Integrating knowledge management with intellectual capital to drive strategy: a focus on Italian SMEs

Abstract

Purpose – This study aims to provide empirical evidence on the linkage between knowledge management, intellectual capital, planning effectiveness and innovation performance in Italian SMEs.

Design/methodology/approach – Survey data from 172 Italian SMEs was collected through an online questionnaire and analysed using structural equation modelling (PLS).

Findings – Results show that KM practices have a positive direct impact on each IC component which influences planning effectiveness. Finally, structural capital and planning effectiveness have a positive direct impact a firm's ability to innovate.

Research limitations/implications – For researchers, this paper fills an important gap in the academic literature by conceptualizing and empirically testing the link between intellectual capital and planning effectiveness. The main practical implication of this study is that developing intangible resources is of particular importance for strategic decision-making in SMEs. The focus on Italian SMEs limits the generalizability of results**.**

Originality/value – This study provides empirical evidence on how KM and IC interact and mutually drive planning effectiveness. Second, results shed light on the importance of intellectual capital to enhance a firm's ability to reach its goals. Finally, the focus on SMEs enriches the extant literature in the field confirming the vital role of knowledge management and intellectual capital in managerial decision-making.

Keywords – SMEs, knowledge management, intellectual capital, planning effectiveness, innovation performance, Italy

Paper type: Research paper

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1. Introduction

In today's economic environment, when firms are highly influenced by rapid changes in technology, knowledge plays a pivotal role for business success and sustainable competitive advantage (OECD, 2013). Thus, performance heterogeneity among firms depends on how they manage their knowledge (Massingham and Massingham, 2014). Knowledge, in fact, is the raw material necessary for decision-making which can determine a firm's success or failure (Litvaj and Stancekova, 2015). There are two key academic disciplines focused on knowledge in organizations: the field of knowledge management (KM) and the field of intellectual capital (IC); the KM literature generally focuses on adopting a dynamic perspective while the IC literature a static one (Kianto *et al.*, 2014). The IC literature focuses on the intangible resources of firms (Spender *et al.*, 2013) such as human, structural and relational capital (Bontis, 2001; Guthrie, 2001). While the KM literature deals with processes and practices with which knowledge can be managed (e.g. Gold *et al.*, 2001; Lee and Choi, 2003; Heisig, 2010).

It follows that KM and IC are two strictly related concepts (Wiig, 1997; Jardon and Martos, 2012), meaning that they reinforce one another (Jordão and Novas, 2017) and lead to value creation in firms (Abeysekera, 2021).

Bontis and his colleagues were among the first in the literature to empirically examine a "stock and flow" metaphor between IC and KM respectively (Bontis *et al.*, 2002). Recent academic literature highlights that superior business performance is the result of integrating IC and KM practices (Kianto *et al.*, 2014; Wang *et al.*, 2016; Jordão and Novas, 2017; Oliveira *et al.*, 2020). KM activities set up the foundation for IC to grow (Zhou and Fink, 2003; Kianto *et al.*, 2014).

Unfortunately, research studies combining KM and IC in small and medium-sized enterprises (SMEs) are still limited (Kianto *et al.*, 2014; Oliveira *et al.*, 2020). SMEs in Europe account for 99% of the total amount of operating enterprises and generate around 50% of total employment and up to 60% of added value (Patrice *et al.*, 2014) and are a pillar for the economy, society and governments (Durst and Edvardsson, 2012; Khalique *et al.*, 2015). Paradoxically, little research is dedicated to the management of IC and KM in SMEs (Marzo and Scarpino, 2016; Durst and Edvardsson, 2012; Martinez-Conesa *et al.*, 2017; Hutchison and Quintas, 2008; Nunes *et al.*, 2006; McAdam and Reid,

2001; Guthrie and Ricceri, 2010). Furthermore, there is virtually no research on how KM and IC integrate for the purposes of planning effectiveness (Giampaoli *et al.*, 2019), as a measure of performance of the result of the planning process (Elbanna and Elsharnouby, 2018).

As Durst and Wilhelm (2012) highlight, the current situation in literature can be defined as unsatisfactory. Therefore, the goal of this study is to fill the void by investigating the joint effect of KM practices and IC on planning effectiveness and on innovation performance, with a focus on Italian SMEs. Specifically, this study tries to answer the following research questions:

RQ1**:** Do knowledge management practices help SMEs to develop their intellectual capital stock?

RQ2: Does intellectual capital help SMEs to reach their goals and improve their performance?

2. Conceptual development

Knowledge resources are considered valuable, rare, difficult to imitate and help firms in conceiving and implementing strategies that improve their efficiency and effectiveness (Barney, 1991). Consequently, firms have to manage them in the most effective way in order to gain a sustainable competitive advantage. KM assures that employees' knowledge is continually improved (Rajesh *et al.*, 2011). O'Dell *et al.* (1998) define KM as a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organisational performance.

Traditionally, intellectual capital has been categorized into three main components: human capital (HC), relational capital (RC) and structural capital (SC) (Bontis, 1999). Human capital (HC) refers to the knowledge embedded in employees' minds in terms of educational background, competence, experience, skills, creativity, innovativeness and problem-solving ability (Kianto *et al.*, 2017; Inkinen, 2015; Youndt and Snell, 2004). Trained and educated employees, provide the main source for innovation performance and adaptability to strategic changes (Cabrilo and Grubic-Nesic, 2013). Relational capital (RC) refers to a firm's network of relationships established with customers, suppliers, public and private institutions (Bontis, 1998). These inter-firm relationships shape an effective network which helps to improve the cooperation amongst partners by reducing information asymmetries (Schilling, 2011; Carmona-Levado *et al.*, 2010; Buenechea-Elberdin *et al.*, 2018; Agostini and Nosella, 2017). Structural capital (SC) is considered the sum of knowledge that

stays within a firm when employees and managers have gone home (Roos *et al.*, 1998; Youndt and Snell, 2004). In other words, SC involves all the codified knowledge within information systems, processes, routines and other non-human storehouses (Bontis *et al.*, 2000; Inkinen, 2015; Khalique *et al.*, 2018). These tools allow for the accumulation and preservation of collective knowledge.

KM and IC are believed to influence each other and are key factors for organizational effectiveness (Shih *et al.*, 2010; Rastogi, 2000). In fact, as suggested by Garcia-Perez *et al.* (2020), KM and IC play a bidirectional role in the value creation process. According to Marr *et al.* (2003), KM improves the effectiveness of a firm's ability to generate IC assets. Finally, IC provides benefits for SMEs, profit and No-profit organization (Agostini and Nosella, 2017; Bontis *et al.*, 2018; Del Baldo *et al.*, 2021; Sgrò, 2021).

The aforementioned is particularly true for SMEs rather than large companies (Durst and Wilhelm, 2012; Demartini and Berretta, 2020). Several authors (Durst and Wilhelm, 2012; Demartini and Berretta, 2020) suggest that the knowledge and the stock of IC differ according to firm size.

Specifically, SMEs' success depends on the knowledge, experience and skills of the owner and employees rather than on physical and financial capital (Man *et al.*, 2002). On the contrary, larger firms can rely on a bigger amount of financial and fiscal resources than smaller firms (Marzo and Scarpino, 2016). At the same time, SMEs often lack adequate resources to exploit their knowledge stock (Durst and Wilhelm, 2012). Therefore, it follows that SMEs' knowledge stock is at risk when staff turnover and long-term absences take place, since replacements are often slow and relatively expensive (Durst and Wilhelm, 2012). In fact, SMEs are often characterized by limited resources and strong dependence on others (Scuotto *et al.*, 2020). Instead, larger companies, are characterized by extensive use of the process of delegation, and this avoids concentrating strategic and operational attention in the owner's or employees' hands. This leads to an increase in the participation amongst organizational members, entrepreneurs, and managers and to greater information sharing than in smaller firms (Durst and Edvardsson, 2012). This allows avoiding the loss of competitiveness, knowledge, and important intangible resources when employees or managers leave the company (Durst and Edvardsson, 2012). Instead, human and relational capital in SMEs suffers from knowledge attrition because critical tacit knowledge resides in the minds of the departing individuals (Droege and Hoobler, 2003). According to Cohen *et al.* (2014) better performing SMEs rely on highly developed IC to counterbalance the effect of their smaller size.

To understand the dynamic between KM and IC better, it is useful to mention the "*stock and*

flow" metaphor first developed by Bontis *et al.*, (2002) and then refined by Kianto *et al.* (2014). More precisely, according to these authors, KM should be considered from a dynamic perspective as a flow of knowledge thanks to which IC is developed over time, while IC should be considered from a static perspective as the stock of knowledge that organizations use to create value (Vas *et al.*, 2019).

Kianto *et al.* (2014) theorized that a dynamic relationship between KM flows and IC stocks over a time turned into a stable set of antecedents for superior performance. Empirical research results in the extant literature that reinforce this theory. Allameh (2018) found that knowledge sharing has a positive direct impact on each IC component. Wang *et al.* (2014) found that explicit knowledge sharing has a positive direct impact on human and structural capital, while Oliveira *et al.* (2020) showed that knowledge sharing has a direct positive impact on human and relational capital. Seleim and Khalil (2011) analyzed the impact that each process of knowledge sharing has on IC and found that knowledge application is the most influential process on each IC component.

Following Andreeva and Kianto (2012), we define KM practices as a set of managerial activities that can be consciously controlled while shaping a stock of IC able to stimulate new ideas and increase a firm's performance (Kianto *et al.*, 2014; Cabrilo and Dhams, 2018; Inkinen, 2015). Several academic scholars (Aureli *et al.*, 2019; Cabrera and Cabrera, 2005; Giampaoli *et al.*, 2017; Lee and Choi, 2003, Lee *et al.*, 2012) have identified several KM practices useful for sharing knowledge via work design, training and development, organizational culture, and information technology.

As underlined by several authors organizational culture is probably one of the most important factors to enhance knowledge sharing by creating an environment of trust and cooperation where knowledge sharing is encouraged (Cabrera and Cabrera, 2005; Lee and Choi, 2003). Work design favours knowledge sharing by establishing interactions and interdependencies so that information flows within firms. Working in team, and even more in cross-functional team, stimulates employees to share their knowledge and the creation of ties among different groups (Cabrera and Cabrera, 2005; Kang *et al.*, 2007). Any kind of training that emphasizes trust and cooperation (i.e. team building, cross-training, etc.) favours knowledge sharing among employees as it creates a common language and builds social ties (Cabrera and Cabrera, 2005). ICTs connect employees and facilitates conversations among them, and reduce the perceived cost of sharing knowledge. However, the most successful information technology is that which is designed to enhance the human networks that already exist and should match the existing organizational

culture. (Cabrera and Cabrera, 2005; Lee and Choi, 2003; McDermott and O'Dell, 2001). Finally, according to Adler and Borys (1996) organizations benefit from formalization of routine tasks while Baum and Wally (2003) empirically proved that formalization of routine tasks have a positive impact on decision-making speed. Therefore, formalization of routine tasks, other than having a positive impact on human capital, strengthen ties between partners within the network by promoting an honest, truthful and correct path of doing business and, finally, it also fosters SC in terms of tacit knowledge that lies in information systems, routines, and other structural arrangements (Bontis *et al.*, 2000; Inkinen, 2015; Khalique *et al.*, 2018).

Considering the above, we analysed the impact that KMP has on IC and we offer the following set of hypotheses:

H1. There is a positive direct relationship between KMP and HC.

H2. There is a positive direct relationship between KMP and RC.

H3. There is a positive direct relationship between KMP and SC.

Even if the knowledge stock represents the most valuable resource for business success, knowledge per se is not sufficient to gain a sustainable competitive advantage. Chen *et al.* (2014) argue that IC is an important resource that each organization needs to develop and manage to effectively implement corporate strategy, acquire and maintain a long-lasting competitive advantage and improve corporate performance. For each firm being able to effectively manage IC, it assumes a pivotal role, as IC helps managers to develop and allocate resources, facilitate decision-making and formulate strategy (European Commission, 2006). According to Cohen *et al.* (2014) IC enhances a firm's responsiveness to the business environment and its ability to implement strategy effectively, while Tseng *et al.* (2013) claim that IC highly affects business strategies, which, in turn, impacts on financial performance. Summarizing, IC set up the roots to achieve strategic goals and attaining better performance. Higher levels of human capital lead to increased information processing skills, enabling higher levels of performance at the individual (Coleman, 1988; Kor and Sundaramurthy, 2009) and organizational (Davidsson and Honig, 2003) levels. The benefits of relational capital are particularly important for making effective decisions in SMEs as the input for the decision-making process is mostly delivered through social ties (cf. Brouthers *et al.* 1998, De Carolis *et al.* 2009, Smith *et al.* 1988, Westhead *et al.* 2005). Finally, empirical findings of Han and Li (2015) show that structural capital helps a firm to coordinate its strategy, and by gathering relevant information to assist decision-making. However, as underlined by Tseng *et al.* (2013) very few

scholars have investigated the relationships among IC, business strategy and financial performance simultaneously.

To investigate the effectiveness of strategy most scholars focus on organizational performance (Goll and Rasheed, 1997) while others examine strategic decision outcomes, such as decision effectiveness (Dean and Sharfman, 1996; Elbanna and Child, 2007; Jansen *et al.*, 2011a,b; Ji and Dimitratos, 2013; Nooraie, 2008) or planning effectiveness (PE) (Elbanna 2016; Elbanna and Elsharnouby, 2018). We adopted the variable planning effectiveness developed by Elbanna and Elsharnouby (2018), as it includes several goals other than the traditional financial one.

Therefore, based on the aforementioned discussion, we tested the following research hypotheses:

H4. There is a positive direct relationship between HC and PE.

H5. There is a positive direct relationship between RC and PE.

H6. There is a positive direct relationship between SC and PE.

In addition, innovation is the result of the exploitation of new ideas and occurs when various types of existing knowledge are combined to generate new applications (Kogut and Zander, 1992). Innovation performance depends on a firm's knowledge stock and its ability to manage, maintain, and create new knowledge (Cohen and Levinthal, 1990; Nonaka and Takeuchi, 1995). This ability is enacted by employees searching for new knowledge, generating new ideas and recombining them for organisational advantage (Foss *et al.*, 2010).

Several scholars (Martín-de Castro *et al.*, 2013; Wu *et al.*, 2007) provide empirical evidence of the positive and direct association between HC and innovation performance. Furthermore, SC allows firms to have up-to-date knowledge repositories and relevant systems which make the firm's innovation activities more efficient (Buenechea-Elberdin *et al.*, 2018). Codified knowledge helps to increase innovation, which is based on the combination of processes or methods already established in a firm's routines and that can be used to produce and test new ideas (Nonaka and Takeuchi, 1995). Therefore, a high level of SC enhances a firm's innovation performance (Buenechea-Elberdin *et al.*, 2018). Not all of the knowledge necessary to innovate is located within a firm's boundaries (Kianto *et al.*, 2017). In fact, RC in terms of relationships established with external partners can enhance innovation by the introduction of new solutions, by the combination of knowledge coming from different external sources or by processes of co-creation (Hargadon and Sutton, 2000).

Considering the arguments presented above, this study tests the following research hypotheses:

H7. There is a positive direct relationship between HC and INNP.

H8. There is positive direct relationship between RC and INNP.

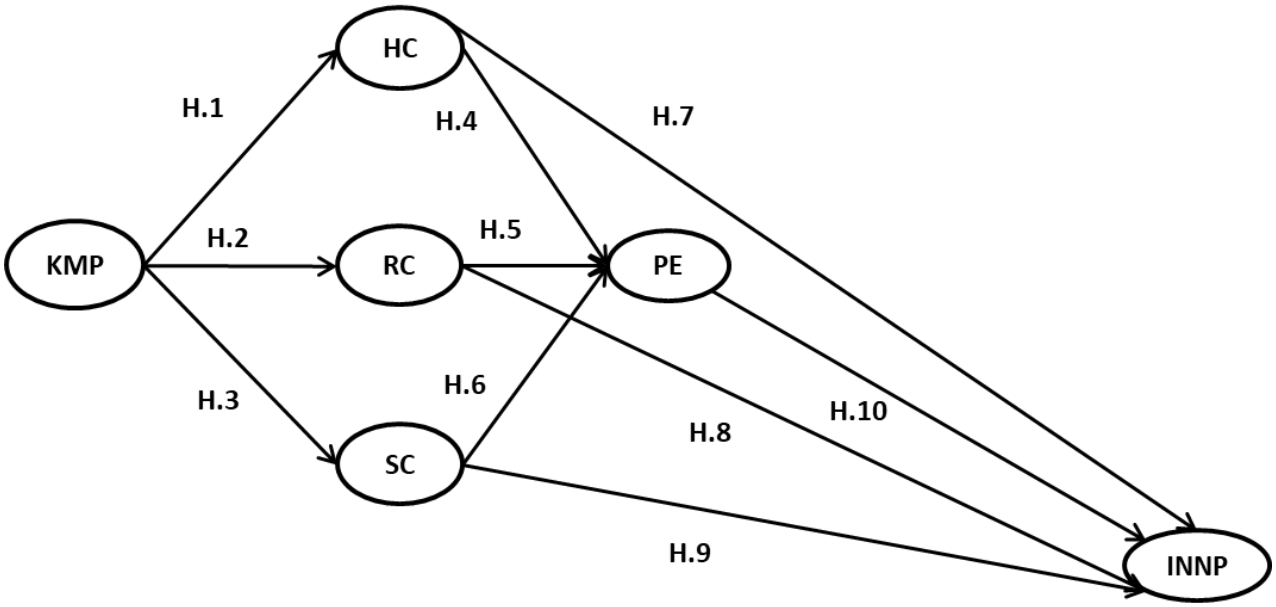
H9. There is positive direct relationship between SC and INNP.

Finally, innovativeness is a vital source to a firm's competitiveness and an organization's innovative performance can be developed by managers' knowledge and insights gathered during the phase of strategy formulation (Dibrell *et al.*, 2014). When formulating and implementing strategies, managers collect a lot of data related to the business competitive environment that, in turn, enlarge the set of information available to the company in terms of knowledge regarding competitors, customers, providers, potential markets opportunities, etc. This information is the key for the innovation process (Song *et al.*, 2011; Dibrell *et al.*, 2014). Therefore, we test the following research hypothesis:

H10. There is positive direct relationship between PE and INNP.

Summarizing the aforementioned discussion, Figure 1 provides a graphic representation of the linkages among the constructs and highlights the corresponding hypotheses to be empirically tested. The constructs in the model include KMP (knowledge management practices), HC (human capital), SC (structural capital), RC (relational capital), PE (planning effectiveness) and INNP (innovation performance).

Figure 1: Research Model



3. Research methodology

3.1 Data collection, sample and survey development

Survey data were collected from December 2018 to March 2019. A random sample of 2000 Italian SMEs was targeted from the *Bureau Van Dijk's AIDA* database using the following criteria: 1) number of employees between 1 and 249, 2) turnover ≤ € 50 m. This was consisted with Micro and SMEs definition of the European Union (2015). The Italian context is a perfect laboratory for our empirical study, due to the fact that the Italian business sector is mainly composed of SMEs, that is, 97.7% of firms are micro, small and medium sized. An invitation was sent to each SME via email inviting them to take part in the survey using their certified email address available on the government web site (see www.inipec.gov.it/cerca-pec for reference). Out of 2000 firms that were initially contacted, 295 participated in the research. However, to increase the quality of information gathered from the survey, only responses from SME senior managers were considered as they are classified as key informants. Ultimately, the final sample consisted of 172 completed surveys, representing approximately a 9% response rate.

Of the final sample, 38% of the respondents were CEOs, 24% CHROs, 21% CFOs, 10% COOs while the remaining 7% represented CIOs, CKOs and CROs. The main sectors represented were manufacturing (44%), other services (21%), commerce (10%) and construction (5%). Approximately

67% of the firms employed between 10 and 49 employees while the remaining 33% between 50 and 249 employees.

3.2 Measures

The research model includes eleven first-order constructs. However, KM practices was conceptualized as a second order construct (KMP). KMP was made up of five first order reflective constructs: organizational culture, formalization of routine task, ICT, training, and work design.

To model the second-order constructs of KMP a two-stage approach was followed (Hair, *et al.*, 2017). In the first stage, the direct effect of lower-order independent constructs was regressed on the corresponding lower-order dependent constructs. The latent variable scores were used in the second stage as manifest indicators of the higher-order constructs to estimate the final model.

Scales were translated from English to Italian by one of the authors of the paper and then translated back into English by another author to ensure alignment between initial scales and final survey questions. Finally, an independent bilingual speaker verified both English and Italian scales (Brislin, 1970). Scales for KMP practices were adapted from Lee and Choi (2003) and Giampaoli *et al.* (2017) while scales for IC were adapted from Han and Li (2015), Kianto *et al.* (2010) and Youndt and Snell (2004). Planning effectiveness was measured using the scale developed by Elbanna and Elsharnouby (2018). Finally, the innovation performance scale was adapted from Kianto *et al.* (2017). All items were measured using a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) as suggested by Dess and Robinson (1984), Delaney and Huselid (1996) and Hansen and Wernerfelt (1989).

4. Results

4.1 Global model fit and measurement model

According to Henseler (2018) fit indices are only applicable for confirmatory studies and not for explorative ones. In this model the value for SRMR was 0.068, well below the suggested threshold of 0.08, indicating a good model fit. The psychometric properties of each scale were assessed in terms of reliability, convergent validity and discriminant validity. The reliability of the inherent variables and individual items was tested using Cronbach's Alpha ($\alpha \geq 0.7$), Dillon-Goldstein's rho ($\rho \geq 0.7$) and average variance extracted (AVE ≥ 0.5) (Hair *et al.*, 2010). Measurement scales had strong convergent validity when the factor loadings of items on their corresponding constructs exceeded 0.6 (Hair *et al.*, 2010). All factor loadings exceeded the recommended

threshold (see Table 1). Moreover, all measurement scales had adequate convergent validity with AVE values in excess of 0.5 (Hair *et al.*, 2010). Ultimately, no items were dropped after the assessment tests. Finally, discriminant validity (DV) was assessed using the Heterotrait-Monotrait (HTMT) ratio. Table 2 shows the HTMT ratio where the maximum value is below 0.90, as recommended by Hair *et al.* (2013). The molar construct has been tested according to the procedure of Becker *et al.* (2012). Having gathered data from a single key informant in each SME, there was a risk of common method bias (Podsakoff *et al.*, 2003). Both ex ante and ex post procedures were adopted to minimize common method bias. First, respondents were assured of anonymity in their responses. Second, a Harman's one-factor test was conducted (Podsakoff and Organ, 1986). No single factor explains more than 50% of the variance suggesting that common method bias was not a likely contaminant in this study. Finally, common method bias was assessed through the variance inflation factor (VIF). VIF values less than 3.3 suggest there is no common method bias in the model (Kock, 2015; Kock, 2017).

Table 1: Reliability and convergent validity

Constructs and measures	Step 1 (first order)	Step 2 (second order)
Organizational culture (reflective)	Cronbach's α = 0.846	
	ρ_c = 0.906	
	AVE = 0.763	
	Loadings	
CUL1	0.889	
CUL2	0.853	
CUL3	0.878	
Formalization (reflective)	Cronbach's α = 0.886	
	ρ_c = 0.929	
	AVE = 0.815	
	Loadings	
FORM1	0.914	
FORM2	0.885	
FORM3	0.909	
ICT (reflective)	Cronbach's α = 0.915	
	ρ_c = 0.946	
	AVE = 0.854	
	Loadings	
ICT1	0.929	
ICT2	0.943	
ICT3	0.900	
Training (reflective)	Cronbach's α = 0.875	
	ρ_c = 0.924	
	AVE = 0.801	

	Loadings	
TR1	0.917	
TR2	0.931	
TR3	0.834	
Work design (reflective)	Cronbach's α = 0.872	
	ρ_c = 0.921	
	AVE = 0.795	
	Loadings	
WD1	0.885	
WD2	0.892	
WD3	0.898	
Knowledge management practices (molar)		Maximum VIF: 2.458
CUL		0.376**
FORM		0.304**
ICT		0.317*
TR		0.113
WD		0.205
Human capital (reflective)	Cronbach's α = 0.894	Cronbach's α = 0.894
	ρ_c = 0.935	ρ_c = 0.935
	AVE = 0.827	AVE = 0.827
	Loadings	Loadings
HC1	0.930	0.931
HC2	0.942	0.943
HC3	0.853	0.852
Relational capital (reflective)	Cronbach's α = 0.942	Cronbach's α = 0.942
	ρ_c = 0.963	ρ_c = 0.963
	AVE = 0.896	AVE = 0.896
	Loadings	Loadings
RC1	0.941	0.941
RC2	0.942	0.942
RC3	0.957	0.956
Structural capital (reflective)	Cronbach's α = 0.849	Cronbach's α = 0.849
	ρ_c = 0.909	ρ_c = 0.909
	AVE = 0.769	AVE = 0.769
	Loadings	Loadings
SC1	0.901	0.901
SC2	0.854	0.859
SC5	0.875	0.870
Planning effectiveness (reflective)	Cronbach's α = 0.893	Cronbach's α = 0.893
	ρ_c = 0.919	ρ_c = 0.919
	AVE = 0.655	AVE = 0.655
	Loadings	Loadings
PLEFF1	0.816	0.816
PLEFF2	0.879	0.879
PLEFF3	0.879	0.879
PLEFF4	0.790	0.790

PLEFF5	0.715	0.715
PLEFF6	0.765	0.765
Innovation performance (reflective)	Cronbach's α = 0.919	Cronbach's α = 0.919
	ρ_c = 0.939	ρ_c = 0.939
	AVE = 0.755	AVE = 0.755
	Loadings	Loadings
INNP1	0.837	0.837
INNP2	0.902	0.902
INNP3	0.904	0.904
INNP4	0.823	0.822
INNP5	0.877	0.877

Note: *p = 0.001, **p = 0.002

Table 2: Discriminant validity

	STEP 1 (first order)								
	HTMT								
	CUL	FORM	HC	ICT	INNP	PE	RC	SC	TR
FORM	0.312								
HC	0.611	0.298							
ICT	0.680	0.309	0.536						
INNP	0.695	0.367	0.541	0.578					
PE	0.828	0.456	0.689	0.616	0.823				
RC	0.546	0.236	0.421	0.490	0.593	0.659			
SC	0.580	0.668	0.586	0.583	0.724	0.755	0.638		
TR	0.607	0.409	0.439	0.624	0.636	0.613	0.391	0.638	
WD	0.696	0.405	0.578	0.595	0.596	0.738	0.450	0.573	0.714

	STEP 2 (second order)			
	HTMT			
	HC	INNP	PE	RC
INNP	0.541			
PE	0.689	0.823		
RC	0.421	0.593	0.659	
SC	0.586	0.724	0.755	0.638

4.2 Structural model

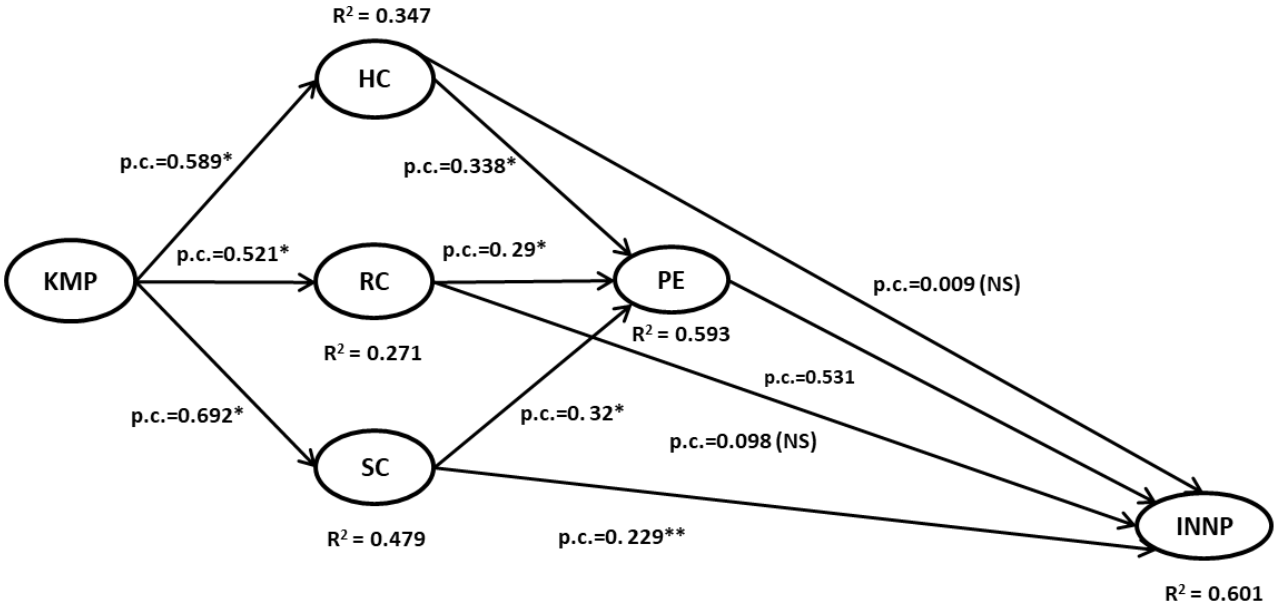
Data were analysed using Partial Least Square (SmartPLS 3.3.2), a structural equation modelling technique widely used in studies investigating KM and IC (Ragab and Arisha, 2013). PLS can deal with both latent and emergent variables as it is often the case in KM and IC research (Benitez *et al.*, 2020; Cepeda-Carrion *et al.*, 2018). PLS requires a minimum sample size equal to ten times the number of indicators associated with the most complex construct or the largest number

of antecedent constructs linking to an endogenous construct (Hair *et al.*, 2010). Therefore, the present research model would have been valid with 60 responses. We collected 172 responses and the final sample is adequate to test the structural model. Table 3 and Figure 2 shows the results of the structural model. The significance of the relations was tested through bootstrapping algorithm (Hair *et al.*, 2017). The predictive relevance (Q^2) is tested using the blindfolding technique (Hair *et al.*, 2013). The technique of blindfolding calculates Q^2 value (Geisser, 1974), a criterion to evaluate the cross-validated predictive relevance of the PLS-path model. Results are presented in table 4 and show that the model has good predictive relevance as the Q^2 values are above zero (Hair *et al.*, 2013). Finally, table 5 show the effect size. It measures the change in the R^2 value when an exogenous construct is omitted from the model (Hair *et al.*, 2017).

Table 3: Results of the structural model

HYPOTHESIS	PATH	PATH COEFFICIENT	T-VALUE	P-VALUE	STATUS
H1	KMI → HC	0.589	9.743	0.000	SUPPORTED
H2	KMI → RC	0.521	7.287	0.000	SUPPORTED
H3	KMI → SC	0.692	16.070	0.000	SUPPORTED
H4	HC → PE	0.338	4.610	0.000	SUPPORTED
H5	RC → PE	0.290	4.074	0.000	SUPPORTED
H6	SC → PE	0.320	4.638	0.000	SUPPORTED
H7	HC → INNP	0.009	0.118	0.906	NOT SUPPORTED
H8	RC → INNP	0.098	1.216	0.224	NOT SUPPORTED
H9	SC → INNP	0.229	2.990	0.003	SUPPORTED
H10	PE → INNP	0.531	6.745	0.000	SUPPORTED

Figure 2: Test of structural model



Notes: NS: non significant; *p = 0.000; **p < 0.01

Table 4: Predictive relevance

	R^2	Q^2
HC	0.347	0.278
INNP	0.601	0.448
PE	0.593	0.379
RC	0.271	0.234
SC	0.479	0.358

Table 5: Effect size

	f^2					
	HC	INNP	KMI	PE	RC	SC
HC		0.000		0.204		
INNP						
KMI	0.530				0.372	0.918
PE		0.288				
RC		0.014		0.137		
SC		0.066		0.145		

5. Discussion

The goal of the present study was to provide empirical evidence of the complex linkage among KM, IC, planning effectiveness and firm performance in the context of SMEs. The model examined KM practices and their link to all sub-conceptualizations of IC (i.e., human, relational and structural capital), and how these, in turn, linked to planning effectiveness and innovation performance. The model was tested on a sample of 172 Italian SMEs using PLS-SEM. The explanatory power of the model was relatively strong with all endogenous constructs yielding healthy R-squared values: R^2 for HC = 0.352, R^2 for RC = 0.256, R^2 for SC = 0.434, R^2 for PE = 0.593 and finally, R^2 for innovation performance equal to 0.601.

Results confirm that effective KM practices are useful in enhancing IC. As hypothesized (H.1; H2; H3) KM practices have a positive direct impact on HC (β=0.593), RC (β=0.506) and on SC (β=0.659) confirming extant studies by Kianto *et al.* (2014) and Jordão and Novas, (2017).

Regarding the importance of IC for planning effectiveness, hypotheses (H4, H5, H6) were also validated. Each IC component has a positive direct impact on planning effectiveness (HC: β=0.338; RC: β=0.29 SC: β=0.32). It is interesting to note that IC is able to explain a great amount of variance of planning effectiveness (0.593). This highlights the importance that KM and IC have in helping senior managers make effective decisions related to their strategic goals.

At the same time, HC does not seem to have a direct impact on innovation performance (H7). Results are in line with Cabrilo and Dhams (2018) and Do Rosario Cabrita and Bontis (2008). Moreover, also RC does not seem to have a direct impact on innovation performance (H8). However, many scholars argue that HC, RC and SC are strictly connected and consequently it is not possible to exclude HC or RC, even if indirectly, in enabling innovation performance. Stewart (1997) claims that HC can be fully utilized only through the other IC components. Other scholars found that only some IC components directly enhance innovation performance (Dumay *et al.*, 2013; Inkinen, 2015, Andreeva and Garanina, 2016). Finally, Do Rosario Cabrita and Bontis (2008), found that HC supports other IC components, that can be drivers of innovation. Further empirical research is needed to analyze the role that HC and RC have on a firm's ability to introduce innovation. It seems that HC and RC may be necessary but not sufficient as antecedents for innovative performance. Only SC seems to be a precursor of innovation performance. This result is consistent with previous studies that recognize the key role of codified knowledge in terms of its capability to innovate (Leitner, 2011; Kianto *et al.*, 2017). Finally, planning effectiveness has a direct positive impact β=0.531 on

innovation performance as expected (H10). This result confirms the assumption of Dibrell *et al.* (2014).

6. Implications

6.1 Implications for researchers

The results of this study fill some important gaps in academic literature. First, the integration of KM and IC is important in the SME context and in Italy in particular which has not been the subject of a previously published study. Second, the role that KM and IC play together in their integrative link to planning effectiveness is an important highlight of the current study. It was confirmed that all three IC sub-components: human, relational and structural capital have a positive and direct impact on planning effectiveness. However, results show that human and relational capital do not have a significant direct effect on innovation performance. Further research is necessary to investigate why the indirect effect of human and relational capital on innovation performance is particular. Finally, planning effectiveness was found to have a significant direct impact on a firm's ability to innovate. In other words, developing a clear vision, defining priorities and achieving a good fit between the external environment and internal capability, aids in enhancing innovation performance.

6.2 Implications for practitioners

For practitioners, this study confirms that senior managers must recognize the importance that intangible resources have on strategic decision-making. This is especially true for SMEs that often lack resources and extent of experience. Using the "stock and flow" metaphor for KM and IC has shown to be very useful for making decisions that enhance innovation performance. In a dynamic and complex environment, the only way to reduce uncertainty in making decisions is to collect useful information from external and internal environments (Bourgeois and Eisenhardt, 1988). Finally, considering that SC is the only component of IC that a firm can control, SMEs should invest in its development.

6.3 Limitations and area of future research

Several are the limitations of this study. First, there is no possibility of the generalizability of the results given the focus on SMEs in Italy. Second, data collected from a single respondent in each SME provides another limitation of generalizability. Third, we have only investigated the influence that IC sub-components have on planning effectiveness in terms of reached objectives and not on

the entire planning process. Future research may consider the use of quantitative metrics as proxies for the constructs that were studied over a longer period of time and the analysis of the role that IC and KMP can play in the planning process.

7. Conclusion

Overall, this study's empirical results confirm that KM and IC must be analyzed together when attempting to improve planning effectiveness and firm performance. Although the fields of KM and IC have forged ahead with their own paths, this study warns that researchers should consider the important interactivity that exists between both phenomena. In the future, the "stock and flow" metaphor in assessing KM and IC respectively, would be a useful mechanism to make sure that researchers examine both the dynamic and static perspective of intangible assets. These results confirm the importance that KM and IC have for SMEs and the need to find the best way to manage and take advantage of them. Knowledge and IC represent important resources able to enhance planning effectiveness and, consequently, SMEs need to manage them in the best possible way. Therefore, SME managers and entrepreneurs should invest in KM practices to enhance their IC effectively. Finally, it is worth noting that SC is able to greatly benefit from KM practices and, at the same time, has a very strong positive direct impact on both planning effectiveness and a firm's ability to innovate. Considering that SC is the only component of IC that a firm can control, SMEs should invest in its development.

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Appendix – Survey items

KMP – WORK DESIGN: In my organization …
1. there are regular teams appointed to with responsibility of reach goals and solve problems 2. individual employees and/or teams with similar aims or problem to solve discuss, share ideas and give reciprocally advice 3. there are specific mechanisms that assure the involvement of employees in solving
KMP – TRAINING: In my organization …
1. there are training courses aimed at team building 2. there are training courses aiming to improve problem solving skills 3. there are training courses on the use of software and ICTs
KMP – CULTURE: In my organization …
1. an environment of trust and collaboration is encouraged 2. employees who experiment and take reasonable risks are well considered even if they should be mistaken 3. innovation and experimentation of new ways of doing tasks is encouraged
KMP – ICT: In my organization …
1. the ICT we utilize enable collaboration and cooperation 2. the ICT we utilize allows a fast and easy access to stored information and knowledge 3. the ICT we utilize allows sharing of information and knowledge with suppliers, clients, partners and other stakeholders
KMP – FORMALIZATION: In my organization …
1. rules and procedures are typically written 2. employees have to adhere closely to formal procedure 3. there are many activities covered by some formal procedures
IC – HUMAN CAPITAL:
1. Our employees are highly skilled in their tasks 2. Our employees have a lot of experience in their job 3. Our employees are good at problem-solving
IC – RELATIONAL CAPITAL:
1. We exchange information with external parties (e.g. customers and suppliers) in a very effective way 2. We collaborate extensively with external parties (e.g. customers and suppliers) to develop new solutions 3. We collaborate with external parties (e.g. customers and suppliers) in a very effective way
IC – STRUCTURAL CAPITAL:
1. Our company has a lot of useful information in documents and databases 2. We keep complete documentation of the work processes 3. We use technology to integrate internal work processes tightly
SKILL FLEXIBILITY:
1. Our firm can shift employees to different jobs when needed. 2. We employ people with a broad variety of skills 3. Many employees in our firm have multiple skills that are used in various jobs.

BEHAVIORAL FLEXIBILITY:
1. The flexibility of our employees' work habits helps us to change according to market demands 2. Our employees respond to changing situations within a short time 3. Most of our employees are flexible enough to adjust to dynamic work requirements
INNOVATION PERFORMANCE: In the last three years …
1. New products and services for customers 2. New production methods and processes 3. New management practices 4. New marketing practices 5. New business models
PLANNING EFFECTIVENESS: In my organization we …
1. Developed a clear vision 2. Oriented the firm toward a unified mission 3. Defined clear priorities and focused on the important issues 4. Achieved a good fit between the external environment and the internal capabilities of our firm 5. Delivering high-quality products/services 6. Improving firm performance