

Intellectual capital in Italian healthcare: senior managers' perspectives

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healthcare

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Abstract

Purpose – This study investigates the perceptions of intellectual capital (IC) among senior managers at Italian local healthcare units (LHUs) and the interrelations among IC components. It also provides a comprehensive definition of IC in the healthcare context and managerial guidance on improving IC to enhance LHU performance.

Design/methodology/approach – A survey was carried out to investigate perceptions among LHU senior management and identify characteristics of each primary IC component. The pilot study's results were examined using principal component analysis.

Findings – The findings illustrate senior management's perceptions of IC in LHUs and the extent to which management identifies and manages IC. A comprehensive definition of IC components in the healthcare sector is derived from these findings.

Research limitations/implications – The research provides a better understanding of IC in the healthcare context and facilitates further research into how IC may be incorporated in quotidian organizational procedures. Results suggest that LHU managers should invest in increasing trust and respect and engage employees in organizational processes to provide recognition for the active role they play. Ongoing management of the three primary IC components is shown to have clear advantages, particularly on their connectivity.

Originality/value – The paper contributes to an increasingly important strand of theoretical research – IC in the healthcare context – and also adds new knowledge on the practical applications of IC in LHUs.

Keywords Public healthcare organizations, Intellectual capital, Intellectual capital management, Survey, Principal component analysis

Paper type Research paper

Introduction

Public healthcare organizations (HCOs) are experiencing a growing need for performance monitoring and measurement, customer focus and social control (De Angelis, 2013). HCOs are considered professional organizations (Mintzberg, 2017) with a high degree of managerial complexity, in which high performance can be achieved by combining clinical and non-clinical competencies (Veronesi et al., 2013), namely professional skills and relational abilities (Veltri et al., 2011). They are reputed to be knowledge-intensive organizations, and as such, it is highly advisable to manage and measure intangibles to unveil any “hidden”



resources (Roos and Roos, 1997). Among the known managerial tools, intellectual capital (IC) allows for the inclusion of a perspective, rather neglected in traditional public-sector measurement processes, which plays a substantial role in providing healthcare services. Moreover, strict financial constraints, which HCOs have in common with other public organizations, require better organization of the available resources to ensure efficiency and effectiveness (Elg *et al.*, 2013; Peng *et al.*, 2007). Previous studies have emphasized the critical role of staff engagement, which leads to enhanced performance and customer satisfaction (Spurgeon *et al.*, 2011).

Within this framework, this paper presents a pilot study designed to address the following research questions: How do senior managers of Italian local healthcare units (LHUs) perceive IC components? Does a comprehensive definition of IC emerge from the healthcare context?

Based on previous studies on IC in the healthcare context (Carlucci and Schiuma, 2012; Evans, *et al.*, 2015; Peng *et al.*, 2007; Radaelli *et al.*, 2011), this pilot study aims to contribute to the literature on the implications of managing IC components in HCOs. Based on the results collected, it also explores possible interrelations among IC components and suggests ways to improve IC and enhance overall performance. Italy was chosen because of its long reform process, which, starting in the 1990s, introduced a set of managerial tools to improve performance throughout the entire healthcare system. Data were obtained through a questionnaire distributed to the senior managers of all Italian LHUs. The questionnaire was designed based on the traditional tripartite definition of IC, which includes human, structural and relational capital. Principal component analysis (PCA) was used to determine how LHU senior managers perceive IC and the importance they ascribe to different IC components.

The research offers three main contributions. First, the findings can enrich the study of IC in the context of HCOs, where there is a dearth of research on IC management. Second, the results may increase senior managers' awareness of the relevance of IC resources. Third, the findings can shed light on the interrelations among IC components, paving the way for enhanced management and higher performance.

The next section presents the relevant literature from the healthcare domain. Section 3 sets the context, while section 4 illustrates the research design and methodology. Section 5 presents the results, and section 6 discusses the results while considering the study's limitations, practice implications and possible future directions for IC research in the healthcare context.

Theoretical framework

IC development

In the so-called knowledge economy, intangible resources have been gaining importance in all kinds of organizations, becoming an essential part of the value creation process. The vast majority of previous studies on IC in both the private and public sectors refers to a tripartite classification (Evans *et al.*, 2015; Guthrie *et al.*, 2001; Habersamand Piber, 2003; Manes-Rossiet *et al.*, 2016):

- (1) *Human capital* refers to all aspects of human resources, such as knowledge, skills and experience owned and used by individuals.
- (2) *Structural capital* (also called *organizational capital*) refers to codified experience and knowledge that are clearly institutionalized, such as databases, information systems, research projects, work procedures and routines, governance principles, ethical codes and management philosophies.

- (3) *Relational capital* (also called *social*, *stakeholder* or *customer* capital) refers to the intangible resources and capabilities embedded and available in organizations, which contribute to internal and external relations and are useful for value creation.

Many papers have used this classification to focus on measurement problems, which are considered a prerequisite for correct management of the three IC components. Nonetheless, there are doubts about the possibility of creating value just by measuring IC, especially when public sector organizations do not implement any strategic or managerial plans based on an awareness of the available IC resources. Therefore, scholars have highlighted the need for stronger efforts to put IC into action and persuade managers to use IC (Dumay *et al.*, 2015).

Intellectual capital in healthcare organizations

HCOs have faced profound changes throughout the world as a result of changes in public policy and available resources as governments seek to limit healthcare costs. Additionally, public sector healthcare has been affected by a highly politicized environment, indirect payment for services through third parties (governmental units and insurance companies) and competition between private and public organizations. This last feature represents an increasing challenge, and the solution lies in a bringing together of clinical and non-clinical competencies (Veronesi *et al.*, 2013) and better management of IC resources (Veltri *et al.*, 2011). Furthermore, as scholars have widely observed, HCOs, as professional organizations (Mintzberg, 2017), form a knowledge-intensive industry (Evans *et al.*, 2015) that is both people-centred and process-oriented (Peng *et al.*, 2007). HCOs are required to provide tailored and high-quality services to actively involved and educated healthcare consumers (Evans *et al.*, 2015; Palumbo, 2016; Simonet, 2015; Zigan *et al.*, 2007). Therefore, the role of IC components in the healthcare sector needs to be investigated (Liu and Lin, 2007).

Research has concentrated on methods to manage and measure IC in HCOs (e.g. Evans *et al.*, 2015). Most studies have aimed to identify and describe IC (Carlucci and Schiuma, 2012; Chang *et al.*, 2014; Habersam and Piber, 2003; Peng *et al.*, 2007; Zigan *et al.*, 2007). Others have investigated specific IC issues, and several focussed specifically on IC in nursing. For instance, Covell (2008) adopted a middle-range theory approach, discussing nursing knowledge with a focus on human and structural capital and examining theoretically the impacts of IC on both patient and organizational outcome. Further studies analysed IC in action in HCOs, investigating how IC management has been adopted in specific cases (Habersam and Piber, 2003). Through an action-research approach at a university hospital, Vagnoni and Oppi (2015) emphasized the need to adopt an IC framework. While many studies have investigated the hospital setting (Radaelliet *et al.*, 2011; Vagnoni and Oppi, 2015; Yang and Lin, 2009), other types of HCOs have not been observed. Therefore, this study aims to investigate IC in local healthcare units from a managerial perspective.

A strand of research has focussed on the relationship between IC and performance measurement. Elg *et al.* (2013) suggest that performance measurement may be a versatile method for driving improvement in HCOs. Peng *et al.* (2007) argue that IC dimensions and performance indicators are important elements for performance management practices in the hospital industry. Pirozzi and Ferulano (2016) propose a performance measurement system involving the evaluation of IC components and encompassing both financial and non-financial performance. Habersam and Piber (2003) found that senior hospital staff had a high awareness of intangible resources and endorsed their use in performance measurement systems. However, the authors warn that the indicators proposed so far may cover only some IC resources.

Previous studies have emphasized that human resources are important because professional skills and employee engagement are drivers for effective performance

(Liu and Lin, 2007; Spurgeon *et al.*, 2011; Veltri *et al.*, 2011). Moreover, investment in human resources should be considered asset creation rather than simply an expense (Guthrie, 2001).

As knowledge-intensive entities, HCOs require specific professional skills (Evans *et al.*, 2015; Numerato *et al.*, 2012). Therefore, continuous updates of knowledge and skills, increasing engagement of clinicians in management (Hartley and Kautsch, 2014) and development of shared procedures and practices for job evaluation are critical (Bevan and Hood, 2006). Previous organizational and managerial studies in the healthcare context (Davies *et al.*, 2000; Elg *et al.*, 2013) underscored the utmost importance of *managerial abilities* in improving organizational performance.

The other IC components have been less investigated. Wu and Hu (2012) focus on structural capital from a knowledge management perspective, highlighting the importance of internal culture and the role of information technology (IT) systems. Other studies considered relational capital in respect to a patient-centred vision and the ability to gain patient loyalty (Pirozzi and Ferulano, 2016) and highlighted the need to have close interaction among employees (Yang and Lin, 2009). Yang and Lin (2009) surpass the individual perspective and discuss the role of team training in strengthening employee interaction.

More recent studies (Vagnoni, 2018) have called for more research to mobilize the potential of all the IC components within HCOs. However, limited attention has been paid to the perceptions of IC held by actors involved in planning and in organizational activities in these specific organizations (Chang *et al.*, 2014; Peng *et al.*, 2007). As Evans *et al.* (2015) highlighted, there is a need to explore IC within the specific organizational contexts in which IC components are embedded, drawing from multiple sources at the human, structural and relational levels.

There has been support among scholars for devising another IC classification system or adding additional categories to the traditional tripartite classification. For instance, Chang *et al.* (2014) propose that *innovation* should be included as an additional dimension, as the growing demand and costs in healthcare urge innovation alongside existing resources and staff engagement. Habersam and Piber's (2003) examination of two hospitals identified *connectivity capital*, a more intuitive aspect of work and personal relationships which cannot be quantified or clearly identified. Moreover, they highlighted interconnections linking *structural capital* with *relational capital* "by group work focused on patients" needs and social interaction with patients (p. 767). *Human capital* and *relational capital* are connected through credibility, reputation and mutual trust, as recognized skills – both inside and outside the organizations – positively influence reputation.

In fact, HCO studies investigating relational capital from a patient-centred perspective stress the need to gain patient trust and underscore the importance of close interaction among employees (Pirozzi and Ferulano, 2016). Other studies highlight the relevance of information-sharing practices in building trust among partners (Vaia *et al.*, 2015; Vosselman and van der Meer-Kooistra, 2009).

Participative leadership and the ability to work in teams using intense communication and exchange of ideas are the connectivity elements linking *human capital* with *structural capital*. Habersam and Piber (2003) also identified a mutual relationship between the three components through brain drain and the international process of benchmarking. No further studies have examined *connectivity*, which nonetheless appears to be the linking element explaining how the other three typical IC components work together to increase performance.

As there is no unanimity in defining IC in HCOs, this study operationalizes the concepts on which the known classifications are based by incorporating the views of senior managers involved in governance and management and thereby translating the concepts into management actions within the healthcare context. Senior management's recognition of IC components and their mutual connectivity is essential for sound management and

measurement. Furthermore, it represents an essential step towards the improvement of organizational performance based on available IC resources.

Setting the context

The Italian National Health Service provides universal cover for health services through general taxation. In the last 30 years, the Italian National Health Service has undergone a process of decentralization and reform with the objective of achieving ongoing and systematic quality improvement in the delivery of healthcare services (Carlucci and Schiuma, 2012). HCOs were among the first public sector entities to introduce managerial concepts and techniques. The New Public Management paradigm has led to the introduction of new managerial approaches and a wide range of technical solutions, including accrual accounting, performance measurement systems and management control (Vainieri *et al.*, 2019).

The Italian National Health Service has a regional structure, with the responsibility for healthcare shared by the national government and 20 regional administrations (as well as two autonomous provinces). The national government controls the distribution of tax revenues to publicly financed HCOs and defines the “essential levels of care”. National resources are allocated to the regions on the basis of a per capita share, adjusted in relation to several factors (e.g. median age, birth rate, death rate, income, education, immigration). Furthermore, hospital care is financed through diagnosis-related groups (France *et al.*, 2005). Citizens are free to receive healthcare services from both private and public HCOs throughout the country. At the same time, regions and autonomous provinces may opt to expand the essential levels of care if they can provide the necessary financial resources. The regions are responsible for organizing and providing health services through two kinds of entities: hospitals and LHUs (Donatini, 2016).

Hospitals fall into three basic categories: general hospitals controlled by LHUs, autonomous hospitals and teaching hospitals. Although LHUs are state-sector entities, they exercise a degree of entrepreneurial autonomy. They are legally obliged to satisfy the healthcare needs of residents within their designated territories of operation (Vainieri *et al.*, 2019). LHUs offer guaranteed healthcare services through several channels. They provide hospital care through the hospitals under their control and may also purchase services from other hospitals, both public and private (Sartirana *et al.*, 2014). They are obliged to guarantee all kinds of health services considered “essential levels of care”. Each LHU is organized into (1) districts (according to the layout of the territory and the distribution of its population); (2) departments (which deal with primary care services, disease prevention initiatives and social services in cooperation with municipalities) and (3) hospital districts.

At present, growing financial pressures, together with intense competition with other public and private healthcare organizations, have impelled Italian LHUs to increase managerialization, in which intangibles play an even greater role.

Italy, like most developed countries, has involved clinical professionals in the management of healthcare services (Veronesi *et al.*, 2013). The chief executive officer of each LHU is appointed by the region. The appointment may therefore be influenced by political strategies at the regional level (Vainieri *et al.*, 2019). Chief executive officers (CEOs) are responsible for the overall management and performance of LHUs. They represent the LHU in relationships with other stakeholders and appoint the managers of the LHU's operating structures. The latter process is also subject to political influences. Each CEO appoints the chief financial officer (CFO) and chief health officer. The CFO takes charge of all administrative procedures, supervising the operational activities assigned explicitly to different managers (e.g. the financial manager, human resource manager and communication manager). The chief health officer, a qualified clinician with experience in health management, is responsible for all issues related to health protocols. He or she also

supervises the activities carried out by the clinicians responsible for the operational planning and monitoring activities of the departmental units within the LHUs. Financial managers are responsible for the supervision and handling of the LHUs' financial affairs. Human resource managers are responsible for the management of LHU employees, and communication managers are responsible for managing all internal and external communications.

The overall picture of LHUs in Italy can be somewhat daunting in its organizational complexity. Figure 1 illustrates the organizational structure of Italian LHUs.

Research design and methodology

The study used questionnaires to investigate Italian LHU senior managers' perceptions about IC components and their interrelations. Questionnaires are widely considered an appropriate tool to collect data regarding managers' perceptions (Nazari *et al.*, 2006; Rowley, 2014) and are an established tool in management and accounting research. The basic epistemological assumption of questionnaires is that subjective perceptions matter, and accordingly, the most reliable source for specific information may indeed be the respondents themselves (Nazari *et al.*, 2006, p. 429). The formulation of the questionnaire drew considerably on Evans *et al.* (2015), whose literature review summarizes the conceptualization, management and measurement of IC in the healthcare context. Items included in the questionnaire were formulated with reference to the IC components identified by Evans *et al.* (2015, p. 558). A survey of perceptions of IC within local governments (Manes-Rossi *et al.*, 2016) was also used as a point of reference. The questionnaire was tested in one LHU, both to ascertain the suitability of the final list of questions and to identify unclear questions or misunderstandings. The results of the test were positive.

The final questionnaire used the tripartite definition of IC (human, structural and relational capital) and consisted of three sections. The first aimed to capture respondents' familiarity with IC issues and contained four overarching questions composed of 63 survey items. The first question concerned human capital (13 items), the second and third concerned structural capital (35 items) and the fourth focussed on relational capital (15 items). The second section dealt with the measurement of IC components (11 items), and the third collected respondents' demographic information.

The survey was launched using a web-based survey host (SurveyMonkey). A cover letter was included to explain the purpose of the research together with broad definitions of human, structural and relational capital. Several studies have highlighted the limits and advantages

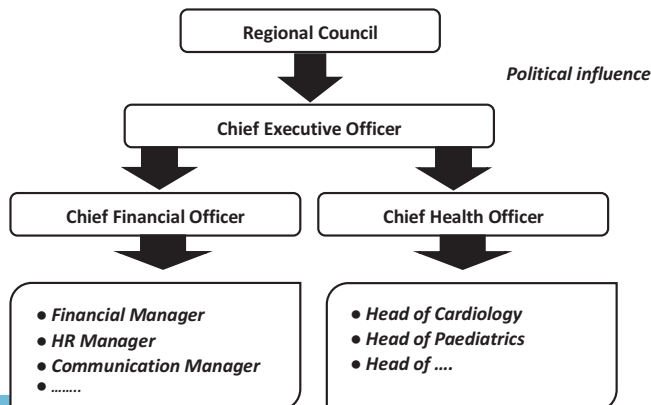


Figure 1.
Organizational
structure of the
Italian LHUs

of online surveys (Nulty, 2008; Wright, 2005). Limitations include uncertainty over the validity of the data and sampling issues. Advantages include increased access to individuals in distant locations, the ability to reach difficult-to-contact participants and the convenience of automated data collection. The questionnaire was emailed to senior managers (CFOs, chief health officers, financial managers, human resource managers and communication managers) at all 121 Italian LHUs. About 49 email addresses were invalid, either because certain senior managers were at the end of their official terms or because the addresses had not been listed correctly on the official website. Additionally, there were 37 duplicates because some managers carried out responsibilities at once. Therefore, the final sample comprised 519 respondents.

A six-point Likert scale was adopted to ensure that respondents did not choose the moderate value (the middle point) (Manes-Rossi *et al.*, 2016). The respondents were asked to express agreement or disagreement to statements, with 6 corresponding to “strongly agree” and 1 corresponding to “strongly disagree”.

The field study was initiated in October 2016 and completed in January 2017. To ensure a high response rate, questionnaire distribution was followed by phone calls, and four reminders were sent to the respondents every 20 days to increase their likelihood of participating. The final response rate was 18% (92 respondents out of 519). This included 17 CFOs (18.5%), 17 chief health officers (18.5%), 21 financial managers (22.8%), 16 human resource managers (17.4%), 16 communication managers (17.4%) and 5 respondents (5.4%) who did not identify their roles. Given this response rate, the present research constitutes a pilot study, providing exploratory insights into the perceptions and implications of managing IC components within HCOs.

PCA was adopted to examine the constituents of each IC dimension. PCA involves the reduction of a data set into a set of values of new variables called principal components. This reduction makes the visualization of the data more straightforward and the subsequent data analysis more manageable. It also reduces “noise” and redundancy (Mardia *et al.*, 2003). This allows for a reorientation of the data so that the first principal component explains as much of the variability in the data as possible, and each succeeding component, in turn, has the highest variance possible (Lattin *et al.*, 2003). To assess the quality of the data set, the Kaiser–Meyer–Olkin (KMO) test and the Bartlett test of sphericity (Bartlett, 1950) were carried out. The KMO test indicates the proportion of variance in the variables that might be caused by underlying factors. The Bartlett test of sphericity’s null hypothesis is that the variables are not related and therefore not suitable for analysis. Cronbach’s alpha coefficient of reliability was also calculated (Cronbach, 1951).

Senior managers’ perceptions of IC in HCOs

PCA was conducted for each IC component to provide a general picture of respondents’ most significant answers concerning human, structural and relational capital as well as measurement. Jolliffe (2002) and Gatignon (2014) both suggest selecting principal components which have an eigenvalue greater than 1. Accordingly, the following tables show the rotated component matrices of the factor loadings of the extracted principal components. Factor loadings can be described as indices showing the strength (i.e. relative importance) of the relationship between observable variables (i.e. the items of the questionnaire) and unobserved factors (i.e. the constructs). The closer the factors are to 1 (or -1), the more they exert an influence on the variable. Di Franco and Marradi (2003) recommend focussing on items with higher factor loadings (indicated in italics in the following tables) to semantically capture the most relevant constructs. The constructs were labelled, and a taxonomic scheme was produced. The conceptualization summarized in the theoretical framework was used to interpret the taxonomy and then to define the IC

components in the HC context. Table 1 presents the rotated component matrix of factor loadings concerning human capital (Question 1). The results of the KMO test (sample adequacy: 0.856) and the Bartlett test (significant level: 0.000) confirmed the data set to be of good quality. Cronbach's alpha test (0.927) also confirmed the reliability of the results.

Three principal components were extracted. The items with high factor loadings were considered to represent the most significant issues concerning human capital according to the respondents (in italics in the table). These items play the crucial role of employee involvement in job evaluation and the importance of performance measurement; this confirmed previous findings from hospital contexts (Elg *et al.*, 2013; Peng *et al.*, 2007). Moreover, previous management research in HCOs (Bevan and Hood, 2006; Numerato *et al.*, 2012) has indicated that employee knowledge is another human capital component requiring consideration and that the combination of managerial and professional attitudes is a key element for fostering productive relationships within HCOs (Veronesi *et al.*, 2013). Table 2 labels the selected items and provides a taxonomic scheme.

Table 3 presents the rotated component matrix of factor loadings concerning structural capital (Questions 2 and 3). The validity of the data was assessed using both the KMO test (sample adequacy: 0.926) and the Bartlett test (significant level: 0.000), while Cronbach's alpha (0.977) confirmed the reliability of the results.

Human capital (Question 1)

	PC 1	PC 2	PC 3
<i>Question 1: In my opinion, the employees of my organization</i>			
Are highly skilled	0.289	0.176	<i>0.829</i>
Know how to do their job	0.247	0.170	<i>0.876</i>
Have opportunities for further studies/training	0.220	0.273	0.680
Understand the KPIs of their entity	0.244	<i>0.819</i>	0.303
Adopt the KPIs of their entity	0.175	<i>0.844</i>	0.279
Receive incentives	0.309	<i>0.748</i>	0.038
Get job satisfaction	0.556	0.407	0.114
Participate actively in the activities of their entity	<i>0.735</i>	0.286	0.292
Are engaged in the organization with their superiors	<i>0.858</i>	0.279	0.096
Receive motivation from their managers to enhance procedures and routines	<i>0.788</i>	0.317	0.288
Receive motivation from their managers to improve knowledge and attitudes	<i>0.781</i>	0.297	0.338
Are aware of the changes made by the entity	0.657	0.425	0.299
Are attentive to the general public	0.671	-0.152	0.412
Kaiser-Meyer-Olkin measure of sampling adequacy			0.856
Bartlett test of sphericity	Approx. Chi-square	df	Sig
	815.021	78	0.000
Cronbach's alpha			0.927

Table 1.
Human capital: factor loadings of extracted PCs

PCs	Label	Interpretation
1st PC	Employee engagement in the organization	Employees are engaged in the organization and receive motivation from their managers to improve procedures and knowledge
2nd PC	Performance measurement	Employees are aware of the importance of KPIs and of how they would affect their organizational role and profile
3rd PC	Professional employees' profile	Employees have both the required qualifications and good knowledge and also play an active role in organizational activities

Table 2.
Human capital: senior managers' perception

Structural capital (Questions 2 and 3)					
	PC 1	PC 2	PC 3	PC 4	PC 5
<i>Question 2: In my opinion, my organization</i>					
Has a clear vision	<i>0.850</i>	0.097	0.116	0.119	0.340
Has a working environment which encourages responsibility	<i>0.767</i>	0.141	0.195	-0.19	0.380
Is an environmentally responsible organization	0.451	0.340	0.229	-0.44	<i>0.665</i>
Focusses on employee needs	0.647	0.244	0.263	0.407	0.234
Focusses on achieving the best results for citizens	<i>0.707</i>	0.266	0.109	0.187	0.470
Adopts advanced technologies	0.261	0.112	0.171	0.446	0.664
Is characterized by good relationships between departments	0.466	0.548	0.014	0.463	0.214
Is well aligned with the objectives of the various levels	<i>0.761</i>	0.335	0.082	0.408	-0.017
Has appealing promotional brochures in which access to services is clarified	0.198	0.305	0.290	<i>0.738</i>	0.034
Provides innovative services	0.353	0.163	0.197	<i>0.685</i>	0.322
Has easily understood managerial procedures	0.674	0.233	0.268	0.356	0.189
Has transparent workplace policies	0.662	0.274	0.314	0.373	0.041
Uses adequate advertising campaigns to promote services	0.198	0.326	0.404	0.619	0.009
Has good managerial capabilities	<i>0.809</i>	0.176	0.215	0.094	0.247
Is able to optimize resources	<i>0.741</i>	0.139	0.387	0.219	-0.067
Respects its deadlines	0.668	0.222	0.409	0.160	-0.119
Measures the outcome of its activity	<i>0.825</i>	0.217	0.233	0.146	0.077
Recognizes and takes advantages of market opportunities	0.547	0.212	0.533	0.120	0.128
<i>Question 3: In my opinion, the employees of my organization</i>					
Recognize the mission and the values of their organization	0.426	0.697	0.210	0.202	0.064
Have a sense of ownership	0.285	<i>0.823</i>	0.155	0.218	0.118
Understand the responsibilities of their organization	0.072	<i>0.850</i>	0.238	0.172	0.061
Are aware of the environmental commitment of their organization	0.044	<i>0.727</i>	0.282	0.201	0.258
Understand that changes in central/regional government policies affect the running of their entity	0.246	0.487	0.443	-0.260	0.104
Easily use ICT adopted by the entity	0.243	0.098	<i>0.704</i>	0.231	0.351
Use information delivered in the strategic plan	0.409	0.484	0.582	0.144	0.117
Use information delivered in the management commentary	0.343	0.479	<i>0.620</i>	0.167	0.095
Are able to give opinions, comments and recommendations to their organization	0.241	0.476	0.583	0.298	0.143
Believe that they are providing high-quality services	0.239	0.238	0.518	0.391	0.234
Are satisfied with the overall performance of their organization	0.499	0.390	0.475	0.315	0.111
Promote the adoption of best practices	0.378	0.409	0.506	0.438	0.169
Comply with deadlines defined for internal procedures	0.314	0.320	<i>0.619</i>	0.394	-0.024
Are involved in assessing user satisfaction	0.488	0.510	0.367	0.215	0.066
Are aware of outsourcing services of the organization	0.139	0.514	<i>0.621</i>	0.205	0.050
Know the quality standard practice of the organization	0.421	0.627	0.386	0.291	0.038
Are aware of the importance of working as a team	0.351	0.563	0.464	0.341	0.088
Kaiser-Meyer-Olkin measure of sampling adequacy					0.926
Bartlett test of sphericity		Approx. Chi-square	df	Sig	
		3112.087	595	0.000	
Cronbach's alpha				0.977	

Table 3. Structural capital: factor loadings of extracted PCs

Five principal components were extracted. The items with high factor loadings are in italics in the Table 3. Structural capital was perceived to be largely based on managerial abilities, internal and organizational resources, the IT system and an effective promotional strategy. These results confirm findings from previous studies that investigated different kinds of HC organizations, such as hospitals and long-care structures. Wu and Hu (2012) discussed the

internal culture and role of IT systems. The importance of managerial abilities and communication skills has been recognized as essential to performance improvement and pivotal in organizational and managerial studies in the healthcare context (Davies *et al.*, 2000; Elg *et al.*, 2013; Palumbo, 2016), though it should be noted that these managerial qualities have yet to be explored in the context of IC in HCOs. The fifth principal component focussed on environmental responsibilities. In Table 4, the selected items have been labelled and a taxonomic scheme provided.

PCs	Label	Interpretation
1st PC	Managerial ability	The investigated LHUs have both managerial capabilities and a clear vision of the future for the benefit of the community. Moreover, it seems propensity to optimize resources and measuring the outcomes of activities are pivotal for a proper governance policy.
2nd PC	Organization's involvement and collaboration	The respondents underline the sense of involvement and "ownership" of employees, indicating their positive attitude towards collaboration. Thus, the relevance of the culture embedded in the organization emerges.
3rd PC	IT system and outsourcing services	The respondents highlight the importance of the use of ICT and outsourcing services. In addition, employees recognize the relevance of information delivered in the management commentary and the respect for deadlines within internal procedures.
4th PC	Communication skills	The respondents are aware of active communication with service users and the importance of providing innovative services.

Table 4. Structural capital: senior managers' perception

Relational capital (Question 4)			
	PC 1	PC 2	PC 3
<i>Question 4: My organization</i>			
Is never too busy to respond	0.558	0.231	0.304
Instils confidence in citizens	0.860	0.278	0.180
Makes users feel respected	0.875	0.253	0.217
Promotes relationships between administrative and clinical structures	0.569	0.611	0.084
Makes use of questionnaires/interviews for users to introduce improvements	0.610	0.246	0.243
Makes use of external consultants to improve clinical procedures and routines	0.448	0.557	0.420
Makes use of external consultants to improve general and administrative procedures and routines	0.312	0.577	0.510
Promotes relationships with research institutions	0.427	0.739	0.071
Promotes relationships with pharmaceutical industries	0.178	0.797	0.144
Promotes cooperation between partners	0.424	0.763	0.154
Has relationships with IT service providers	0.207	0.711	0.449
Has transparent workplace policies	0.566	0.537	0.265
Is admired and trusted	0.760	0.358	0.166
Has a good website for communication with users	0.190	0.278	0.823
Is identified by users through its logo	0.259	0.062	0.871
Kaiser–Meyer–Olkin measure of sampling adequacy			0.899
Bartlett test of sphericity	Approx. Chi-square	df	Sig.
	965.346	105	0.000
Cronbach's alpha			0.943

Table 5. Relational capital: factor loadings of extracted PCs

Table 5 illustrates the rotated component matrix of factor loadings concerning relational capital (Question 4). The data set is of good quality according to both the KMO test (sample adequacy: 0.899) and the Bartlett test (significant level: 0.000). Moreover, the results are reliable (Cronbach's alpha: 0.943).

Three principal components were extracted (items with high factor loadings are in italics in the Table 5). The analysis of responses concerning relational capital highlights that trust, responsibility and the ability to promote relationships with other institutions are considered pivotal elements of the LHU's mission and represent intangible resources of great value for the community. While the first two dimensions are consistent with the findings of previous studies (Pirozzi and Ferulano, 2016; Yang and Lin, 2009), the last dimension, web communication, emerges as a new element of relational capital for HCOs. This result is consistent with other strands of research which have indicated the importance of information-sharing practices in building trust between partners (Vaia *et al.*, 2015; Vosselman and van der Meer-Kooistra, 2009). Building on this interpretation, the following taxonomic scheme is proposed (see Table 6).

Question 5 concerned respondents' perceptions about the way in which IC components are measured. The data set was of high quality according to both the KMO test (sample adequacy: 0.932) and the Bartlett test (significant level: 0.000). The results are reliable (Cronbach's alpha: 0.969).

The aim of this question was to gain an understanding of respondents' awareness of the importance of measuring IC. The main perception related to measurement is that it enhances both organizational culture and the employees' sense of belonging. IC measurement is also considered essential to improve flexibility, providing the organization with a more open attitude to change and innovation (see Table 7). This result is consistent with the main identified features of human capital, with the use of KPIs recognized as fundamental in defining the role and profile of employees within the organization. This result is also consistent with previous studies that have highlighted the importance of IC components and performance indicators for performance management practices (Peng *et al.*, 2007).

These results show that even though there is no formal framework to manage and monitor IC components, senior managers of the investigated LHUs *de facto* devote considerable attention to them. Therefore, results which emerge from the analysis assess how IC acts in practice, contributing to improve the whole performance, and especially highlights the relevance of specific factors, as the PCA has revealed. Accordingly – and bearing in mind how important it could be to gain awareness of the connectivity among the IC components – an additional analysis was carried out to measure connectivity (Habersam and Piber, 2003) by determining whether there are correlations between the extracted factors. Therefore, having assessed average values concerning items of the questionnaire related to the extracted factors, correlations among them have been calculated. Table 8 illustrates the correlation matrix.

PCs	Label	Interpretation
1st PC	Trust and respect	The relationship between the LHU and its users is largely based on trust and respect
2nd PC	Promoting relationships and cooperation	A strong propensity of LHUs to collaborate with other organizations (such as research institutions, pharmaceutical industries and IT service providers) emerges from the analysis
3rd PC	Identification and web communication	The respondents place emphasis on the identification of each LHU through its logo and communication with users via the website

Table 6. Relational capital: senior managers' perception

Table 7.
Measuring IC
(Question 5)

Measuring IC (Question 5)			
<i>Question 5: In my opinion, measuring IC</i>			PC 1
Supports strategic planning of the entity			0.859
Supports career advancements			0.827
Supports personnel training			0.897
Increases the sense of belonging of the employees			0.921
Sustains growth in organizational culture			0.940
Improves flexibility and attitude to changes in the organization			0.904
Attracts agreements and conventions with other private and public organizations			0.842
Integrates financial data			0.744
Compares development of the organization with that of other similar organizations			0.848
Demonstrates its own attitude towards innovation			0.922
Demonstrates that knowledge and human resources are the most relevant assets of the organization			0.915
Kaiser–Meyer–Olkin measure of sampling adequacy			0.932
Bartlett test of sphericity		Approx. Chi-square	df
		1200.126	55
Cronbach's alpha			Sig
			0.000
			0.969

Focussing on the strongest correlations (see Figure 2), the first human capital component (HC1: *Employee engagement in the organization*) is at the heart of intense relationships with factors related to structural capital, namely *managerial ability* (SC1), *IT system and outsourcing services* (SC3) and *communication skills* (SC4). Furthermore, HC1 is connected with two relational capital components, namely *trust and respect* (RC1) and *promoting*

	HC PC1	HC PC2	HC PC3	SC PC1	SC PC2	SC PC3	SC PC4	RC PC1	RC PC2	RC PC3
HC PC1	1	0.618**	0.531**	0.734**	0.564**	0.756**	0.611**	0.777**	0.661**	0.496**
HC PC2	0.584**	1	0.442**	0.607**	0.450**	0.634**	0.608**	0.599**	0.533**	0.344**
HC PC3	0.523**	0.489**	1	0.368**	0.571**	0.483**	0.427**	0.547**	0.345**	0.398**
SC PC1	0.697**	0.569**	0.460**	1	0.482**	0.624**	0.582**	0.774**	0.648**	0.325**
SC PC2	0.562**	0.415**	0.489**	0.533**	1	0.663**	0.517**	0.591**	0.558**	0.465**
SC PC3	0.742**	0.600**	0.487**	0.642**	0.675**	1	0.671**	0.679**	0.755**	0.662**
SC PC4	0.599**	0.595**	0.487**	0.585**	0.542**	0.688**	1	0.664**	0.672**	0.495**
RC PC1	0.793**	0.590**	0.589**	0.753**	0.613**	0.707**	0.678**	1	0.653**	0.497**
RC PC2	0.632**	0.505**	0.373**	0.650**	0.568**	0.725**	0.691**	0.643**	1	0.485**
RC PC3	0.518**	0.328**	0.313**	0.384**	0.475**	0.645**	0.499**	0.539**	0.485**	1

Note(s): HC = Human capital; SC = Structural capital; RC = Relational Capital; PC = Principal Component. The correlations above (below) diagonal are Pearson (Spearman) two-tailed correlations. Correlation is significant at **0.01 level (two-tailed)

Table 8.
Correlation matrix

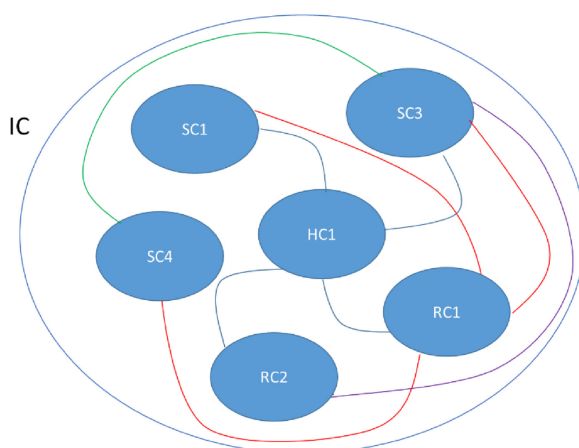


Figure 2.
Interconnectivity
between IC
components

relationships and cooperation (RC2). These results are consistent with the managerial complexity of professional entities such as HCOs (Mintzberg, 2017). Therefore, performance relies on the ability to combine professional skills and relational abilities (Veltri *et al.*, 2011).

These results are consistent with the knowledge-intensive nature of HCO, in which it is important on the one hand to engage doctors in management (Hartley and Kautsch, 2014; Veronesi *et al.*, 2013) and, on the other hand, to develop shared procedures and practices of job evaluation (Bevan and Hood, 2006).

Towards a new definition of IC in HCOs: reflections and future research path

IC components play a crucial role in HCOs and therefore can affect HCO performance (Habersam and Piper, 2003; Vagnoni, 2018). Consequently, a coherent set of tools and techniques is needed to manage IC effectively (Van Beveren, 2003). Furthermore, a thorough understanding of why and how these organizations should develop human, structural and relational capital is important for guaranteeing high-quality services (Zigan *et al.*, 2007). Focussing on the Italian context, this research investigated LHUs, which have not been studied in connection with IC in the healthcare sector, focussing on the perceptions of key actors (namely chief officers and managers) regarding IC components, their connectivity and the correct ways to manage them.

Regarding the first research question, the respondents recognized the relevance of human resources and the importance of attributing incentives. The results suggest that managers can motivate employees with regard to improving procedures and routines, while at the same time, they can involve employees in the organization's activities and the job evaluation process. Furthermore, managers should be aware that the recognition of incentives plays a relevant role. This result is consistent with that of previous studies (Elg *et al.*, 2013; Peng *et al.*, 2007; Veronesi *et al.*, 2013), which highlight the central role of employee involvement in job evaluation processes and in measurement in the healthcare context. Employee knowledge is also considered relevant; this result is consistent with the findings of previous studies focussed on HCOs (Bevan and Hood, 2006; Numerato, *et al.*, 2012) as well as local governments (Manes-Rossi *et al.*, 2016). More generally, the findings can be interpreted in accordance with Guthrie (2001), who argued that human resources should be considered an investment, not only a cost, with human capital being a relevant "asset" for LHUs. However, it should be observed that respondents ascribed only a minor role to continuous training.

In relation to the second research question, a comprehensive definition of IC components in the healthcare context emerges. First, *human capital* can be defined as a combination of the following features: managers' attitude towards encouraging employees to improve procedures, routines and knowledge; attitude towards pursuing performance objectives in a work environment that encourages and recognizes the efforts undertaken; and employee skills and competencies deployed in the achievement of the LHU's objectives. Viewed from a practical perspective, this would mean that knowledge-intensive organizations such as HCOs should increase employee involvement in job evaluation processes and give more recognition to the active role played by employees. In doing so, it is recommended that HCOs adopt a clear set of KPIs to assess and recognize employee efforts.

As in the case of human capital, analysis of the results concerning *structural capital* should also assume the knowledge-intensive nature of LHUs as a starting point. Accordingly, the crucial points seem to be not only work procedures and organizational routines, but also IT systems and outsourcing services, which could have a penetrating effect on an LHU's global performance. These findings are in line with previous research concerning other types of HCOs (such as hospitals or agencies). However, it is worth observing that the results further emphasize the role of managerial abilities and communication skills. Although these issues have been considered important in improving healthcare performance from a managerial perspective (Davies *et al.*, 2000; Nordstrand Berg and Byrkjeflot, 2014; Palumbo, 2016), they seem to be under-investigated from an IC perspective. The study's findings also emphasize the environmental responsibilities of LHUs. Furthermore, the respondents seem to be aware of the importance of having a clear vision of the future and introducing innovations to improve the quality of services provided to patients and other stakeholders. Finally, measuring the outcome and optimizing resources are considered to be relevant issues.

Therefore, we would argue that defining structural capital in the healthcare context should also take into account these features. An innovative definition of *structural capital* should thus comprise the complex web of procedures and organizational routines, IT systems and outsourcing services as well as the ability to stimulate innovations and encourage responsibilities, including environmental ones, contributing to the value creation process and improving the efficiency and effectiveness of services.

This result emphasizes that it is time to take into consideration the relevance and effectiveness of public-service delivery systems, as well as well-structured and well-organized interorganizational relationships. Viewed from a practical perspective, the consequence would entail the promotion of managerial abilities and the strengthening of IT infrastructures to inform decision-making and support strategies.

The main finding concerning *relational capital* is a largely positive perception among senior managers of LHUs' relationships with both users and external organizations. Relational capital is primarily based on trust and respect, which are the main ingredients of cooperative relationships with citizens, research institutions, pharmaceutical companies and IT service providers. While this result is consistent with previous research (Yang and Lin, 2009; Pirozzi and Ferulano, 2016), this study additionally emphasizes the importance of web communication and knowledge sharing, to support patients in the information-sharing process as well as workers in knowledge and skills improvement (Liu and Lin, 2007).

Therefore, an innovative definition of *relational capital* should consider the combination of relationships and acts aiming to enhance trust, respect and collaboration between the HCO, its partners and the general public and also to take advantage of knowledge sharing and the opportunities offered from web communication.

Interpreting the meaning of the components extracted through PCA in light of previous IC studies in healthcare settings, there seems to be a convergence towards some central points: the attention paid to global performance, expressed through the adoption of KPIs and the involvement of employees in evaluation processes; the focus on achieving the best results for

citizens; the awareness of the organization's responsibilities; and the desire to instil confidence and trust in citizens. Human resources play a central role, acting as a *fil rouge* which links all these factors, serving as the pivotal element around which all IC components are connected. Viewed from a practical perspective, this would suggest that the three IC components should be considered and managed jointly, linking them through connectivity (Habersam and Piber, 2003) to combine professional skills and relational abilities.

Our pilot study has some limitations due to its exploratory nature. First, it offers insight into IC in the context of a single country. Second, it analyses perceptions of IC among senior managers, but it does not capture *if* and *how* patients perceive IC. Third, the research does not explore how to disclose IC management and related outcomes. This research could be further developed through a comparative analysis with different countries to provide a deeper understanding of the levers to be used to increase IC in HCOs. Other possibilities for future analysis include a focus on the management and measurement of IC in HCOs and related communication practices.

This study contributes to the literature in several ways. First, building on the general meaning of IC components, and following the advice from Evans *et al.* (2015) that context is key to understanding IC components, it enriches the literature on IC in HCOs by providing a comprehensive definition of IC in the healthcare context. Second, this study sheds light on how key actors perceive IC components, identifying levers that could be used to enhance overall HCO performance. Third, the study's results emphasize the relevance of connectivity among IC components and provide support for combining managerialism and professionalism by involving clinicians in HCO management for the benefit of the whole organization.

This study also offers several policy implications, paving the way for further research into how IC management may be incorporated in day-to-day organizational procedures. First, the findings highlight that managers perceive human capital to be relevant and encourage the engagement of human resources in determining activities, objectives and correlated incentives (Spurgeon *et al.*, 2011). Second, the essential role of several features of structural and relational capital emerges, highlighting how potentially important it is for knowledge-intensive organizations such as HCOs to introduce innovations to improve managerial abilities and IT services. Third, the results may inspire policymakers to define policies supporting human resource development within HCOs and pursue stronger relations, both within the organization and with competitors and partners, to improve efficiency and effectiveness in managing the available resources.

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