category from the analytical framework, the following Table 3 and Figure 2 can help to understand the picture of the sample selected of papers.

Figure 1   Trend overtime on 717 papers

Table 3   Overall results from the analytical framework

A Topic/focus	A1	A2	A3	A4	A5	A6	A7	–	–	–	–
Numbers of papers	40	208	175	60	75	22	137	–	–	–	–
B Research area	B1	B2	B3	–	–	–	–	–	–	–	–
Numbers of papers	544	137	36	–	–	–	–	–	–	–	–
C Geographic area	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
Numbers of papers	23	8	82	141	148	91	13	49	36	3	123
D Research methodology	D1	D2	D3	D4	D5	D6	D7	–	–	–	–
Numbers of papers	41	248	339	15	2	54	18	–	–	–	–

Figure 2   Results from the analytical framework: first and second most relevant general framework about analyzed papers
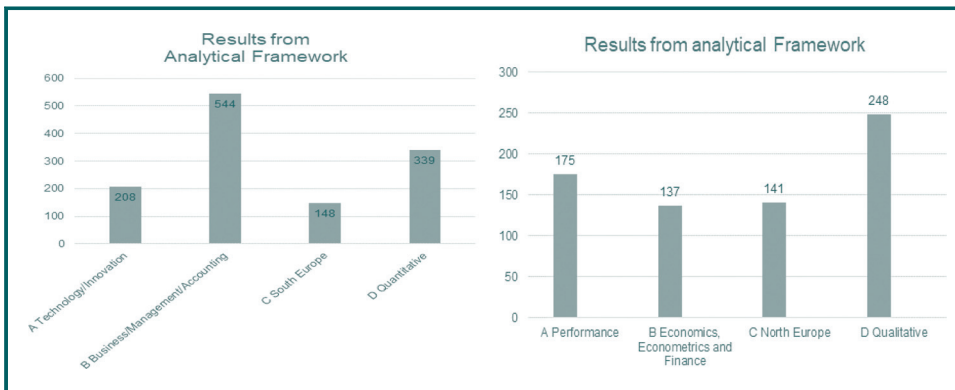
Reading Table 3 and Figure 2 we must give a first general and average picture overtime on the articles' profile. In particular, as per article topic/focus, out of 717 papers, 208 are on technology/innovation, 175 on performance. As per geographic area, the total amount of papers written by authors belonging to the European institution is 289. Authors prefer mainly quantitative and qualitative research methodologies (587 papers). Finally, the prevailing research area is business/management and accounting, followed by economics, econometrics and finance area.

In the following sections, we will try to conclude the above results per each category of the analytical framework.

4.2 Article focus/topic

As *per* the focus/topic of papers, over time, we remind the seven A) categories as follows:

- Public sector;
- Technology/innovation;
- Performance;
- Human resource;
- Governance/strategy;
- University; and
- Other.

The results of our analysis (Table 4) show the distribution among different topics as follows:

- A1 category, with 40 results;
- A2 with 208 results;
- A3 with 175 results;
- A4 with 60 results;
- A5 with 75 results;
- A6 with 22 results; and
- A7 with 137.

Table 4	Article focus							
Article/focus category								
Time	A1	A2	A3	A4	A5	A6	A7	Total
2000	–	–	–	2	–	–	–	2
2001	–	–	–	–	–	–	1	1
2002	–	–	–	–	–	–	2	2
2003	–	2	–	–	–	–	–	2
2004	–	2	–	1	1	–	–	4
2005	3	5	1	–	–	–	2	11
2006	–	3	1	2	1	–	2	9
2007	1	4	1	2	1	–	2	11
2008	–	7	1	1	7	2	4	22
2009	1	11	7	2	4	–	4	29
2010	1	4	6	5	4	–	5	25
2011	3	9	8	2	2	2	20	46
2012	1	13	13	2	2	–	8	39
2013	8	16	11	3	7	–	12	57
2014	4	21	19	4	5	1	9	63
2015	3	24	14	8	4	–	14	67
2016	5	20	20	8	6	2	12	73
2017	3	22	32	9	10	4	18	98
2018	7	39	34	8	15	5	19	127
2019	–	6	7	1	6	6	3	29
Total	40	208	175	60	75	22	137	717
(%)	5.6	29.0	24.4	8.4	10.5	3.1	19.1	–

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There is evidence that the distribution shows a preference on the topics A2 (technology/innovation) and A3 (performance – financial or environmental).

It is also the case to highlight that year 2019 gives back partial and not relevant results because at the day of the present analysis solar year it is not finished, yet.

Up to 2011, relatively few researches have focused on these topics (6.4%). After this period, and because of the intensity of the studies about IC and KM, the number of papers started to grow.

The following Figure 3 highlights the evolution per A under-category over time.

It emerges that the most afforded topics are technology/innovation and performance (respectively, A2 and A3), which increase their consistency from the 2014 year.

IC research began in the late 1990s (Sveiby, 1997; Bontis *et al.*, 1999; Marr *et al.*, 2003) and follows different stages. The first stage was focused on recognition and measurement models of IC. A second stage puts IC in a relationship with the performance of firms through different organizational variables, such as KM, Innovation and Entrepreneurial capabilities.

Literature from this latter period was voted to study IC's impact on firms' market value and its drivers to gain performance (Petty and Guthrie, 2000). For those reasons, we are motivated to devote more attention to this second period, applying our research from the year 2000, to study the interrelations between IC, KM and E.

Looking at specific topics, we have to point that, on one side, several studies on innovation and technology were written already before 2011 (in our sample just in the 2003 year, we have *n.*2 papers, while in 2009 we have *n.*34 papers). In performance category, on the other side, at the same time 2009, we can count only 11 papers. Therefore, although the A3 category is second for the topic, it gets started late to receive attention from scholars, in particular in the 2012 year, according to our analysis.

In any case, the highest concentration of papers is among the period 2012–2018.

4.3 Research area

With reference to the research area, as we mentioned above, three main research fields have been identified directly linked to the research on the Scopus database.

Figure 3 Evolution per under-category over time
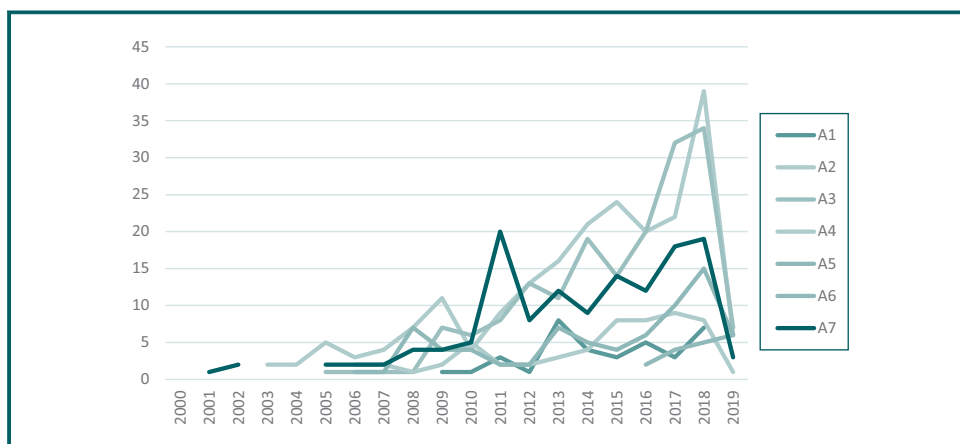
In Table 5, the greatest part of the paper is in the area business, management and accounting (B1); the greatest concentration is between 2015 and 2018, with specific reference to years 2017 and 2018.

4.4 Geographic area

As we said before, the geographic variable identifies the prevalent area of affiliation of the author/authors of papers.

The categories are the following:

- C1 Middle East;
- C2 South America;
- C3 USA and Canada;
- C4 North Europe;
- C5 South Europe;
- C6 Asia;
- C7 Africa;
- C8 UK;
- C9 Oceania;
- C10 Russia; and
- C11 mix.

Following the overall general situation on geographic belonging of authors (Table 6).

Table 6 shows that greatest part of the researches come from as follows: South Europe – C5 (Italy, Spain, Portugal, Greece, Serbia, Bulgaria and Romania); North Europe – C4 (Lithuania, Norway, Czech Republic, Slovenia, Nederland, Sweden, Belgium, Germany, Hungary, Austria, France, Poland, Switzerland, Denmark, Finland, Ireland, Liechtenstein and Croatia) followed by and Asia – C6 and America/Canada – C3.

As for the concentration of papers over time among different geographic areas, we can notice that the area C3 (the USA and Canada) is constantly present and equally distributed in the sample analyzed, while C4 and C5 areas present their highest concentration of frequencies in 2014–2018 years. This is probably due to the lack of research from European and continental countries till the first decade of the 2000s, while American countries are the pioneers of the research on this topic. Other limits came from a different language, written academic literature is published in the English language. For non-English speaking countries (like South European ones are), it represents a huge barrier, which only recently has been moved.

It is the case to remind that area C4 and C5 in the past five years recovered the gap and rebalanced the research, as our results show because of a good part of IC research and literature on methodologies to capture its value and its contribution to firms get was born in North European country (balance scorecard, skandia navigator, intangible asset monitor,

Table 5	Research area		
Research area	B1	B2	B3
No of papers	544	137	36
(%)	76	19	5

Table 6	Geographic area										
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	Total
2000	–	–	–	–	–	–	–	2	–	–	–	2
2001	–	–	1	–	–	–	–	–	–	–	–	1
2002	–	–	2	–	–	–	–	–	–	–	–	2
2003	–	–	1	–	–	–	–	–	1	–	–	2
2004	1	–	2	–	–	–	–	1	–	–	–	4
2005	–	–	4	2	–	1	–	3	–	–	1	11
2006	–	–	3	2	–	1	–	–	2	–	1	9
2007	–	–	–	3	3	1	1	1	1	–	1	11
2008	1	–	6	6	3	3	–	–	2	–	1	22
2009	1		8	5	4	2		5	2		2	29
2010	1		4	6	3	3		2			6	25
2011	2		3	11	11	3	1	5	3		7	46
2012	1	1	11	8	8	3		5	2			39
2013			5	7	19	11	1	4	2		8	57
2014	2	2	6	17	13	9	1	5	2		6	63
2015	3		6	12	10	13		5	3		15	67
2016	1	1	6	18	18	7	2	1	4	1	14	73
2017	4	1	3	18	23	12	3	4	5		25	98
2018	5	3	9	23	26	17	4	5	6	1	28	127
2019	1		2	3	7	5		1	1	1	8	29
Total	23	8	82	141	148	91	13	49	36	3	123	717
(%)	3	1	11	20	21	13	2	7	5	0.4	17	100

EVA and CIV methods, etc.) at the beginning of 2000s and gave inspiration to scholars to focus their attention on these topics.

It is also important to claim that year 2019 gives back partial and not relevant results because at the day of the present analysis solar year it is not finished, yet.

Finally, it is important to highlight, as for the purpose of the analysis of the present paragraph, that C11 (mix) area is not relevant as for the identification of geographic affiliation of authors because of the nature of such papers, which are voted to perform mixed geographic affiliation of authors.

4.5 Research method

To analyze how the use of the different methodologies changes over time, we can observe that the greatest part of the research is qualitative (D2) and quantitative (D3) analyses, which are transversally spread among scholars as a methodology to carry out a research project, for almost the 80% of the production. The major concentration of the papers is in 2011–2018 years, with the highest frequencies of D2 and D3 in 2018 and an average production of 22 papers and 36 papers in the period, respectively (Table 7).

We also remind that the D7 category (other) contains papers whose authors did not define a specific and structured methodology of the research. This category includes generic papers and researches where the methodology was not clearly explained, too.

Table 7	Research method					
D1	D2	D3	D4	D5	D6	D7
41	248	339	15	2	54	18

4.6 The most cited articles

To provide clear evidence of the literature review methodology, and to look at their impact on the academic literature, we have selected for each category articles with a number of citations higher than 30 and it has emerged 120 papers are the most cited.

The most cited analysis was performed according to a process of gathering information from the Scopus database as for the content and major details of articles. As per the number of citations, we use the half-life citation index, available by Google Scholar.

The most important category to the analysis of the most cited articles is the A category *article focus*. About this category we made several considerations as for the year of publication, the total amount of citations and a sort of average citation number within the specific A under-category. For this purpose, we have to point out that papers, which receive more than 100 citations are the oldest ones, published from 2003 up to 2011. This is consistent with the fact that the more the paper past on the editorial market, the more it is indexed and available to scholars and cited by them. To avoid this limit, we also used a metric average citation per year (CPY), provided by Dumay (2013), which, for a group of scientific articles published in a specific category, follows this algorithm: (article number of citations)/(2018-year of publication). As we anticipated before, we selected up to the 2018 solar year as 2018 represents our base of the algorithm because there was no reason to cite articles published in 2019 (we gathered citation data for all articles at March 30, 2019). To be more accurate and detailed, the same process should have been applied to the number of scientific journals among the sample and to year (publication date of papers quoting the most cited articles). This is a limit we did not overlap, yet, at least in this first explorative paper.

As per the *article focus* of the most cited, the following Figure 4 can help to understand their profile.

At an overall view, among the sample of 120 most cited articles, 68% of papers have the following focus: A2) technology/innovation (32 papers; 27%); A3) performance (26 papers; 22%); A4) human resource (12 papers; 10%); and A5) governance/strategy (12 papers; 10%), which are generally considered the most attractive and striking focus for the research on the issue of IC, KM and E.

More specifically, if we look at the most cited in Category A2 "technology/innovation," we can make some thoughts about their content. It mainly regard papers, which focus on the topic of open innovation context, from a managerial and strategic perspective; innovation capability in a very dynamic environment; open innovation contexts (Laursen and Salter, 2014).

Figure 4 Article focus on the most cited

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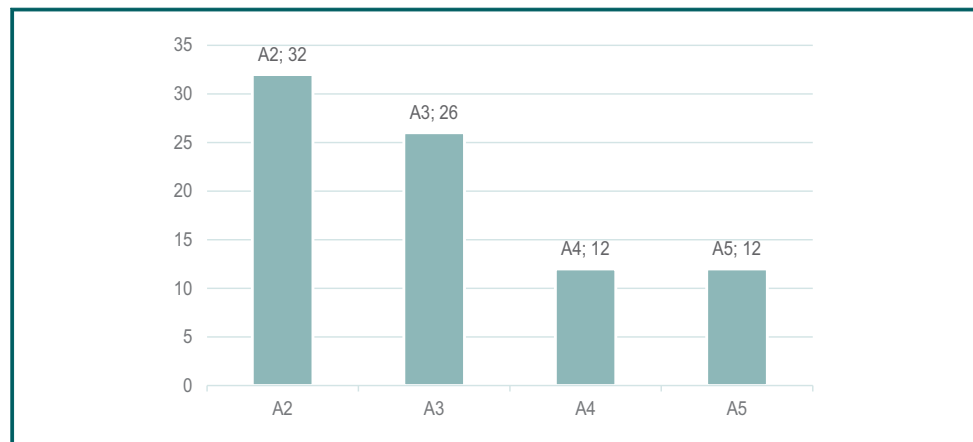
The most cited paper in this category focus on managerial capabilities of entrepreneurs to act strategies, which can affect the financial performance of firms in the information technology sector (Sambamurthy *et al.*, 2003), published by *management information systems quarterly*. It has a CPY as 97. It is the above all most cited paper because it is a very well-established work, standing on the market from 2003. Further, also probably because it links managerial and entrepreneurial capabilities/initiatives to the organizational performance of firms. Another highly significant paper from this category is, to our opinion, from Laursen and Salter (2014), which received 216 citations (CPY as 54). It is a very high number of citations if we consider that it is a very recent work, published in *Research Policy Journal*. It grounds in the field of open innovation and collaboration and innovation strategy. It is a quantitative study on the way knowledge can flow from UK firms to the external environment and it confirms the paradox of openness. Openness needs collaboration from the external environment but firms need the strength of the protection of their innovations. So that it focus on the way to commercialize profitably new ideas and innovations, underlying the contribution of IC and E. Another highly cited paper is from Prajogo and Ahmed (2006), which specifically focuses on innovation and entrepreneurial capabilities to turn innovation into performance. It could be a pioneering paper, but it never quantifies, nor evaluates, the financial performance of firms. It makes its conclusions only throughout a survey analysis. A very highly cited paper is an LR on the specific topic of KM and transfers in specific businesses (Shaw and Williams, 2009). Nevertheless, to our purpose, the most relevant paper, considering the scope and research questions of our work, is from Martin-De Castro *et al.* (2013). It gains 76 citations (15 CPY) and it is published in *studies in managerial and financial accounting*. It is a quantitative paper, which tries to analyze the matter, not only from a managerial but also from an accounting perspective, looking at the effects of IC and KM on innovation among a sample of Spanish firms. It also considers innovation culture as a moderating variable in the relationship. Within the sample of papers, this latter is the only paper with is in line with our *RQ n.*2. The remaining papers in this category, even if highly cited, focus only on specific aspects of entrepreneurial capability or innovation or knowledge process management. Furthermore, papers in this category focus mainly on social capital, which represents a partial aspect of IC, in technology and innovation environment.

In Category A3 "performance," the two most cited papers are both published in the 2009 year in the *Journal of Management Studies*, and empirically focus on managerial ability, E, ambidexterity and human resource management in open innovation context and organizational performance. Unfortunately, as *per* the latter issue they do not test, nor quantify, the financial performance of firms, as we would intend beneficial to the accounting perspective. For instance, Lichtenthaler and Lichtenthaler (2009) focus on a capability-based framework for open innovation processes where KM capacity is a dynamic capability, which reconfigures and realigns the knowledge capacities. The authors refer to a firm's ability to successfully manage its knowledge base over time. The paper is voted to build a framework where internal capacities and external resources (both of them are knowledge-based) are aligned by managers to survive in an open innovation environment. The rest of the most cited articles in this category disregard the financial effects of IC and knowledge, too. It should be also interesting to look at the knowledge generated from employees, as elements, which could empower the managerial competencies at an organizational level and test it empirically. The unique paper investigating the organizational performance is from Holcomb *et al.* (2009) with 154 citations from 2009 to 2018, whose focus is on managerial abilities as a source of organizational value creation.

As per category A4 "human resource" the most cited papers focus on human resource strategies, management and coopetition, looking at future research agenda and the effects on organizational performance. For instance, Jiang *et al.* (2012), with 86 CPY, published in *Academy Management Journal*, is about the influence of human resource management on

organizational outcomes (human and financial performance). It is limited to human resource management and has little to do with IC and knowledge practices as we intend to be beneficial to our SLR. Another highly cited paper in this category is from Boxall and Purcell (2000), which affords the resource-based theory as a grounding theory beyond the strategic human resource management of firms. Another cited paper is from Bengtsson and Kock (2014), which focus their attention on the issue of coopetition and deal with the concept of competition and protection needs of firms in open access environments (the open innovation paradox, as we above anticipated). It confirms that articles lay only from a managerial perspective.

Within the Category A5 "governance/strategy," the highest CPY is reached by the paper of Zheng *et al.* (2010), published in the *Journal of Business Research*. It examines possible independent mediating KM practices in the relationship between organizational culture, structure, strategy and organizational effectiveness.

Concerning Categories B), C) and D), following there are some reflections on them.

An insight into the Category B) research area, our results highlight that the 76% of the most cited research are gathered into "business, management and accounting" *research area*, which is overall considered the most interesting strategic stream of the research on these issues.

As for the Category C *geographic area*, Figure 5 illustrates the geographic belonging of the authors of the most cited papers.

It shows that 83% of papers are written by scholars belonging to North European (highest number- C4); North American (C3) South European (C5) and Asian (C6) institutions. It also confirms that if we take a look to the whole European continent (C4 + C5), this is the most relevant area among the most cited papers (46 from C4 and C5/120 most cited papers), reaching a percentage of 46% among the five mentioned most cited geographic areas. It reflects the same trend of the overall general results, as we illustrated in the previous sections, confirming that overall growth of European scientific articles leads to a growing number of citations over time.

Finally, the results definitely confirm that, among the sample, the most used are the qualitative (D2) and the quantitative (D3) methodologies, as Figure 6 shows. It is also aligned with the overall general results on 717 original papers in the sample (as we mentioned in Section 4).

Figure 5 Geographic area of the most cited

5. Discussion and conclusion

Our analysis was performed to find a composition of the research questions mentioned in the introduction section about our motivation for the relationship of IC, KM and E.

More specifically, *RQ1* was addressed to understand the "state of the art" about the interconnection between the three variables, which are involved in this research stream as follows: "IC," "KM" and "E," and how academic literature has been developing the three topics, over time.

The overall *panorama* from previous Section 4 depicts a general fragmented and unsystematic vision of the relationship between the three topics (IC, KM and E). In fact, this section shows that there is a certain lack of consistency in the handling of this matter. This is also due to several reasons belonging to the authors. First, the keywords define a wide perimeter in which it is not easy to identify the evolution in a clear and unambiguous way. Second, it is necessary to consider that the sample of analysis is very broad and covers a consistent time span, although the themes individually have been addressed by the literature, as the early 1990s. Anyway, the contribution of literature in this sense is objectively scarce.

As regard *RQ2*, "future lines of research regarding the interactions between IC, E and KM," it could explore the topics, which, despite having aroused much interest, present gaps to be filled. Therefore, from our structured literature review emerge relevant theoretical implications for the academy.

In particular, we suggest for academics a way to follow to better investigate the fields KM, IC and E to fill the gap identified to give a unified and not fragmentary vision.

Among the six categories identified, the results show that "technology and innovation" and "performance" are the fields with the most number of articles. Although the number of published papers, after our structured literature review, we can assert that also in this field several gaps still persist.

From the structured literature review, we found some papers, which combine both the topics "technology and innovation" and "performance (Martin-De Castro *et al.*, 2013; Prajogo and Ahmed, 2006; Sambamurthy *et al.*, 2003). In this sense, we propose to combine these fields adding to the analyzed topics (KM, IC and E). So it could be interesting to study not only KM, IC and E but also the linkage with performance and innovation.

Figure 6 Methodologies of the most cited

Research Method of most cited
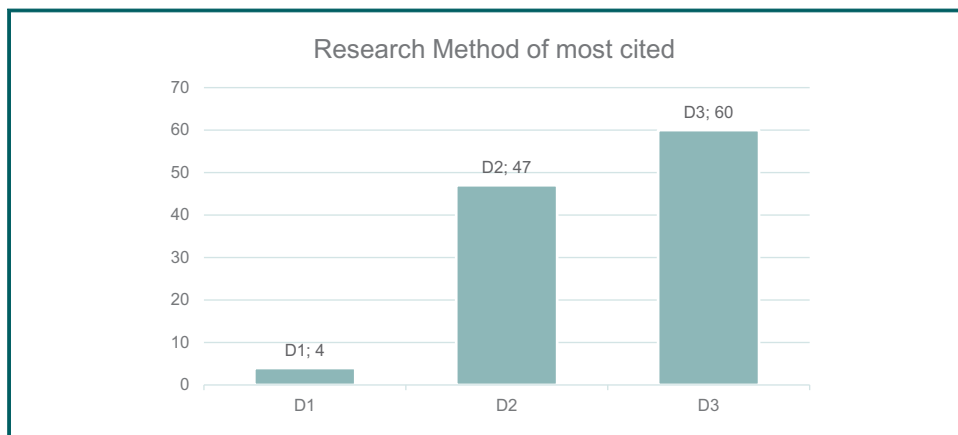
So, what do we intend for "innovation?" Innovation consists of new ideas, turning them into new products, processes or services, to the success on the market, to economic growth and increasing employment career and creativity (Drucker, 1985). Furthermore, innovation represents a special tool for entrepreneurs to combine different existing product or process beneficially for different businesses or services. Innovation affect, not only the offer but also the way in which it deals with the company's business model, as innovation is not only necessarily linked to a technological breakthrough but also to a new combination of traditional products or to the may an existing product/service is offered to consumers. In a few words, innovation affects the value proposition of organizations toward customer demand. In this sense, innovation is an opportunity for managers to translate practically new ideas and to commercialize them successfully on the market.

In particular, for the future, we propose to investigate the intellectual or entrepreneurial drivers/proxies for innovation and to what extent entrepreneurs use KM (entrepreneurial knowledge) and IC to innovate and to transfer/generate and evaluate knowledge and entrepreneurial knowledge.

Main features, perhaps, emerges from our discussion and according to Sayadi (2013), which originates different model of organizations, namely, informality, lack of concentration, vertical and horizontal communications, non-exclusive information, group works, easy and informal control, active employees, management support, the appreciation of management from risky employees, variety in financial support and best applying the employees' new ideas. Entrepreneur organizations are those where systematic innovation and creativity trends are settled in the traditional structure of the company. The innovation involved extremely human source and IC management (Sayadi, 2013).

As for *RQ2*, namely, the future of the research about IC, KM and E, therefore, we are here launching for future research *agenda* the issue about if it will be possible to match these three different topics in a productive perspective, to verify the simultaneous effects of IC and KM and practices on innovation and, indeed, on the financial performance of firms. Concerning this question, we have to make a premise.

The research on intangibles, specifically IC, dates back to the early 1990s and pass through different stages. As we pone our vision from a managerial and accounting perspective, scholars should catch the opportunity to go beyond the traditional mainstream on this issue. In fact, moving from Baker's (2008) work, actually, there is an urge to move the focus of IC research toward new models of its representation, by including the social capital, namely, knowledge capabilities (explicit or not), relationships with other stakeholders, skills, innovativeness embedded in people and in the workforce within the organizations, which are able to turn knowledge in innovation and competitive advantage (firms performance). Very important, to our opinion, is also to evaluate and recognize the above mentioned IC's components, which affect the organizational and the financial performance of firms. Among these, knowledge is essential to this aim.

Organizations now realized their success is mainly because of their employees' knowledge (human capital IC and knowledge) and expertise. Workers' knowledge is the main asset entrepreneurs are essentially required to manage them as best (Daragi *et al.*, 2009). So, the efficiency of IC measurement and management can be most beneficial in competition fields (Matos *et al.*, 2010). The content of entrepreneurial functions lies in active management in the IC area.

As it emerges from the structured literature review over the period (2000–2019), very few attempts tried to match these three different topics, to identify and recognize the components of knowledge, as well as recognizing new forms of social capital such as entrepreneurial capital, which is connected to innovation and creativity. The recognition of these elements is highly beneficial to academic literature because it would allow them to speak up of such intangible components and to evaluate effectively their contribution to the

financial performance of firms and, finally, to recognize them in the financial reporting of firms.

Our *RQ2* was to verify if it is possible for future research to address the question if and to what extent IC contributes to the innovation attitude of firms, transfer/generating and evaluating knowledge treasury/resources. Our inspiring conclusion from previous studies is to think in a new way at the role of knowledge-based IC in organizational E. Starting from the assertion that knowledge-based process of innovation and E are linked, it can be tested, also from case studies help or empirical application that organizations with a pleasant level of IC are more likely to be more innovative and in conclusion, have a higher market value.

After our structured literature review, we can definitely assert that in this stream of research several gaps still persist about the effective components of IC and the way to recognize them, to make them profitable on the market and embedded in product/process/services highly commercialize. It should be interesting to qualify the way for organizations to adopt special strategies and processes at an entrepreneurial level to translate human in organized IC aspects inside the organization and among the workforce.

It should be also enforced the attention by scholars on the social aspects of organized IC, namely, on human capital and the huge luggage of knowledge embedded in human capital, which leads organizations to innovate, to stimulate E capabilities and to success on the market, but remain still under-investigated and with no quantification/evaluation, still now. On the side of E, it could be profitable to address and test, which are entrepreneurial human capital features, which can affect the ability of a firm to generate value (level of education, gender, personality, ethnicity, culture, the team supporting the entrepreneur, gender, experience in business and in the industry and learning ability (Gimmon and Levie, 2009).

On the side of KM future researchers should be pointed out how KM practices can be measured and how they can be integrated as a measurable discipline into the fabric of E (Bandera *et al.*, 2017). On the side of E and KM, it could be profitable to deep the concept of entrepreneurial knowledge and KM and their role in improving the firm performance by enhancing the innovation.

At the same time, academic efforts should be addressed to reduce the misalignment between the epistemological concept of KM and organizational KM activities, to extract value from KM initiatives (Marr *et al.*, 2003). Even if valuable works were provided, scholars seem to still keep the distance from this thorny topic, adopting theoretical frameworks, without any deepening of the evaluation of the intellectual and knowledge capabilities to entrepreneurs. Although recently scholars have been concerning more empirically about the relationship between IC, KM and E (Hussinki *et al.*, 2017), they still remain more involved in the theoretical aspect, disregarding new ways to look at IC. In fact, few studies exist on how to empirically measure, to quantify, to recognize the contribution of knowledge to the success of firms, through IC and its components, not only from a managerial and strategical but also from an accounting and "financial" perspectives (Tayles *et al.*, 2002). Such gaps were identified by scholars but still remain unexplored.

The future of KM of the IC resources is clearly likely to lie on the recognition of the component of knowledge, as well as on the recognizing of new forms of social capital such as entrepreneurial capital, which is connected to innovation and creativity and firm value. An integrative framework of IC measurement should be built to link IC with KM and E. This is to guarantee that the measurement of IC does contribute to the efficiency and effectiveness of KM.

At the end, it is necessary to dwell on some limits or our research. The most relevant limitation of the work is represented by the use of only one database (as Scopus). In the

future, it will possible to think about the opportunity to implement the research with the results obtainable by others (e.g. WoS or Google Scholar).

Moreover, the analysis has been made manually, without a database, so using a personal judgment that could affect the results. To reduce the risk of bias, the authors worked together to identify the main classes and to classify abstracts.

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