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**Sustainable development operationalization in healthcare  
organizations and the role of intellectual capital**

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*Never give up.*



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## Abstract

The thesis investigates the operationalization of the sustainable development principle (SD) in health care organizations (HCOs). Based on the examination of the literature, the thesis uses a multi-method approach to investigate: a) the emerging interpretation about SD in the health context, b) intellectual capital (IC) factors that may affect the implementation of SD projects, c) the organizational approach used for sustainability decision making, and d) the main sustainability practices in the health care context. To answer these research questions, a *survey* was initially carried out through the realization of, which was addressed to General Directors (GDs) of Italian health care organizations, as responsible for HCOs' strategic planning. Subsequently, the case study of an Italian Regional Health Service has provided the opportunity to analyze the implementation of a SD program within HCOs, introduced by a new *policy* agenda. The analyzes revealed that sustainability decision-making within these organizations is mainly a matter of existing organizational structures, combined in informal and occasional ways, or of collective bodies, in order to take advantage from different skills. A minority has however indicated the use of office/organizational positions: this approach does not allow cross-fertilization between different disciplines and could prevent the development of a SD culture. The construction of an IC model based on the reference literature, has allowed to test the contribution that these *assets* have given to the realization of SD projects within HCOs. Among them, according to GDs, the "research for efficiency" was the factor that played the most important role in this respect, while "skills and training" were perceived as less important probably due to the inability of the current academic system to set programs for health professions based on interdisciplinarity, as required by the nature of SD. In addition, the GDs who attributed high importance to information technology and advanced technologies for the realization of sustainable projects within the organization, were also those that have adopted SD strategies. The results of the case study have shown that the SD culture, especially for what concerns environmental sustainability, has not been able to develop at the operational level, the one of health professionals, as they were not involved in the process of strategic priorities' definition; moreover, implemented projects were fragmentary. The relational capital was instead important as it allowed the implementation of environmental and clinical projects. SD performance measurement systems as part of structural capital were rather homogeneous and not consolidated, as well as the use of incentives. This suggests that the predominant focus on efficiency adopted by the national health policy may hinder their development. The study extends the knowledge about the role of IC for SD within public organizations. Study limitations concerned the low number of respondents to the survey and interviews conducted for the case study. Further research will test the developed model of sustainable IC for HCOs in

other contexts in order to support strategic planning process, by checking the total and partial contribution of the identified *assets* to SD. In addition, it is necessary to deepen the role of the connections between different *assets*, to identify those combinations that help or hinder the implementation of SD within organizations. With reference to policy implications, the construction of a continuous dialogue between the institutions, HCOs' management and health professionals is recommended in order to promote a shared SD culture.

## Estratto

La tesi investiga l'operationalizzazione del principio di sviluppo sostenibile (SS) nelle aziende sanitarie. Partendo dall'esame della letteratura, la tesi utilizza un approccio multi-metodo per indagare: a) l'interpretazione emergente circa lo SS nel contesto sanitario, b) i fattori di capitale intellettuale (CI) che possono influenzare l'attuazione di progetti di SS, c) l'approccio organizzativo utilizzato per la presa di decisione circa la sostenibilità, e d) le principali pratiche di sostenibilità adottate nel contesto sanitario. Per rispondere a queste domande di ricerca, è stata realizzata inizialmente una *survey*, per il tramite di questionario, la quale è stata rivolta ai Direttori Generali (DG) delle aziende sanitarie italiane, in quanto responsabili della pianificazione strategica aziendale. Successivamente, il caso di studio relativo ad un Servizio Sanitario regionale italiano ha fornito la possibilità di analizzare l'attuazione di un programma di SS nato dalla *policy* regionale all'interno di queste aziende. Le analisi hanno rivelato che le decisioni in materia di SS all'interno delle aziende sanitarie vengono principalmente prese da strutture organizzative esistenti, combinate in modi informali e occasionali, o da organismi collegiali, al fine di sfruttare diverse competenze. Una minoranza ha indicato invece l'uso di uffici/posizioni aziendali, fattore che non permette la fertilizzazione incrociata tra diverse discipline e potrebbe impedire lo sviluppo di una cultura per lo SS. La costruzione di un modello di CI basato sulla letteratura di riferimento, ha permesso di testare il contributo che questi *assets* hanno dato alla realizzazione dei progetti di SS. Tra essi, la "ricerca dell'efficienza" è stato il fattore che secondo i DG ha svolto il ruolo più rilevante in questo senso, mentre "competenze e formazione" sono stati percepiti come meno importanti probabilmente a causa dell'incapacità attuale di impostare programmi accademici per le professioni sanitarie basati su quell'interdisciplinarietà che lo SS richiede. Inoltre, i DG che hanno attribuito alta rilevanza alle tecnologie dell'informazione e avanzate per la realizzazione di progetti di sostenibilità all'interno della propria azienda, sono anche coloro che hanno adottato strategie di SS. I risultati del caso studio hanno mostrato come la cultura dello SS, specialmente per la sostenibilità ambientale, non è stata in grado di svilupparsi a livello operativo, relativo ai professionisti sanitari, in quanto non sono stati coinvolti nel processo di definizione delle priorità strategiche ed i progetti implementati sono risultati di natura frammentaria. Il capitale relazionale è risultato invece rilevante circa l'implementazione di progetti ambientali e clinici. La misurazione delle performance di SS quale componente del capitale strutturale, è risultata piuttosto omogenea e non consolidata, così come l'uso di incentivi. Ciò suggerisce che il focus predominante all'efficientamento adottato dalla politica sanitaria nazionale può impedirne lo sviluppo. Lo studio estende la conoscenza circa il ruolo del CI per la pianificazione di SS all'interno delle organizzazioni pubbliche. I limiti dello studio



riguardano il basso numero di rispondenti alla *survey* ed di interviste condotte per il caso studio. Ulteriori ricerche potranno testare il modello di CI sostenibile per le aziende sanitarie sviluppato in questo lavoro in altri contesti ai fini di supportare la pianificazione strategica, verificando il contributo parziale e totale degli *assets* individuati allo SS. Inoltre, è necessario approfondire il ruolo delle connessioni tra *assets* differenti, per individuare quelle combinazioni che contribuiscono od ostacolano l'attuazione dello SS all'interno delle organizzazioni. Tra le implicazioni di policy infine, la costruzione di un dialogo continuo tra istituzioni, direzione aziendale e professionisti sanitari è raccomandata al fine di promuovere una cultura condivisa per lo SS.

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# Chapter 1

## *The aims of the study*

### **1. Introduction to the thesis**

Healthcare systems are currently facing the potential problem of unsustainability (Albers Mohrman et al., 2012). The increasing trends of healthcare expenditures due to the aging of populations (and the consequential increase in chronic diseases), as well as the expensive costs of innovative treatments are pushing governments to act for efficient healthcare organizations (HCOs). In addition to budget constraints that HCOs are facing, social and environmental impacts of their activities are increasingly under the public scrutiny as sustainability principle is rooted among citizens. Healthcare organizations are relevant consumers of natural resources and hardly impact on environment in terms of CO<sub>2</sub> emissions, which is responsible for climate warming and consequent increase in illness rates. International institutions such as the World Health Organization (WHO) have called HCOs to act for sustainable healthcare provision, being the concepts of health and sustainable development strictly interconnected. As WHO underlines, health depends on social, economic and environmental factors: “*Whether people are healthy or not, is determined by their circumstances and environment*” (WHO Health Impact Assessment Program, accessed 2014), where circumstances and environment include both the conditions of the social and physical environments in which people live (Goldsteen et al, 2015). Thus, HCOs are called to act as socially responsible entities (Brandao et al., 2013) and to change their role within society to become *health promoting hospitals* (Pelikan et al., 2001). This requires HCOs to consider the impacts of the healthcare setting and workplace on hospital populations, to improve health care services, to act for prevention while empowering training and research on health promotion (Pelikan et al., 2001). Considering the relevance of sustainable development as an emergent discourse, as far as known by the author, in this dissertation, the topic of sustainable healthcare is analyzed for the first time from the organizational perspective: sustainability implementation and assessment in HCOs are investigated, as well as factors facilitating the strategic management of sustainable development in HCOs. The impact of the sustainable development principle in the

healthcare setting is discussed looking first at international literature on the healthcare context, and second, conducting an empirical investigation of the Italian healthcare setting, where sustainable provision of care is actually emerging as a relevant challenge. With reference to this setting, the study was routed to: a) determine the managerial approach followed by the HCOs' General Directors in dealing with sustainable development within the organization, b) undercover the main projects undertaken on sustainability, and, c) investigate the role of intellectual capital (IC) factors in facilitating the implementation of HCOs' sustainability practices. Moreover, considering the case study on a regional Italian healthcare setting, the qualitative analysis was conducted to complete the picture on the operationalization of the sustainable development principle in HCOs: perceptions from different organizational levels pertaining to HCOs, the regional authorities' perspective, the top management's one and the healthcare professionals' one, were investigated with reference to the implementation of a regional sustainable development program. To this trail, the study contributions are the multiples. First, it aims to broad the knowledge about the process of operationalization of sustainable development in HCOs, and about the definition and implementation of performance assessment tools to assess SD in healthcare. This could help healthcare professionals to approach the complexity about the use of such models and to foster the discourse on sustainability operationalization and measurement within the organization, despite the literature in the field is scarce and sustainability suffers from a subjective definition process. Second, the study offers the possibility to investigate to what extent the operationalization of SD within HCOs is taking place, and thus, which kind of organizational positions are involved in the sustainability decision-making process; this helped to define benefits and limits of these managerial approaches.. Third, it contributes to theory about the role of intellectual capital in promoting the shift towards sustainable development, focusing on the public organizations' context, and in particular, the healthcare one, which are currently under investigated. The examination of the literature provided the opportunity to design a Sustainable Intellectual Capital Model for Healthcare Organizations and to test the whole contribution of IC factors as well as single assets' role for the implementation of sustainability projects, where sustainability is intended in its three main dimensions, the social, environmental and financial ones (Jameton and McGuire, 2002). Moreover, the

IC factors' role for SD was also examined through an exploratory case-study to determine the present and potential contribution of these assets to the strategic management of SD. Within the case-study, connectivity among different IC assets were also taken into account, as the behavior of each asset can affect the achievement of strategic goals. Fourth, the thesis also contributes in providing some policy indications for the Italian healthcare context and in particular, to the regional one: to foster a sustainable development culture within HCOs is considered as essential to create a shared discourse on sustainability. This discourse should be able to permanently involve the different hierarchical levels of the organization, and in particular the healthcare professionals' one, which sometimes has been perceived as distant from sustainability problematizing.

The chapter is structured as follows. Section 2 presents the research questions this dissertation focuses on, while section 3 describes the methodology used to address them. In section 4 general findings of the study are discussed. Section five is about implications of the study, while section 6 discusses contributions, limitations of the study and further research.

## **2. The research questions**

Health is discussed not only as an outcome of SD, but also as a measure of efficiency of sustainable development policies (see for e.g., United Nations General Assembly A/RES/66/288 of 2012). However, when facing the health care systems' capability to provide "sustainable healthcare", and thus combine the two terms, we have to deal with elusive and ambiguous meanings. Some of the definitions that have been proposed by scholars about sustainable healthcare focus on: a) SD's traditional features which find also application in the healthcare context, such as the focus on ecology, long-term survival and holistic approach (Anaker and Elf, 2014); b) the relationships between the health of nature and the health of human beings (Jameton and Pierce, 2001; Connor and Mortimer, 2010; Neira, 2014; Ebi, 2014; Spring, 2014); c) the relationship between social and economic conditions and access to healthcare services (NRC, 2010; Adler and Newman, 2002); d) the provision of green medicine (Alliance for Natural Health, 2006); e) financial sustainability (Thomson et al., 2009); and f) the integration of environmental concerns into healthcare organizations' management practices (Gerwig,



2014; Singleton and Wadhwa, 2013). The risk of having a plethora of SD's definition can result in a difficulty for organizations at various levels to set strategic priorities; while scholars such as Broman et al. (2017) argue that science can contribute in creating a shared vision of the change needed for sustainability, others such as Kemp and Martens (2007) refuse to objectively define SD and argue that the transition to sustainability should benefit of a participative approach able to include local dimensions, science as a support to policy making, learning by doing and co-production of knowledge by all the different actors of the system. Focusing on the organizational perspective, and thus, considering SD from a managerial point of view, the Triple Bottom Line (TBL), developed by Elkington (1999), has emerged recently as one of the leading framework to deploy sustainability in healthcare organizations. The TBL approach requires to consider economic, social and environmental impacts of activities when operationalizing sustainability programs and practices inside HCOs (Jameton and McGuire, 2002); costs and quality provision of healthcare services are then balanced with the environmental impact of health facilities' activities. Hospitals, despite their nature of non-profit organizations, can be under pressure for margins, but they have the mission to provide *quality and affordable care* (Gerwig, 2014); the accomplishment of this mission requires to act for environmental sustainability (Gerwig, 2014; Institute of Medicine Roundtable on Environmental Health Sciences, Research, and Medicine, 2007), in addition to the pursuit of traditional cost and quality goals. Nevertheless, the extent to which the TBL has found practical application in the healthcare context is unknown; for this reason, based on the studies reported in the literature, the first research question that leads this dissertation is the following:

*RQ1*: How sustainable development has been interpreted and managed within HCOs adopting the TBL approach?

As informative systems, performance measurement systems can help organizations to track their progress towards sustainability and make sustainability a stable practice (Albers Mohrman et al, 2013). Despite sustainability performance measurement in public organizations has been said to have a high potential to drive public policies (Ball and Babbington, 2008), its development for the public sector has been scarce and routed to approach measurement frameworks coming from the private one. When referring to

hospitals, SD performance measurement practices are often based on environmental management systems (see for e.g. Douglas and Meltzer, 2004), cost-based assessment tools such as life cycle assessment (see for e.g. the study of Kaiser et al. 2001) or tools to balance efficiency and the reduction of the organization's environmental impact (as a way of example see for e.g. Giacchetta and Marchetti, 2013; Askarian et al., 2011). The most used metrics are the ones on resource consumption and waste management, and more in general, to catch regulations' compliance on these items (Boone, 2012), leaving the social dimension of sustainability only recently approached by the literature (Shroeder et al., 2013). Despite the increasing attention in innovative tools that can help organizations to measure sustainability in its various components (such as quality, patients' satisfaction, costs and efficiency) (Albers Morhman et al., 2012), little is known about sustainability accounting in HCOs. Recent emergent practices in hospitals and other healthcare organizations have seemed to be generally connected to the use of the Triple Bottom Line approach theorized by John Elkington (1999) to manage sustainability and assess social, economic and environmental benefits deriving from the adoption of sustainable strategies (Lettieri et al., 2012; Schroeder et al. 2013). Despite the framework received relevant critics by literature for the limits related to the balance among the three dimensions (Henriques and Richardson, 2004), benefits deriving from its adoption in the healthcare sector were proved (Shroeder et al., 2013). Thus, the thesis aims at answering the following research question:

*RQ2: Which are the main approaches to sustainability performance measurement, based on the Triple Bottom Line conceptualization of sustainable development?*

Several factors can affect the implementation of sustainability practices inside a healthcare organization; these factors generally pertain to intellectual capital (IC). Intellectual capital contributes to value creation, organizational performance and competitive advantage of private and public organizations (Lerro, et al. 2014; Vagnoni and Oppi, 2015). Especially in nonprofit organizations, such as HCOs, IC has been claimed to help these entities in a) achieving financial sustainability, and, b) complying with their social mission that includes the management of relations with their stakeholders (Pirozzi and Ferulano, 2016). New competition challenges of efficiency, accountability, transparency, high demand of quality services have heavily impacted on

HCOs (Habersam and Piber, 2003). In this emerging context, IC management can allow these organization to accomplish these goals (Sillanpää et al., 2010). Recent contributions in the IC literature have also pointed out the need to include social and environmental concerns in IC management to redefine the contribution each organization can provide to global society and ecosystem by ways of interactions (Allee, 2000).. In the healthcare sector, the role of intellectual capital for sustainability of HCOs is under investigated; nevertheless international institutions have urged these organizations to address the challenge of SD. The literature about the role of IC for sustainable development has been mainly investigated with reference to the private sector relating to: strategical role of IC for SD (Mertins and Orth, 2012; Robinson et al., 2006; López-Gamero et al., 2011); the effects of intellectual capital on sustainable performance (Chen, 2008; Yahya et al. 2015; Liu, 2010), IC and SD in reporting practices (Pedrini, 2007; Oliveira et al., 2010; Dumay, 2016), green innovation and relational capital (De Marchi and Grandinetti, 2013). Except for Mertins and Orth (2012), these studies look at the contribution of green IC to competitive advantage of organizations. With reference to the healthcare sector, only recently scholars have started to address the potential of intellectual capital for healthcare sustainable development. To this trail, Botturi et al. (2015) argues that sustainability of healthcare systems can be achieved if urgent actions are taken to strengthen the role of social capital for sustainability though social relations between citizens and health care professionals, technological and competences' empowerment of health care staff and patients in order to help them to better manage diseases. Borgonovi and Compagni (2013) urge about the need to involve citizens and patients in shaping the healthcare system's capability to satisfy their needs and solicit to strength the personalization of care paths, as a support for diversity and inclusivity principles. In addition to the above discussed topics, Pencheon (2013) urges to consider environmental resource limits and to enact valuable healthcare spending. For this purpose, scholars urged to account for both costs and value creation in the long term (Pencheon, 2011) and to introduce incentive systems that can support sustainable care paths (Pencheon, 2015). Naylor and Appleby (2013) proposes new models of sustainable care, based on prevention, evidence-based medicine, the integration of health and social services. This proposed change often challenge HCOs' leadership, and require to introduce SD goals in HCOs'

planning activities, structure, monitoring and accountability systems (Pencheon, 2015). Despite IC is emerging as a leading factor affecting healthcare sustainable development, in literature, we find fragmentary studies on different intellectual capital assets contributing to SD. As a matter of example, scholars have investigated the role of: corporate culture's empowerment (Ball et al., 2014; Pinzone et al., 2012) by interdisciplinary dialogue between healthcare managers and professionals (Topf, 2005), the development of competences through education (Rich et al., 2013; Ramirez et al., 2013; Rogers et al., 2009; Sarriot et al., 2004, Schroeder et al., 2012, Frumkin et al., 2008), clinical possibilities (Weisz et al., 2011), managerial philosophies such as leadership on SD (Ramirez et al., 2011; Kira and Lifvergren, 2014; Lifvergren et al., 2008), change management practices (Lettieri et al., 2012; Pencheon, 2013) research of efficiency (Weisz et al., 2011; Balcezak et al., 2014; Schroeder et al., 2012, Chiarini and Vagnoni, 2016), the use of technology (Eysenbach, 2001, Ball and Lillis, 2001), collaboration and partnerships with stakeholders such as patients, firms and local authorities (Frumkin et al., 2008; Worley, 2012; Albers Mohrman et al., 2013; Gerwig, 2014), and performance measurement and incentives systems (Albers Mohrman et al., 2013; Hrickiewicz, 2016). The literature on these human, structural and relational capitals of healthcare organizations that compose IC (see the MERITUM taxonomy, 2002) is often confined to single case-studies that deepen the role of single factors on SD implementation, and does not consider intellectual capital's effects on SD as a whole. Moreover, literature has urged researchers to deep the role of intellectual capital in public sector context, such as HCOs. Guthrie and Dumay (2015) urged to analyze IC practices as well as how IC works or does not work within organizations; Dumay et al. (2015) called to engage in public sector research on intellectual capital in order to contribute to knowledge on IC that can benefit citizens with practical implications; Allee (2002) urged organizations to focus on the broader role IC can play with reference to society and ecosystem (thus at a macro-level); others call to challenge IC frameworks and model in public sector organizations (Dumay et al., 2015), focusing on how different IC assets behave within the same organizational strategy (Mouritsen, 2006) and how these assets are characterized by connectivity within HCOs (Habersam and Piber, 2003).

Thus, the third research question the study tries to address is the following:

*RQ3:* To what extent intellectual capital factors are affecting the implementation of sustainability practices (and possibly, sustainability planning) within healthcare organizations?

Intellectual capital assets can contribute to SD; however, if they are not properly addressed from a managerial point of view, they cannot bring value to the organizations' sustainable development. Nevertheless, studies about the link of IC with strategy and organizational performance are highly recommended (Vagnoni and Oppi, 2015; Lev, 2014); for these reasons, IC management for sustainability of HCOs can be considered a quite interesting field of research being HCOs knowledge-intensive organizations. To this end, the fourth research questions aims at asking:

*RQ4:* What are the roles (if any) played by intellectual capital factors in the shift toward a sustainable healthcare systems, and how these assets are connected each other in this process?

### **3. Methodology**

To answer the above defined first and second research questions, a systematic literature review (Bryman, 2008) was conducted to identify case studies of HCOs adopting sustainability projects and performance measurement systems based on the TBL conceptualization. The search was conducted using SCOPUS database as it covers a wider variety of Journals compared to others such as PubMed and Web of Science (Falagas et al., 2008). The first chapter of the thesis presents the results of the literature review. The research has been subsequently routed to investigate strategic planning for sustainability within HCOs, looking at the role of intellectual capital in promoting the shift toward sustainable healthcare. Indeed, in the Italian healthcare context, intellectual capital has been depicted to potentially help HCOs to shift towards sustainability (Botturi et al., 2011; Botturi et al., 2015; Lavallo et al., 2015). To this end, the second chapter analyzes sustainability planning within a sample of Italian Healthcare Organizations, and if intellectual capital in its three major components, human, structural and relational capital, plays a role in promoting sustainable initiatives.

The three components of human, structural and relational capital derive from MERITUM taxonomy (2002) that found consistent application in studies of IC in

healthcare organizations (Habersam and Piber, 2003; Evans et al., 2015): human capital is defined “*as the knowledge that employees take with them when they leave the firm*”, including “*the knowledge, skills, experiences and abilities of people*”; structural capital represents “*knowledge that stays within the firm at the end of the working day*”, including “*the organizational routines, procedures, systems, cultures, databases*”, and relational capital defined by “*all resources linked to the external relationships of the firm, with customers, suppliers or R&D partners*” (MERITUM, 2002; pp.10-11). In the thesis IC’s contribution to sustainable healthcare was analyzed espousing the definition of sustainable healthcare that includes social, environmental and ecologic concerns to be addressed by HCOs (Jameton and McGuire, 2002). Thus, for the purpose of the study sustainable intellectual capital was defined as “*the sum of knowledge that contribute to implement sustainable development projects in healthcare organizations, where sustainable development is composed by social, economic, and environmental dimensions*”. A model of “Sustainable Intellectual Capital for Healthcare Organizations” was then constructed looking at literature on IC and sustainable development in HCOs, detecting the following items: competences, organizational culture, leadership support and presence of dedicated structures, collaboration among managers and employees, clinical possibilities, change management, ICT and advanced technologies, research of efficiency, dedicated time, collaboration with and support from external stakeholders. Subsequently, a questionnaire has been designed and sent to a sample of 204 Italian HCOs’ General Directors to detect if they were adopting formalized SD strategies; which kind of organizational positions were managing sustainability issues; which sustainability projects/actions were adopted; which part IC assets took for the successful realization of those initiatives. The sample was almost equivalent to the total population of hospitals with juridical autonomy (Legislative Decree d.lgs. number 502 of 1992). Therefore, a stochastic ordering test (Bonnini et al., 2014) was conducted to assess if HCOs adopting a sustainability strategy were also the ones attributing high relevance to IC assets (in the test, IC assets were considered as a whole looking at the developed model, as well as single assets contributing to sustainability projects).

In order to investigate if IC assets can act as a propeller for sustainability in a healthcare service context (RQ4), a case study (Eisenhardt, 1989) within a North Italian healthcare

setting (the Emilia Romagna regional healthcare service) is presented in the fourth chapter of the thesis. The setting has been chosen as it actually represents one of the first attempts to introduce SD policy-making in an Italian regional healthcare context. The nature of the case study was exploratory (Scapens, 2004), being the role of intellectual capital for HCOs' sustainability not approached before with reference to the chosen setting. In that Region, the authorities gave the birth to the Sustainable Development Program in 2007, calling healthcare organizations to address sustainability within their practices. Studying the emerging context in which HCOs actually operate, allowed to detect some intellectual capital assets that can act as enabler for sustainable healthcare: leadership and competences, organizational culture on SD, performance measurement and incentive systems, social capital and technologies (Chiarini and Vagnoni, 2016; Pencheon, 2015; Botturi et al., 2015; Lavallo et al., 2015; Borgonovi and Compagni, 2013; Pencheon, 2013; Naylor and Appleby, 2013). Then, interviews and focus groups have been conducted with a division of the Regional Directorate of Public and Social Health that set the goals of the regional Sustainable Development Program; the regional HCO's General Directors who have the responsibility to set strategies for the achievement of the SD program; a sample of healthcare professionals that are supposed to operationalize SD within their routines. Their perceptions were indeed examined in order to investigate the emerging definition of SD within the healthcare setting, and the role of IC in the achievement of the healthcare system's SD goals. Findings have been subsequently validated through the analysis of HCOs' archival records, websites and direct observation.

#### **4. Findings**

The present dissertation was routed to investigate sustainability planning and implementation in healthcare organizations (HCOs) and the role of intellectual capital in promoting their shift towards sustainable development (SD).

The conducted systematic literature review on sustainability implementation and assessment in healthcare organizations showed the high heterogeneity of realized sustainability projects and practices, including care paths and programs, healthcare facilities' construction and management. Being SD multidisciplinary in nature and crossing different disciplines, such as social, medical and ecological sciences, heterogeneity in the Journals' approach discussing the cases-study was found. The

approach followed to study SD in healthcare was based on a specific perspective (such as Journals focusing on management sciences, or medical ones) or on an interdisciplinary one (interdisciplinary Journals that aim to connect different disciplines).

Despite sustainable development was interpreted through different models based on the Triple Bottom Line conceptualization for healthcare (Jameton and McGuire, 2002), HCOs' capacity to integrate social and environmental concerns with the goals of resource rationalization and quality of care improved decision-making. Intellectual capital (IC) assets were also found to play a relevant role in the implementation of sustainability projects; factors such as human competences, clinical and technological possibilities, dedicated time, financial resources' availability together with political and environmental context could indeed determine the success or failure of such initiatives. Discussing performance measurement practices, sustainability assessment in healthcare is in its early stage, being the variety of tools and measures used by HCOs to evaluate social, economic and environmental performance.

With reference to the survey, the response rate was of response rate of 15% (31 respondents on 204). With reference to SD strategy formulation in the Italian Public HCOs' context, the results showed that the majority of General Directors were adopting (14 respondents) or waiting for approval/adoption (7 respondents) of a sustainability strategy. Furthermore, informal and occasional structures, or collegial bodies, were the main organizational entities dealing with sustainability decision-making within HCOs (12 respondents). Thus, these HCOs deal with SD decision-making through existing structures, combined in informal or occasional ways, exploiting competences that can relate with environmental, social and financial aspects, instead of creating new and permanent sustainability bodies. Only five GDs indicated the use of dedicated offices or positions operating within the hospital for sustainability decision-making. In this latter case, appointing single individuals within the organization to deal with SD might limit the creation of an organizational culture fully committed to SD (Ling et al., 2012); moreover, coherently with Evans et al. (2015), connections among different disciplines and specializations are not exploited for knowledge transfers (Evans et al., 2015), that can be useful to sustainability decision-making. On the contrary, when the



interdisciplinary approach is used to create team and collegial bodies it allows to overcome the disciplines' divide, and consequently, IC reach its maximum expression. The above cited findings on structures used to deal with SD, are coherent with Ling et al. (2012) who stated that healthcare service leaders have different preferences for organizational approaches to deal with SD. Finally, for organizations whose GDs argued to rely on informal and occasional bodies for sustainability decision-making, it can be presumed that SD in these HCOs is managed through piecemeal projects rather than through continuity and long term commitment. In terms of SD deployment, rational use of natural resources, waste management, working place's health and safety, sustainable life-styles' promotion, and financial sustainability were the main projects/actions applied by the investigated HCOs. To investigate the role of intellectual capital for sustainable healthcare, as affirmed in the methodology section of the thesis, a "Sustainable Intellectual Capital for HCOs" including corporate culture, competences and clinical possibilities, managerial philosophies, collaboration with stakeholders, information communication technologies and advanced technologies, was constructed. Then, perceptions of General Directors on single assets' role for the implementation of sustainability projects, collected through the questionnaire, were analyzed, after the calculation of Cronbach' alpha, whose value was satisfactory (78.6%) for scale's reliability. In general, IC was perceived to have contributed to the implementation of sustainability projects, and more in depth, "research efficiency" as a managerial philosophy (composing the *structural capital* dimension) was said to play the most relevant role for the success of the implemented initiatives. This is coherent with Schroeder et al. (2012) arguing that the rationalization of resources through efficiency and a lean approach can help hospitals to be sustainable in the provision of quality services (Schroeder et al., 2012), given the financial pressure coming from healthcare institutions. Competences and training were perceived as the less important factor enabling SD projects in the analyzed sample. Despite the need for SD education in the healthcare context has been stressed by several authors (Rich et al., 2013; Ramirez et al., 2013; Rogers et al., 2009; Sarriot et al., 2004, Frumkin et al., 2008; Schroeder et al., 2012), the study showed that they were not considered so relevant by GDs. This could be due to the actual rigidity of the academic system that is incapable to respond to SD challenges (Miller et al., 2011). Therefore, when looking at sustainability planning, the

non-parametric stochastic ordering test for the limited sample showed that HCOs attributing higher values of relevance to Information and Communication Technologies (ICT) and other advanced technologies in implementation of sustainability projects were also implementing sustainability strategies. ICT could indeed act as a lever to sustainability in the healthcare sector (Ball and Lillis, 2001; Eysenbach, 2001) despite their potential has not been yet fully explored. Given the results of the survey, it seemed appropriate to closely analyze the contribution of IC assets to SD within a case study: the Emilia Romagna Region Healthcare Service. Starting from 2007, regional authorities formally committed to sustainability; that gave life to the “Sustainable Development Program for the Healthcare Service”. The case study that was conducted allowed to investigate how sustainable development was perceived and deployed within regional healthcare organizations, and how IC was perceived to have a role in the shift of HCOs towards sustainability. As mentioned in the methodology section, perceptions of the actors involved in the case-study were analyzed about the following variables: leadership and competences, organizational culture, performance measurement systems and incentives, collaboration with territorial stakeholders.

Results showed how SD culture was not expanded at the level of healthcare professionals, because they were not involved in a permanent dialogue that can help them implement environmental sustainability in their clinical routines. The lack of a shared vision on SD, being healthcare professionals not involved in strategic goals’ definition, affect also the contribution different IC assets can provide to SD. Indeed, healthcare professionals’ competences are not exploited, as the organizations lack mechanisms to let them emerge. The lack of relational capital among professionals at various level (clinicians, managers, technicians, etc.) does not allow the organizations to growth in terms of sustainability knowledge. Therefore, the lack of a cultural ground impedes also cross-fertilization among different assets of structural capital, as sustainability is not routinized in processes, structures and systems to support SD strategy.

Sustainability projects were not systematic which restricted the development of staff awareness of sustainability issues. Social capital enabled environmental projects as well as medical projects that increased patients’ capability to manage disease. Technology was depicted to have a huge potential for the shift toward sustainability, but currently

requires to consider material and immaterial costs for its implementation. With reference to technology investment, rational use of resources criterion is balanced with patients' utility combining economic and social aspects of sustainability from one side, and connectivity between structural and relational capital from the other. SD performance measurement was confined to internal reporting and indicators used were not routinized, while incentives showed mixed results with reference to their role for SD. This suggests that HCOs' relations with national and regional health authorities calling for efficient use of resources can impede the development of sustainability performance measurement systems as a part of structural capital. Indeed, cost accounting continues to dominate healthcare sustainability performance measurement, as cost control represents a pressing goal to achieve while guarantying quality of care. This confirms Peng et al. (2007)'s findings about the potential damage institutional goals can generate to the leverage of HCOs' structural capital in terms of SPMS. Indeed, scholars have underlined that balancing the knowledge on patients' needs with expertise on environmental matters is necessary to promote HCOs' sustainability (Ryan-Fogarty et al., 2016).

### **5. Implications: policy and practice**

The developed model of Sustainable IC for HCOs can help healthcare managers to focus on the assets that are needed to make their organizations more sustainable. Moreover, the model is not exhaustive and can be modified or extended to consider other IC assets that can be relevant for SD. In the case-study after nine years of programming on SD, a permanent culture of sustainability has not grown. Instead, scholars have urged for research benefiting society with practical implications (Dumay et al., 2015): the case study's findings signal that at the operative level, the healthcare professionals are not committed to environmental sustainability as not involved in the strategic priorities' definition on SD. Indeed, goals' communication process enacted by managers stops with the technicians (for e.g. energy managers), that can contribute to educate staff to best practices; however, because of sustainability projects are not systematic, they do not permit to create networking activities for the overall growth of sustainability organizational knowledge. This could represent a relevant issue for the regional healthcare service, since the professionals that were interviewed will cover

managerial roles in departmental structures of HCOs. For these reasons, institutions and hospitals' top managers should enact a shared decision-making process, through which the professionals are made aware of a) how sustainability affects the performance of the health system; b) how they can contribute to the sustainable provision of care services; c) how a sustainable provision of services requires sustainable management of IC. This will help them to put their competences to the service of the organization' SD.

In addition, health care organizations should start monitoring environmental and social effects of their activities to enact a valuable promotion of health, being more attentive to the public role they play within society. This work urges institutions and researchers to act for the development of assessment frameworks that can be shared between hospitals and their relevant stakeholders, as sustainable healthcare requires assessment to go beyond the financial focus and reach its social mission.

## **6. Contributions, limitations of the study and further research**

This dissertation represents the first attempt to explore how the principle of sustainable development has been operationalized by healthcare organizations. The approach followed was based on the analysis of the organizational perspective (the *meso* level), and in particular how HCOs implemented and assessed sustainability practices. At the current state of the art scarce literature is found with reference to the operationalization of the sustainability principle in the healthcare context; thus, the study firstly aims to fill this gap, presenting a review of cases from the international context which has dealt with the management and assessment of sustainability programs. This will help healthcare practitioners to deal with the complex world of performance measurement systems on sustainability. The study also contributes to theory development on the role of IC for HCOs' sustainable development. Indeed, HCOs represent a suitable setting of analysis as IC management can support these organizations in dealing with new performance challenges emerging from the institutional context. The study aimed to respond to the call about the functioning of IC practices within public sector organizations (Guthrie and Dumay, 2015), how different IC assets interacts and connect each other (Habersam and Piber, 2003) and behave within the organization's strategy (Mouritsen, 2006), how they are value enablers for society and ecosystem (Allee, 2000). Indeed, the study aimed to investigate IC for SD first in the Italian context, and second,

in a Regional healthcare service where a Sustainable Development Program was set. The study also represents, at the time of writing, one of the first attempts to investigate a) GDs' approaches to SD management in line with the call for studies looking at the link between IC and strategy (Vagnoni and Oppi, 2015; Lev, 2014), b) GDs and healthcare professionals' perceptions with reference to sustainability implementation in HCOs. Limitations of the study concerns the low number of respondents for the analysis of survey results that did not allow the use of parametric methods of analysis, and the limited number of interviews conducted to the healthcare professionals' level within the case study research. With reference to the use of the developed model of Sustainable IC for HCOs, further research could be oriented to test its functioning in different organizations, in order to identify IC assets that contribute less to SD, in order to leverage them. As cited before, the model is not exhaustive and can be extended to include different IC assets: as a matter of example, new lines of research could investigate personal experiences and attitudes of healthcare employees that can impact on the development of SD organization's knowledge (as a component of HCOs' human capital). With reference to the case study, it could be interesting to involve other hospitals' representative stakeholders to look at sustainability vision that HCOs nurtures within the local context and to identify which IC assets they consider relevant to enable sustainable healthcare. In addition, to extend the analysis to other Italian regional healthcare services could allow to compare different setting, being sustainable healthcare policies in their infancy in this healthcare context. Further research should also deepen the role of connectivity of different IC assets, identifying combinations of them contributing to / hindering sustainability implementation. Finally, the author hopes to encourage the debate on sustainability in public organizations, as it actually represents an under-investigated issue.

## Chapter 2

### *Sustainable Development Implementation and Performance Measurement in Healthcare Organizations*

**Chapter 1 represents a longer draft of the paper “Sustainable Development and Performance Measurement in Healthcare Organizations” published in *The International Journal of Sustainability Policy and Practice*, Volume 12, Issue 4, December 2016, pp.1-17. Please refer to this latter for citation.**

#### **1. Introduction to the chapter**

In healthcare organizations (HCOs), the concept of sustainable development (SD) has been mainly discussed looking at the Triple Bottom Line framework of Elkington (1999): hospitals that aim at being sustainable have to consider social, economic and environmental concerns emerging from their core activities. This includes to consider the costs to provide health care, the environmental impacts of health facilities and services, the capability to provide quality of care (Jameton and McGuire, 2002). The present chapter aims at analyzing, through a systematic literature review, how healthcare organizations are adopting sustainability strategies and projects, which are the determinants of a successful implementation of SD, and how healthcare organizations are measuring sustainability performance connected to these activities. Thus, the systematic literature review has been conducted looking at international publications discussing cases of SD implementation based on the Triple Bottom Line approach. Results and implications for healthcare practitioners are discussed along the chapter.

#### **2. Problem statement**

In the last decade, the topic of healthcare sustainable development emerged in the international arena. The World Health Organization (WHO, 2009), in the document "*Healthy hospitals, healthy planet, healthy people: Addressing climate change in health*

*care settings*", urged healthcare organizations to intervene in order to address their climate footprint. Initiatives such as Healthcare Without Harm and Healthier Hospitals Initiative were born to give support to hospitals facing SD problematizing within their organizations; those initiatives mainly had a "green" orientation and supported cooperation projects to push HCOs to reduce waste, to promote a rational use of resources, to promote a fair trade consumption pattern, but also encouraged them to account for their SD performance. The concept of health has also evolved from anatomical view about the correct functioning of the human body (due to physiological and psychological integrity), to one in which these conditions enable human beings to perform interactions with others as "social organisms". (Prah Ruger, 2010). Indeed, as WHO underlines health depends on social, economic and environmental factors: "Whether people are healthy or not, is determined by their circumstances and environment" (WHO Health impact assessment Program, accessed 2014), where circumstances and environment include the social environment (income and education conditions, etc.), and the state of the physical one (the natural characteristics of an area and its built components) (Goldsteen et al., 2015). Health is seen not only as an outcome of SD, but also as a measure of efficiency of sustainable development policies (see for e.g., United Nations General Assembly A/RES/66/288 of 2012). However, when talking about the health care systems' capability to provide "sustainable healthcare", and thus combine health and sustainability, we have to deal with elusive and ambiguous meanings. As a consequence SD at the organizational level is deployed in a subjective way. Moreover, current sustainability performance measurement systems have limited impacts on HCOs capability to assess their own performance. As a matter of fact, the extent to which sustainability performance measurement systems have been implemented by these organizations is currently unknown. The present chapter represents an attempt to investigate these emerging practices with the intent to help practitioners in approaching the problem of sustainability assessment of healthcare activities, given the complexity of the topic. The chapter starts addressing the complexity of the topic of healthcare sustainability and proceeds with analyzing the determinants of sustainability implementation in HCOs. Moreover, a general outlook at current sustainability assessment tools used in the healthcare sector is presented. Then, by the conduction of a systematic literature review, the chapter aims at investigating: a)

how SD has been conceptualized and deployed at the organizational level; b) which are the determinants of a successful implementation of the found SD practices, and, c) how healthcare organizations are measuring sustainability goals' achievement.

### 3. The ambiguity of “*Sustainable Healthcare*”

The Brutland Report (1987: p.41) defined sustainable development as the “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*”. Despite this definition of sustainability has been the mainly accepted in the international context, scholars have depicted SD as having multiple meanings (Hopwood et al., 2005). Historical and cultural settings can indeed impact on the way SD is interpreted (Mebratu 1998). With reference to health and health policies in the institutional context, at the United Nations Conference on Sustainable Development (Rio+20, 2012), the General Assembly of the United Nations emphasized the link between SD and health; in a general overview, health should be seen as an outcome of SD policies, but also a measure of efficiency of SD policies (please see the UN General Assembly Resolution A/RES/66/288 of 2012). With the born of Agenda 21, SD was expressed as the integration of social and economic development and environmental security to improve living standards. Thus, as Anåker and Elf (2014) argued, Agenda 21, (which is a document of intent on the environment, economy and society, signed by over 170 countries during the United Nations Conference on Environment and Development (UNCED, 1992)), proposed the three pillars model of sustainability. The same orientation was not followed when analyzing European policies, where sustainability of healthcare was intended as an ambiguous concept involving financial and environmental aspects (Anåker and Elf, 2014). Thus, SD in healthcare seemed not to have a generally accepted definition (Fischer, 2015). Despite the criticalities of identifying a uniform concept of SD, those authors proposed a framework including the common features the examined several definitions showed; those characteristics were: the global and holistic approach needed to interpret SD; the focus on ecology and the environment, the “future” perspective, and the long-term continuity.

Focusing on the holistic approach, some authors' studies suggested to consider interdependencies among health, nature, climate change and social/economic conditions



of populations as major features characterizing SD in healthcare; then, mutual relations between nature and health as well as the ones among climate changes and healthcare activities (Connor and Mortimer, 2010) became quickly themes to be deepened, followed by the analysis of inter-sectorial links characterizing SD (Jameton and Pierce, 2001; Neira, 2013). On this trail, some authors defined climate change as a determinant of a non-healthy status (Younger et al., 2008; Ebi, 2013). For example, in Africa, increasing temperatures leading to stronger rains brought diarrheal diseases, and the subsequent malnourishment caused high rates of mortality (Ebi, 2013). Spring (2013) reported that the temperature split due to incremental CO<sub>2</sub> emissions provided higher rates of deaths in developing countries, resulting in social inequalities. Socioeconomic variables such as education, occupation, income levels and public policies could generate disparities in the access of care (Adler and Newman, 2002). Therefore, SD was discussed considering their linkages with the evolving concept of health, as not only dependent on the accessibility of care services, but also on social and economic conditions of people and their living territories (National Research Council, 2010).

To the point of view of “eco-friendly” healthcare, the focus on environment was the most predominant element in the literature concerning SD in healthcare, many authors dedicated whole books to the topic (see for e.g. Gerwig, 2014) focusing on strategies to “green” hospitals. In parallel, many definitions of sustainable healthcare focused on the predominance of the environmental dimension. By way of example, the Alliance for Natural Health (2006: p.9) stated “*sustainable healthcare is a complex system of interacting approach to the restoration, management and optimization of human health that have an ecological base...*” giving emphasis to the need of introducing more natural treatments as opposed to traditional orthodox medicine. However, connotations such as the one just provided lacks to capture the eminent questions on what has to be sustained, how long and in which modality, who has to sustain, and so on, understanding that social, political, and moral values could influence some of these answers (Hudson and Vissing, 2013).

However, in specific branches of medicine, such as in clinical practice, Mortimer (2010) argued that sustainability meant not only to enforce prevention and education of patients to be more proactive in determining their health status, but also to guarantee a lean specialized service delivery and promote the use of ‘eco-friendly’ treatments and

medical technologies in order to foster SD consciousness and move to a sustainable level of care.

Concerning the capability of the organization to persist and survive over time, Gruen (2008) listed the high number of definitions conferred by literature to healthcare organizations' survival: from the capacity of a health program to be effective in the long term, to the ability of an entity to allocate resources in order to satisfy health needs. With respect to the latter, the focus on resource spending was generally one of the main concerns relating to financial sustainability of healthcare systems (Stuart and Adams, 2007; Chernew et al., 2003), and was mainly oriented to capture variables causing the huge increase in health spending. To this end, some authors discussed about the confusion that has been produced in literature between the concept of sustainability as the ability to survive, and the concept of SD in the corporate context (Aras and Crowther, 2009), where those terms continued to be often used interchangeably.

Social, economic and cultural factors such as education and income as well as social relations can impact on people's health; thus, sustainable healthcare should be operationalized considering such aspects (Fisher, 2015). In this sense, sustainable healthcare has not only to be ascribed to patients, but also to employees, community and to the whole social context in which healthcare organizations operate, even if the plethora of definitions on sustainable healthcare often varies on who to consider as the recipient of SD benefits. By way of example and focusing on patients, some authors underlined the need of medical staff to acquire better cultural competences to deal with patients, as determinants such as gender, religion and personal experiences can condition patients' access to care (Green et al., 2002). Considering patients' perspective, other topics that have been traditionally linked to sustainable healthcare have been the increasing proactivity of patients to collaborate in defining their care path (Lifvergren et al., 2009), as well as the relationship among ethics, care and dignity of death (Shroeder et al., 2013). Sustainability is subjective in nature, and this can create some problems when trying to operationalizing the concept. If different actors at different levels (macro, meso and micro levels) implement their own vision of sustainability, there is a risk that the actions taken by each of them do not effectively contribute or even prove counterproductive for the sustainability of the entire eco-system. For these reasons, some scholars such as Broman et al. (2017) stressed the necessity to have a scientific

definition of sustainability, as science can explain the current state of the art of unsustainability, can forecast the evolution of the system, can help to find solutions to move towards SD; indeed, science can contribute in creating a shared vision of the change needed for sustainability, across different cultures and values (Broman et al, 2017). Others such as Kemp and Martens (2007) refuse to objectively define SD: on the opposite, they affirm that transition management towards sustainability should benefit from a participative approach: including local dimensions, science as a support to policy making, learning by doing and co-production of knowledge by all the different actors involved. If sustainability goals are defined by a multinational or central government, forgetting local communities, the risk is to do not have a social change towards sustainability (Kemps and Martens, 2007).

Despite the different positions of authors about sustainability definition, the Triple Bottom Line of John Elkington (1999) has recently emerged as a guidance framework to interpret and deploy SD in healthcare at the organizational level; the model is constituted by the integration of three spheres: then, economic, social and environmental perspectives of action should be considered by the organization that aims to shift towards sustainability. The TBL framework was born for the firms' sector, and emphasized the need to go beyond the traditional bottom line of profit to look at corporate social responsibilities required by stakeholders. In healthcare, the TBL has been deployed looking at the specificities of the sector, and in particular to three key goals: the quality of care for patients (and community); the organization's financial sustainability through cost control; and the reduction of the environmental impact of healthcare facilities (Jameton and McGuire, 2002; Pencheon, 2011; Savitz, 2014; Duane et al. 2014). To this trail, it is argued by scholars that society currently needs resilient healthcare systems through innovation and efficiency strategies, without forgetting social, economic and environmental determinants of health (Neira, 2013). Being the Triple Bottom Line a leading concept beyond SD in healthcare, the use of words such as "sustainability" or "sustainable" made by the author in this work is referred to social, economic and environmental dimensions of SD. Hospitals, despite their nature of non-profit organizations, can be under pressure for margins, but they are born to accomplish the mission to provide *quality and affordable care* (Gerwig, 2014); to this trail, what is required from them, is to commit to this mission, that in turn means

to act also for environmental sustainability (Gerwig, 2014; Institute of Medicine Roundtable on Environmental Health Sciences, Research, and Medicine, 2007), in addition to economic and social goals that hospitals traditionally fix. For these reasons, according to the literature attributing value to the TBL, the author decided to consider it as the representative model to deploy SD in the healthcare setting.

#### **4. The determinants of a successful implementation of SD in healthcare**

The actual unsustainability of healthcare systems is due to several factors. The ageing of the population, the rise of chronic diseases, and the increasing cost of innovative treatments, are the main factors affecting the increasing trend in healthcare expenditures (Albers Mohrman et al., 2012). Moreover, social inequalities continue to affect the capability of people to access care services. From the organizational perspective, workplace conditions in HCOs worsened due to the increase in the intensity of work: the changing patterns in the provision of services and on facilities' organization caused by budget constraints brought to a deterioration of healthcare workers' situation. In addition, healthcare systems continue to have a significant impact on the ecosystem (Albers Mohrman et al., 2012); as a matter of example, it was estimated that the English NHS in 2012 accounted for over a third of carbon emissions of the whole public sector (Sustainable Development Unit, 2014). Starting from the above considerations, many factors have been discussed to have the capability to help hospitals shift towards sustainability. Among these factors, change management practices could indeed support healthcare organizations in implementing sustainability (Lettieri et al., 2012). However, SD introduction requires a new mindset to think differently from the past; Ball and Grubnic (2007) argued in this sense that the introduction of sustainability practices means to revolutionize concepts of social and environmental responsibilities, which do not match with the traditional idea of profit. Therefore, governments' pressure for efficiency led to the implementation of single actions such as reduction in energy consumption, which might have very limited impacts on the overall sustainability of HCOs. Pinzone et al. (2012) argued that architectural and organizational factors could act as levers of sustainability inside hospitals. Spatial layout and ambient conditions, technical structure, and the use of signs to communicate environmental engagement as

well as the choice on materials could improve the hospital's environment with health and efficiency results for both patients and staff. From the organizational point of view, culture, structure, leadership, staff practices and work processes were considered by the authors as essential in sharing a common vision on SD and acting in that direction. Conversely, people's negative behavior such as the lack of adherence to the treatment protocols in clinical settings could lead to negative consequences on quality and efficiency of care. It has also been demonstrated how wrong practices, such as the delivery of inappropriate treatments, and lack of coordination between management and staff could be primary causes of inefficiency in hospitals (Berwick and Hackbarth, 2012). To this end, and with reference to the firms' context, Galpin and Whittington (2012: p.41) affirmed "*workforce engagement is a central element of transforming a firm's sustainability mission, strategy and values into measurable results*". Similarly, for public entities such as hospitals, Kira and Lifvergren (2014) stressed the need of continuous dialogue among leadership and employees in order to engage workers in improving delivery of care and to promote resource conservation practices; a participatory approach in the definition of SD organizational strategies could make the staff more conscious of the social purposes and consequences of their actions, and encourages them to take an active role for sustainability. In addition, the development of ad hoc social and environmental competences could help HCOs to better develop their sustainable status. In effects, social barriers such as the inconsistency of healthcare systems compared to socio-cultural characteristics of different population and the scarce capability of cross-cultural communication, could make the understanding of the needs of patients and their satisfaction extremely difficult.

From the environmental point of view to create these skills could be possible through the empowerment of curricula and background for employees; in particular, training initiatives that integrate medical aspects with sustainable development themes (Rich et al., 2013; Barna et al., 2012), learning projects (Ramirez et al., 2013), inter-hospitals projects and realization of cross-functional teams (Pinzone et al., 2012). Commitment and specialization could allow the organization to achieve sustainable goals. In addition, the integration of environmental issues in nursing and medical curricula could be positively implemented through the training of faculty champions and students (Rogers et al., 2009), and by the interactions between academia and HCOs in the definition of

training programs (Ramirez et al., 2013). Innovation could also act a relevant change agent in promoting sustainable healthcare (Fisher, 2015). The case of an Italian pilot clinic showed how an increase in technology-based innovation strategies (biomedical technology, Information and Communication Technologies and greening technology) using the TBL approach could ensure sustainable effectiveness and a better social, economic and environmental performance (Lettieri et al., 2012). The authors of the study concluded that: a) the biomedical technology (robotics, innovative prosthesis) helped standardization and a higher productivity diminishing length of stay, and it improved the quality of patients' lives by reducing disease and helping their social relationships; b) telemedicine contributed to reducing discomforts of patients coming from afar, avoiding costs of transportation; c) greening technologies such as photovoltaic equipment, toxin-free materials, electric hand drier for the toilet helped cut costs and decreased the environmental impact of the hospital. But innovation should not be view only through a technological lens. Other kind of innovations could be implemented at the managerial level: by a way of example innovativeness related to health care funding mechanism could encourage cost control (Fisher 2015).

If factors such involvement, progress in sustainability skills, leadership ability and innovation might affect the implementation of sustainable strategies, it is reasonable to believe that they could also influence the realization and adoption of SD evaluation systems. Therefore, sustainability assessment is certainly conditioned by personal sensitivity on what has to be considered sustainable. To this trail, Hudson and Vissing (2008) argued that the evaluation of outcomes made in the past by researchers could not be considered valid even if plausible, unless a sharply delimitation of the concept of SD in public health is provided.

## **5. Sustainable performance measurement in healthcare**

Public sector organizations (PSOs) such as hospitals are expected to be sustainable given the relevance they have inside the society in terms of monetary resources spending; for those reasons, as Ball et al. (2014: p.185) stated “sustainability accounting in PSOs must encompass information about sustainability policy, strategy, programs and outcomes as well as operational impacts”. As argued by Adams et al. (2014), the

need to be competitive on the global market and to engage with stakeholders led to an increasing attention in performance evaluation techniques by public managers; but when focusing on sustainability issues, public sector reporting on those aspects little developed. Thus, sustainability accounting and reporting on SD could be considered as an emergent field (Williams et al., 2011). Therefore, the ambiguity of sustainability (Farneti and Guthrie, 2009), as well as the limits of current practices to account for SD (Gray and Milne, 2002; Gray, 2010; Bebbington and Larrinaga, 2014) made reporting on those issues very problematic. Despite this, many authors emphasized the need of SD performance measurement techniques to help managers improve the process of decision-making (Burrit and Shaltegger, 2010; Waas et al., 2014). In the public sector, sustainability performance measurement was seen to have the potential to drive public policies (Ball and Bebbington, 2008); however, sustainability assessment in public organizations has been scarcely investigated and mainly referred to the use of models developed for the firms' sector (see as a way of example the study of Fraser, 2012). When referring to hospitals, literature on SD performance measurement was often confined to examples of environmental management systems (see for e.g. Douglas and Meltzer, 2004) as well as cost-based assessment tools such as life cycle assessment methodology (see for e.g. the study of Kaiser et al. 2001) or concerned single management projects to increase efficiency and reduce environmental impact such as waste, water and energy management (see for e.g. Giacchetta and Marchetti, 2013; Askarian et al., 2011). With reference to metrics, Boone (2012) argued that the more used indicators to assess hospital sustainable strategies were energy-based ones (thanks to the direct cost advantage their use could allow), waste-based ones and more in general, indicators captured by regulations' compliance. In addition, social outcomes were scarcely assessed given the social perspective only recently approached by literature (Shroeder et al., 2013). Despite new attempts made to support innovative tools in measuring SD goals achievement focusing on assessment of quality, patients' satisfaction, costs and efficiency (Albers Morhman et al., 2012), little is known about sustainability accounting in HCOs. Recent emergent practices in hospitals and other healthcare organizations have seemed to be connected to the use of the Triple Bottom Line approach theorized by John Elkington (1999) to manage and assess social, economic and environmental benefits deriving from the adoption of sustainable

strategies (Lettieri et al., 2012; Schroeder et al. 2013). Despite the framework received relevant critics by literature for the limits related to the balance among the three dimensions (Henriques and Richardson, 2004), benefits deriving from its adoption in the healthcare sector were proved (Shroeder et al., 2013 ). Therefore, to understand to what extent and by what mode the TBL logic has been implemented remains a question mark, as well as the investigation of, SD performance measurement practices in HCOs. Given the gap underlined, the scope of the chapter is to present a literature review on SD performance measurement models used by these organizations; that could subsequently help practitioners with empirical works on the topic.

## **6. Methodology**

Systematic literature review (Bryman, 2008) has been conducted to detect cases of HCOs implementing sustainable development practices based on the TBL conceptualization of healthcare, and thus, sustainability performance measurement systems which were adopted to assess those practices. Systematic literature review requires the definition of the topic and outcomes to be discussed, the need of consistent records of the reviewing process to add relevant information while recovering the issue, and a shift from general sources to specific ones to enforce references (Hart, 1998; Bryman, 2008). Following those prescriptions, the literature search was conducted using SCOPUS database, as it covers a wider variety of Journals compared to other databases such as PubMed and Web of Science (Falagas et al., 2008). The search of articles, abstracts and keywords was based on the following search string: TITLE-ABS-KEY("sustainab\* hospital") OR (SRCTITLE("sustainab\*") AND TITLE-ABS-KEY("HOSPITAL")) OR (TITLE-ABS-KEY("sustainab\* healthcare") OR TITLE-ABS-KEY("sustainab\* health care") OR (TITLE-ABS-KEY("sustainab\* assessment") AND TITLE-ABS-KEY("health care")) OR (TITLE-ABS-KEY("sustainab\*assessment") AND TITLE-ABS-KEY("healthcare") OR (TITLE-ABS-KEY("sustainab\*assessment") AND TITLE-ABS-KEY("hospital")) OR (TITLE-ABS-KEY("sustainab\*") W/15 TITLE-ABS-KEY("assessment") AND TITLE-ABS-KEY("healthcare")) OR (TITLE-ABS-KEY("sustainab\*") W/15 TITLE-ABS-KEY("assessment") AND TITLE-ABS-KEY("health care")) OR (TITLE-ABS-KEY("sustainab\*") W/15 TITLE-ABS-KEY("assessment") AND TITLE-ABS-



KEY("hospital")). Combinations of key words “sustainable\* assessment”, “hospital”, “healthcare”, “health care”, “sustainable\*”, “assessment” were used in order to select relevant literature in the field, looking at specific journals on performance measurement, accounting and sustainability, and also journal with an interdisciplinary focus including both performance measurement and SD topics. The search was carried out for the time-line 1990-to present, given the topic of SD addressed for the first time in 1989 with the Brutland Report. The results of the search were after filtered considering only papers. Concerning references’ selection, literature recommend the researcher to specify the criteria for inclusion and exclusion of sources (Gough et al., 2012; Boland et al., 2014). The criteria for inclusion/exclusion of bibliographic sources were defined as follows:

1. Only papers in peer-reviewed scientific journals in English has been considered, basing on previous literature approaches to systematic review (Macdonald et al., 2011; Ormshaw et al., 2013). As the theme of sustainable development cuts across multiple disciplines, journals that did not deal only with management and accounting were included in the review. Papers in non-English language were excluded;
2. Given the aim to discuss the use of the emergent Triple Bottom Line approach in healthcare, only papers adopting this perspective in the construction of performance measurement system were considered;
3. Papers were included if they presented case studies giving information about the operationalization and application of the measuring process for decision-making of the organization considered, and information on social, environmental and economics metric used.

Initially, 514 documents were identified with the following data search: of this, 4 were excluded because were doubled inserted, 2 documents were excluded for incompleteness of data and 18 papers were excluded for the non-adherence to language criteria. The abstracts, titles and keywords screening led to a rejection of 490 papers due to the non-adherence to the second criteria. 6 papers were finally screened by full text reading: 2 papers were rejected due to their non-adherence to the third criteria and the final sample of 4 papers was detected.

The final sample of papers was analyzed through a textual analysis. A part from an introductory description of the cases, a cross comparison was made to address

similarities and differences considering the following items: conceptualization of SD, features of the frameworks/sustainability assessment tools developed and discussed in the cases, the performance measurement process, metric used and strengths and weaknesses of the approach adopted in performance measurement.

## **7. Main results**

The four papers detected at the end of the selection process were all case studies about SD strategy's implementation and assessment related to healthcare. The table below presents the summary of information for each case study.

**Table 1. Identification of the selected studies**

Author and year	Article Title	Journal	Purpose of the study	Setting	Method	Main Conclusions
Sarriot et al. (2004)	“A methodological approach and framework for sustainability assessment in NGO-implemented primary health care programs”	<i>International Journal of Health Planning and Management</i> 19: 23-41	To show how a sustainability evaluation tool can help guide sustainable health projects. The case is based on NGO’s primary health care projects.	Urban Bangladesh: local system aggregation among Concern Worldwide Inc., Ward Health Committees, Municipal authorities.	Realization and implementation of the Child Survival Sustainability Assessment to evaluate the sustainability of Primary care programs in urban Bangladesh.	To stimulate discussion and realization of sustainability assessment tools for health care programs, as they could be managed in a sustainable logic. The use of the CSSA provides an example of that.
Buffoli et al. (2004)	“Making hospitals healthier: how to improve sustainability in healthcare facilities”	<i>Annals of Hygiene</i> 26(5): 418-425	To analyze two healthcare facilities in Lombardy through the adoption of Sustainability Assessment Tool.	Old healthcare facility with a capacity of 600 beds; new in-design hospital with 500 beds; Lombardy Region.	Through the creation of the Sustainability Assessment Tool, an existing hospital has been compared to an in-design one, to understand the level of sustainability they presented and guide investment decision-making..	The Sustainability Assessment Tool can be supportive in investment decision making on healthcare facilities
Weisz et al.(2011)	“Sustainable hospitals: a socio-ecological approach”	<i>GAIA- Ecological perspectives for science and society</i> 20(3):191-198	To demonstrate the value of sustainability criteria for decision-making, in order to avoid collateral effects of health care.	Intensive care wards for the treatment of patients with chronic lung disease dependent on artificial respiration (internal department of a pilot hospital in Vienna)	Realization and implementation of the Sustainability Triangle framework to the hospital setting in order to estimate the effects of a potential internal reorganization of the ward in terms of sustainability	The integration among the three perspectives of the Sustainability Triangle can help healthcare providers to deal with sustainability issues.

Balcezack et al. (2014)	“WorkSMART at Yale-New Haven Hospital: A Program To Eliminate Waste and Improve Efficiency”	<i>Sustainability: The Journal of Record</i> 7(5): 262-268	To show how a hospital program for efficiency and sustainability can help achieve the triple bottom-line.	The non-profit, private Yale-New Haven Hospital, with 12,000 employees, 1541 bed and two-campus academic medical center, New Haven, Connecticut.	Realization and implementation of the WorkSMART Program inside the hospital, targeting 6 areas to eliminate waste, improve efficiency and sustainability.	The WorkSMART Program helped the Yale New Haven hospital to achieve benefits in terms of social, environmental and costs related goals.
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As can be noticed, the detected papers were published in journal with different approaches: two journal were based on management topics (*The International Journal of Health Planning and Management* and *Sustainability: The Journal of Record*), one was a clinical journal (*Annals of Hygiene*) and one had an interdisciplinary focus (*GAIA-Ecological perspectives for science and society*). To comment the variety of Journals found to approach SD, is relevant to determine if the field of research can be *divided sectorally* as proposed by Tranfield et al. (2003). To answer this question one should consider that SD is multidisciplinary in nature and crosses different disciplines, such as social, medical and ecological sciences, as found in the discussed systematic review. Therefore, the approach that can be followed to study SD in healthcare can be based on a specific perspective (such as Journals that focus on management sciences, or medical ones) or on an interdisciplinary one (this is the case of interdisciplinary Journals that contain research included in different fields and try to evidence the connections among different disciplines). All the case studies were heterogeneous, being the SD measurement process referred to different aspects of healthcare: to this end, the Triple Bottom Line Framework operationalization was related to hospital's facilities (architectural or organizational aspects) and operations, as well as healthcare delivery programs. Two of the case-studies, Buffoli et al. (2004) and Sarriot et al. (2004), explicitly referred to the realization of a sustainability performance measurement tool, one referred to the implementation of a sustainability framework (Weisz et al. 2011), and one concerned the implementation of a sustainability program (Balcezack et al., 2014). The study of Sarriot et al. (2004) introduced the Child Survival Sustainability Assessment framework (CSSA) to assess a program in urban Bangladesh to improve child and mothers' healthcare and the delivery of health services by municipalities and NGOs of the local territory. The study of Buffoli et al. (2004) presented the Sustainability Assessment Tool as a system to analyze the sustainability of two healthcare facilities of the Lombardy Region; the comparison among a new in-design hospital and an old one allowed to guide investment decision-making on the technical characteristics of the buildings to improve sustainability. The work of Weisz et al. (2011) discussed the realization of the Sustainability Triangle as a framework to introduce sustainability in healthcare core activities, and presented its potential application in a respiratory care ward of a pilot hospital. The paper of Balcezack et al.

(2014) described the adoption of the WorkSMART Program to increase sustainability and efficiency of the Yale-New Haven Hospital while increasing employee satisfaction. Table 2 provides a general outlook of the case-studies with reference to subjective conceptualization of SD in healthcare, the characteristics of the frameworks and performance assessment tools, the evaluation process, the indicators used and strengths and limits of the approach used.

**Table 2. Main features of the selected studies**

Study	Type of organization	Conceptualization of SD	Name of the framework/assessment tool	Features	Kind of assessment	Metrics	Strengths	Weaknesses
Sarriot et al. (2004)	Concern Worldwide Inc. (CWI) in Bangladesh: an NGO using the sustainability assessment framework to track its progress in a program of primary care	Sustainability requires an overview of human, social and organizational process beyond the traditional healthcare perspective	Child Survival Sustainability Assessment	Three interrelated dimensions broken down into two components each: 1. Health and health services, divided in Health Outcomes and Health and Social Services; 2. Organizational dimension, divided in Organizational Capacity and Organizational Viability; 3. Community and Social Ecological Conditions divided in Community Competence/Capacity and Ecological, Human, Economic, Political and Policy Environment.	Scoring and global indices construction for each component based on evaluation of defined items	Health outcomes based on the standard CSTS (2000); qualitative assessment of items characterizing each component	<ul style="list-style-type: none"> <li>✓ Innovative because of the direct involvement of stakeholders in the assessment exercise;</li> <li>✓ Increase mutual accountability and progress on sustainability;</li> <li>✓ See healthcare delivery as multidimensional, not only related to biomedical aspects</li> </ul>	<ul style="list-style-type: none"> <li>✓ Lack of competences to assess social and ecological aspects of healthcare programs</li> <li>✓ Qualitative approach should provide verifiable information for outsiders</li> </ul>
Buffoli et al. (2004)	Two healthcare organizations belonging to Lombardy Region: one of old construction and one of recent construction that were evaluated by Sustainability Assessment Tool	Value and efficiency of healthcare and the link among health and the environment	Sustainability Assessment Tool	Pyramidal structure: three main macro-areas: Social, Economic and Environmental, each operationalized in different criteria. For each criteria indicators are defined	Scoring process on a weighted base considering differences between in-design and old hospitals; realization of a Global Sustainability Index for each and final comparison	Description not provided	<ul style="list-style-type: none"> <li>✓ It allows to fit possible strategies in the design phase of healthcare facilities</li> </ul>	<ul style="list-style-type: none"> <li>✓ More effective if applied to a larger range of buildings</li> </ul>
Weisz et	A respiratory	Sustainability has	Sustainability triangle	Health care and health	Indicators	Savings on	<ul style="list-style-type: none"> <li>✓ Benefits</li> </ul>	Not provided

al. (2011)	care unit of a pilot hospital located in Austria was chosen to estimate the benefit of a sustainable change management initiative	been conceptualized through social and ecological understanding as well as focusing on hospital's reality		promotion are core activities in the center of the triangle. In the corners, economic efficiency, social compatibility and ecological compatibility can influence and be influenced by the center.	evaluation (estimates)	costs and materials used. Qualitative description of health gain.		deriving including sustainability in quality criteria decision-making	
Balcezac k et al. (2014)	The Yale-New Haven Hospital in which a sustainability program (the WorkSMART Program) was set	Healthcare facilities can influence the satisfaction of present and future generations' needs.	WorkSMART Program	Six targeted area (operating room reprocessing, courier services printing and paper, waste, energy conservation, transportation demand management), identified by two complementary structures: the Employee Engagement Subcommittee and the Waste reduction, Efficiency and Sustainability Subcommittee.	Indicators evaluation	Carbon footprint, pounds of waste diverted, costs saving, number of employee using mass transit, etc.	✓	Encourage employees satisfaction, innovation and co-operation ✓ Support healthcare organizations in fulfill their social mission and achieve efficiency	✓ Time needed to implement organizational changes; ✓ Interdisciplinary and departments cooperation main criticalities



Looking at similarities, it was possible to notice that frameworks were born thanks to a process of sharing ideas and discussion on SD. For all the cases analyzed, the participatory approach followed by the organization under analysis, allowed to deploy sustainability into practical goals to be measured. As a consequence, what was intended for sustainable healthcare and thus, the fixation of sustainable goals, depended on the sensitivity of the actors involved in the process. Concerning the conceptualization of SD, remarkable was the effort to go beyond the traditional quality and efficiency goals' combination connected to healthcare delivery, and to consider social, organizational and environmental elements as affecting and being affected too by healthcare activities. In some cases, the strategical management of sustainability largely depended on the organizational, clinical, political, social and financial context in which the entity operated. In the study of Weisz et al. (2011), the available options for SD implementation were the ones connected to clinical possibilities, resource funding, and capacity to generate revenues. Sarriot et al. (2004) cited factors such as political support, financial viability, collaboration with local stakeholders and development of specialized competences for the success of primary healthcare delivery in the examined urban context. Even in the study of Buffoli et al. (2004), possible measures to implement SD investments in healthcare facilities were conditioned by past choices made on facilities. Then, the fixation of SD goals could not happen without taking into account potential limits related to the characteristics of the operating environment. Moreover, SD concerns should be strictly evaluated when constructing new healthcare buildings (Buffoli et al., 2004).

Discussing the performance measurement process, two of the cases were based on a scoring approach (Sarriot et al., 2004 and Buffoli et al., 2004), and on the construction of global indices to synthesize the performance of the whole entity that was assessed. Metrics used in the study of Sarriot et al. (2004) were mainly qualitative (except for health outcomes), while the study of Buffoli et al. (2004) did not provide any description on the kind of data monitored, except the fact that they have been derived from users' survey, staff interviews and documents' observation. Both of the studies were based on a participatory scoring exercise. While for other two, a single indicator evaluation approach was followed. Then, metrics were mainly monetary and quantitative (such as savings, resource and materials consumption, environmental impact), and generally, qualitative description of social results was also presented (such as employee satisfaction in the work of Balcezack et al., 2014). The operationalization of the measured social dimension varied among studies: for three of the studies patients were definitely recognized as recipients of the sustainable strategy; while the study of Balcezack et al. (2014) was mainly related to

employees, being the program discussed addressed to increase employees involvement and reward on their capacity to promote efficient behavior. Employees were considered relevant in the assessment of sustainability global index in Buffoli et al.'s work (2004). At least, one of the studies referred to community as a recipient of social progress. Thus, social dimension seemed to do not have a common connotation, being its development at an early stage as confirmed by literature (Shroeder et al. 2013). In one of the case analyzed, the use of metrics to evaluate social dimension was less tangible: Weisz et al. (2011) did not quantify the reduction of the risk of infections for patients as well as the empowerment due to their lower stay in the emergency room. In the study of Sarriot et al. (2004), clinical outcomes referred to safe motherhood, immunization and sanitization were assessed through the use of clinical standards, conversely, information of social and ecological progress were not provided given the lack of competences developed by the evaluators.

As can be noticed, the problems that were identified when implementing sustainability models found confirmations in literature: the need of time, of adequate competences in the deployment of social and environmental concerns (as SD is interdisciplinary in nature), and of cooperation among the different actors involved in the process, represented the most meaningful challenges connected to operationalization and measurement of sustainability. Benefits deriving from the adoption of sustainability performance measurement tools and sustainability programs were related to improve decision-making for all the case-studies that were analyzed. Issues on measurement techniques were mainly raised by the study of Sarriot et al. (2004), which underlined the importance to realize multidimensional tools to catch SD performance, and therefore, emphasized the value of the participatory approach of stakeholders in the negotiation of goals; however, the use of a qualitative scoring exercise could hinder the provision of reliable information to potential outsiders.

## **8. Conclusions**

Despite sustainability performance measurement in healthcare has not developed yet, the study can be considered as a valuable attempt to broad the knowledge about the process of definition and implementation of SD performance assessment tools in healthcare. The high degree of heterogeneity of the presented cases-studies did not allow to synthesize results for generalizability, but gave some useful insight to interpret how the TBL has been approached and conceptualized when HCOs implemented and assessed sustainability. Despite the variety of frameworks that were found, the possibility to include social and

environmental concerns and integrate them with traditional resources constraints and quality goals of healthcare delivery improved the process of decision-making and helped the analyzed organizations to shift towards sustainable development practices. Major obstacles deriving from the adoption of sustainable strategies and evaluating processes that were detected in the case-studies were coherent with the relevant literature in the field and mainly related to the lack of SD competences and time to dedicate to sustainability. Finally, the definition of SD goals varies within the cases as it was influenced by the features of the operating context, such as financial viability, political factors, human competences development and available clinical and technological possibilities. This chapter outlined the current state of the art on sustainability implementation and assessment in healthcare focusing on the following aspects: the process of construction and use of such evaluation tools, the factors affecting their implementation, as well as benefits and limits of their adoption within the analyzed organizations. The study will help healthcare practitioners in approaching the complexity of sustainability and its assessment in healthcare when deciding to implement such performance measurement systems in their organizations. However, the scarcity of literature in the field, as the study signals, suggests a deeper empirical investigation to detect: a) if and how HCOs are addressing the challenge of SD implementation and performance measurement; and b) which factors can practically act as lever to sustainability implementation within these organizations.

## Chapter 3

### *Intellectual capital: a lever to achieve sustainability? Evidence from Italian healthcare organizations*

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#### **1. Introduction to the chapter**

The present chapter aims at investigating strategic planning for sustainability within healthcare organizations, and the role that intellectual capital (IC) plays in sustainable development. Based on key variables affecting the implementation of sustainability projects that emerged from a review of the literature, the author designed a model of “Sustainable Intellectual Capital for HCOs”, composed by human, structural and relational capital (MERITUM project taxonomy of IC, 2002), and conducted a survey on a sample of General Directors (GDs) of Italian hospitals to determine: whether GDs were adopting formalized SD strategies, the kind of organizational positions that deal with sustainability decision-making, the main sustainability projects/actions adopted by these organizations, and the effect of IC in incentivizing those initiatives. In addition, a stochastic ordering test was conducted to assess whether the HCOs adopting a sustainability strategy were also the ones that highly rated IC’s contribution to the implemented sustainable initiatives. The chapter is structured as follows: section 2 focuses the attention on the Institutions’ call for SD in healthcare organizations and discusses about the role IC can play with reference to the shift towards sustainability. Section 3 discusses the challenge of sustainable development within the Italian healthcare context, where IC was depicted to have a strong potential for sustainable healthcare. In section 4 the relations between IC and SD are deepened looking at literature on private and public sector organizations. Section 5 presents the developed model for “sustainable intellectual capital for healthcare organizations”. In section 6 the methodology is introduced. Section 7 discusses the results of the study, while in section 8 some conclusions are presented.

## 2. The call for healthcare sustainable development

The UN Sustainable Development Goals firmly stressed the need to promote healthy lives and wellbeing for all populations (UN General Assembly, 2015). In this context, healthcare organizations (HCOs), such as hospitals and local health authorities, are responsible for guiding the shift toward sustainability, which includes a more equitable provision of care and prevention to reduce costs of unnecessary treatments, improving the efficiency of the system, and the reduction of the environmental impact of their structures; indeed, social responsibility should guide the governance of HCOs (Brandao et al., 2013). In other words, hospitals have to change their traditional patterns of organization to consider the impacts of the healthcare setting and workplace on hospital populations, to act as change agents in order to enforce healthy behaviors, and to develop training and research on health promotion while empowering health services (Pelikan et al., 2001). In the Italian healthcare context, it is claimed that intellectual capital management can act as a lever to encourage sustainable development of HCOs. However, when looking at literature on the role of IC for sustainable development, research is mainly focused on the business sector, and routed to investigate the effect of green IC on the competitive advantage of business organizations (see for example Chen, 2008 and Yahya et al., 2014). Models of green IC, such as the one of Chen (2008), have thus been shaped by a traditional conceptualization of IC that identifies human, relational and structural capital as the main dimensions of the framework.

This taxonomy was introduced first by the MERITUM project (2002), and found consistent application in studies of healthcare organizations (Habersam and Piber, 2003; Evans et al., 2015); Human capital is defined “*as the knowledge that employees take with them when they leave the firm*”, including “*the knowledge, skills, experiences and abilities of people*”; structural capital represents “*knowledge that stays within the firm at the end of the working day*”, including “*the organizational routines, procedures, systems, cultures, databases*”, and relational capital defined by “*all resources linked to the external relationships of the firm, with customers, suppliers or R&D partners*” (MERITUM, 2002; pp.10-11).

With reference to the contribution of IC to sustainability of HCOs, at the current state of the art we assist at fragmentary studies that look at single assets’ role for sustainability successful implementation, while the whole effect of these assets for organizational performance are left unexplored (Evans et al., 2015) despite *connectivity* has been considered relevant for IC contribution to organizational performance (Habersam and

Piber, 2003). In addition, sustainable healthcare has been mainly deployed by the use of a Triple Bottom Line approach that focus on social, economic and financial dimensions of sustainable development (Jameton and McGuire, 2002). This requires to extend IC conceptualization including social and environmental concerns to unlock the potential contribution of these assets for public and private organizations and for society and ecosystem (Allee, 2000), despite social aspects of sustainability are often left underexplored by scholars (Mackay and Wolbring, 2013). Studies such as Mertins and Orth (2012)'s paper, although based on private sector organizations, are in this sense pioneering as they focus on an integrated perspective between sustainability (composed by social, economic and environmental dimensions) and IC management. Indeed, the adoption of innovation (which is a component of intellectual capital) in flexible healthcare structures was depicted as fundamental to HCOs' sustainability strategy planning and implementation (Worley, 2012); nevertheless, a) studies about the link between IC and strategy and between IC and organizational performance are recommended (Vagnoni and Oppi, 2015; Lev, 2014), and b) IC management for sustainability of HCOs can be considered a quite interesting field of research being these latter knowledge-intensive organizations. For these reasons, the study aims at analyzing sustainability planning in the Italian public healthcare system (PHS), the role of IC in prompting sustainability initiatives and its association with sustainability strategy adoption. IC's contribution to sustainable healthcare is analyzed espousing the definition of SD in healthcare encompassing social, environmental and ecologic dimensions (Jameton and McGuire, 2002). For the purposes of the chapter, using the MERITUM (2002) conceptualization of intellectual capital sustainable intellectual capital was defined as *“the sum of knowledge that contribute to implement sustainable development projects in healthcare organizations, where sustainable development is composed by social, economic, and environmental dimensions”*. The contributions of the work are several: first, it aims to analyze the role of IC for sustainability management purposes as recommended by the literature calling for research on the link between IC and strategy (Lev, 2014; Vagnoni and Oppi, 2015). Second, it enables the creation of a Sustainable Intellectual Capital framework that can be used by healthcare practitioners as a reference to think about assets that can contribute to implement sustainability within their structures and processes.

### **3. The challenge of sustainability in the Italian healthcare context: a role for intellectual capital**

In 2015, the Italian Senate produced a document titled “Consultation on the sustainability of the healthcare system” (“Indagine conoscitiva sulla sostenibilità del Sistema Sanitario”) in which the sustainability of the PHS was presented. In the report, the Senate outlined the main criticalities the Italian PHS should address to achieve sustainability. The containment of healthcare spending, the deficit of some Regions’ balance sheets for which repayment plans were issued (De Belvis et al., 2012), and the periodic block of turnover for healthcare professionals (France et al., 2005) were depicted by the Italian Senate (Senato della Repubblica Italiana, 2015) as possible causes of high disparities in the provision of services by the regional healthcare systems of the Italian PHS. The economic crisis also affected health expenditure: health expenditure per person decreased by 3.5% in 2013 and 0.4% in 2014 (OECD, 2015). Moreover, an increased citizens’ copayment on drugs (De Belvis et al., 2012) and an increase in requests for private health services were the main consequences of a system not designed for quality and efficiency (Senato della Repubblica Italiana, 2015).

Examining these issues, some scholars indicated that IC, especially social capital (human and relational), could help lift the healthcare system out of the crisis. Intellectual capital itself contributes to organizations’ value creation, organizational performance and competitive advantage (Edvinsson and Sullivan, 1996; Allee, 2000; Lerro, et al. 2014; Vagnoni and Oppi, 2015). Especially in nonprofit organizations, such as HCOs, IC has been claimed to help these entities in a) achieving financial sustainability in front of diminishing public funding, and, b) complying with their social mission, through the maintenance of stakeholders’ relations which in turns rely on specific intangible assets (Pirozzi and Ferulano, 2016). Moreover, *New Public Management* policies in the public organizations’ contexts such as hospital’s one, have required organizations to show efficiency, accountability and transparency as well as to improve quality in front of an increasing demand of high specialized services, in order to be competitive (Habersam and Piber, 2003). Although studies of IC in healthcare organizations are limited in number, the research setting deserves a deeper examination, as IC management has the potential to respond to performance challenges these knowledge intensive organizations are facing (Sillanpää et al., 2010).

However, management of IC in HCOs is particularly challenging for several reasons (Evans et al., 2015): it requires overcoming the traditional divide between disciplines or

healthcare specializations (e.g. clinic and management knowledge) to be efficacy managed; leaders and professionals' workforce instability can prevent the organization to progress in knowledge development overtime; HCOs are characterized by high volumes of tacit and explicit knowledge that can be not easily understood by the members of the organizations (also because some assets lack measurability). With reference to this latter challenge, scholars emphasized that: a) knowledge can also be managed effectively without measure, and (Dumay and Garanina, 2013), b) in healthcare organizations, a part from quantifiable knowledge, we assist at kind of literal (explainable), intuitive (explicable) and black box (not explicable) knowledge capitals; these latter, although not representable with metrics, contribute to organizational performance and require new means of visualization to be accessed (Habersam and Piber, 2003). More recent contributions in the IC literature have also emphasized the potential of intellectual capital when it addresses social and environmental concerns in redefining the contribution each organization can provide to global society and ecosystem by ways of interactions (Allee, 2000). In the healthcare sector, some studies started to address the potential of IC for HCOs' sustainable development. As a matter of example, Lavalle et al. (2015) stressed that healthcare can benefit from a participative approach in which patients and professionals share competences, experiences and commit themselves to improve decision making on care provision, taking the dimension of sustainability into account. Healthcare systems should enable the development and persistence over time of human and relational capital because HCOs are major providers of relational goods. Cooperation should be first oriented to prevention, which is considered a pillar to achieve sustainable development; therefore, the Senate (2015) addressed prevention as the main contributor to sustainability through the orienting of lifestyles, providing access to screening programs to prevent disease, using health and environmental data to improve citizens' quality of life and reduce the need for care services. Issues of the unsustainability of the Italian healthcare service were represented by excessive bureaucracy, scarce informatization of procedures and scarce standardization of care paths, purchases of health technologies at disproportionate costs, inadequate coordination of assistance especially for patients with chronic conditions due to inadequate settings of care (Cartabellotta, 2015; Cartabellotta et al., 2016). Although actions were taken to intervene in and update the structural capital of the PHS (such as the introduction of electronic medical records and unified public procurement centers, the digitalization of informative databases, the closure of small health facilities to eliminate waste and problems with quality, and the introduction of registers to monitor prescriptions' appropriateness), high heterogeneity in the provision of services by regional healthcare



services persists (OECD, 2014) and may jeopardize the achievement of sustainability goals, as some regions are still in a situation of economic crisis. Moreover, the use of the structural capital, such as technological platforms to manage health data for decision making, risks increasing this inhomogeneity because information technologies have been introduced in HCOs in very different ways across the PHS (Lo Scalzo et al., 2009). This could represent a huge problem in light of the new managerial approach adopted by the Ministry of Health with reference to the use of national health data. Indeed, the Italian Health Ministry Beatrice Lorenzin, has stressed that digitalization can be a lever to the reorganization of the whole system toward SD; the Minister of Health, during her intervention in a conference titled “Sustainable Innovation from Patients to System” (“Innovazione Sostenibile dal Paziente al Sistema”; June 14, 2016), stated that new information and communication technologies (ICT) could allow the collection of patients’ big data to improve diagnostic and clinical appropriateness. As way of example, ICT in the clinical field has recently enabled the realization of national monitoring registers on drugs’ efficacy (the so called “Registri dell’ Agenzia Italiana del Farmaco”); monitoring will help the PHS to set prices that valorize the efficacy of expensive and innovative drugs, but also adequate reimbursement policies if the tested treatments are ineffective (Montilla et al., 2015). The shift toward sustainability that can be achieved through open innovation and new technologies requires a change in the traditional organizational patterns characterizing the healthcare system and, in particular, the development of social capital that can support their use (Botturi et al., 2011).

As argued, healthcare professionals play a central role not only in healthcare but also for socio-economic development (de Francisco Shapovalova et al., 2015); however, the promotion of sustainable healthcare systems requires the adoption of new models of organization that overtake traditional roles and competences. Such change will require adequate governance mechanisms through supra-organizational and participative models of decision making (Olsen, 1998) in order to: a) achieve integrated care paths derived from the coordination of professional skills and technologies (Cartabellotta, 2015), and b) define and assess healthcare responsibilities to ensure the satisfaction of stakeholders’ needs through optimization strategies (Lavalle et al., 2015). To this end, development of the three fundamental components of IC (human, relational and structural capital) is considered essential to promote open innovation for the sustainability of the Italian PHS. To achieve this, authors such as Botturi et al. (2011) suggested: a) the participation of citizens in the evaluation and planning of healthcare services; b) the development of professionals’ competences devoted to innovation; c) change in the culture and structure of the

organization to overcome the internal efficiency logic and to develop social capital strategies; and d) cooperation between citizens and public administrations through ICT and social web. The above mentioned studies reveal the potential of IC for healthcare sustainable development, and deserve a deeper investigation to unlock the role of intellectual capital in prompting HCOs' sustainability planning and implementation.

#### **4. The relationship between IC and SD: an overview**

The literature discussing the link between IC and SD is mainly related to the private sector. For example, scholars have started to focus on integrated reporting as a means to combine IC and sustainability information. Indeed, the overlap existing between IC and SD in social and environmental reports and sustainability reports (Cordazzo, 2005; Del Bello, 2006; Polo and Vázquez, 2008; Cinquini et al., 2012) and the use of international sustainability guidelines (such as Global Reporting Initiatives) favoring IC disclosure (Oliveira et al., 2010) seem to be the major arguments in favor of integrated reporting. However, many academics have questioned the utility of such a reporting practice: first, firms are not prone to disclose critical success factors such IC and SD in their reports because it can result in a loss of the matured competitive advantage; second, reporting does not have a strategical focus given its impossibility to disclose timely information that can meaningfully modify the value of the firm for stakeholders (Dumay, 2016). However, what emerges from this stream of research is a definite link between IC and SD. From a strategic point of view, many authors argued that the adoption of SD in management and performance measurement practices is scarce, and they urged organizations to integrate IC in management frameworks as a driver of sustainability. Mertins and Orth (2012) presented a draft model based on InCaS Guidelines and Sigma's conceptual categories of capital that supported the causal relation between IC and SD (where SD is interpreted through the concept of Triple Bottom Line); the model was realized to help firms define the incidence of their intangible assets and their modifications on triple bottom line performance and to help them redesign their business processes to achieve sustainable goals. Sustainability requires "rethinking how business is performed" (Wong, 2010), and the development and organization of new capabilities and innovation through knowledge management and organizational learning to guarantee viable practices and behaviors (Wong, 2010) as well as a distinctive advantage (Rodríguez et al., 2002). Thus, knowledge management has been considered relevant to operationalize sustainability in organizations to improve governance and increase stakeholders' value (Robinson et al., 2006). Organizations need to promote

sustainable practices based on their IC to fit with “society’s environmental agenda” (Baharum and Pitt, 2009). To this end, authors refer to “sustainable IC” or “green IC” to depict the human, structural and relational capital needed to shift to sustainability.

López-Gamero et al. (2011, p. 20) defined sustainable IC “as the sum of all knowledge that an organization is able to leverage in the process of conducting environmental management to gain competitive advantage”. Chen (2008), based on Bontis’ (1999) and Johnson’s (1999) distinctions of IC, described green IC as having three components:

1. Human capital which is “the employees’ stocks of knowledge, skills, capabilities, experience, attitude, wisdom, creativities, and commitments”.
2. Structural capital which is “the stock of organizational capabilities, organizational commitments, knowledge management systems, reward systems, information technology systems, databases, managerial institutions, operation processes, managerial philosophies, organizational culture”.
3. Relational capital which is “accumulative interactive relationships” about “corporate environmental management and green innovation” that “can help companies obtain competitive advantage” (p. 275).

This tripartite categorization of IC is not new as it origins in Sveiby (2001) who identified individual competences, and internal and external structures created by individuals’ interactions inside and outside the organization, as intangible assets characterizing knowledge transfers for value creation. Edvinsson and Malone (1997) reclassified IC introducing customer capital as representing external relations and networking an organization develop with its clients. The MERITUM project (2002), extending the potential of firms’ relations with the environment, introduced the concept of relational capital, to include resources coming from firms’ external relationships with the environment (MERITUM, 2002).

Variations of the above mentioned Chen’s framework introducing the concept of “green intellectual capital” are reported by Yahya et al. (2014) in which innovation and organizational capital replace structural capital to identify respectively, the firm’s ability to address environmental issues in new products, and the system of procedures to implement and check green operations.

Moving from theories to empirical research, scholars focusing on the business sector tested the link between green IC management and performance, starting from the assumption that IC can generate competitive advantage. Chen (2008) conducted research in the Taiwanese information and electronics industry. Chen (2008) showed a positive correlation between

the three classifications of green IC and firms' competitive advantage. Competitive advantage was analyzed using managers' perceptions of 11 items that included company's profit, image, R&D and innovation compared to their market rivals. Moreover, the author found evidence of the major relevance of relational capital to create value for firms in the sector. Lopez-Gomero et al. (2011) investigated firms' propensity to develop green IC; they found that sustainable human capital was cultivated by training and updating employees on changes to business processes due to environmental improvements and by incentivizing employees' creativity. Firms modified structural capital by adapting structures and roles to deal with the complexity of sustainability issues and they mainly adopted prevention technologies to redesign internal processes. In terms of relational capital, customers and suppliers were considered relevant sources of information to enact sustainable practices. Based on four constructs of green IC (green human capital, green organizational capital, green innovation capital and green relational capital), Yahya et al. (2014) found a positive association between IC and the competitive advantage performance of Malaysian manufacturing firms, with green innovation capital as the main predictor of the model. Delgado-Verde et al. (2014) investigated a sample of firms in the metal industry and discovered that relational capital mediated the relation between organizational capital and environmental product innovation. De Leaniz and Del Bosque (2013) validated the inverse relation between SD and green capital: they found that firms undertaking sustainable initiatives had an increase in their relational capital due to an improvement in their corporate reputation. A study by De Marchi and Grandinetti (2013) showed that green innovators were more prone to engage in networking with external partners (in their search for external sources of knowledge) than non-green innovators. Other studies focused on the determinants of green IC. Chang and Chen (2012) studied the ways in which corporate social responsibility (CSR) and environmental consciousness can enhance firms' IC: CSR attracted employees, enhanced technology rates and involved the public in determining new product innovations, while sensitivity helped orient people and processes to changes due to environmental trends. Liu (2010) showed the significance of green internal control procedures, companies' culture and information system building (as components of structural capital) compared to relational and human capital in achieving competitive advantage in the long term. These studies, except for Mertins and Orth (2012), mainly focused on the role of intellectual capital in greening organizations for competitive advantage, but they do not consider sustainability as composed by social, environmental and financial aspects. Moreover, they do not consider the link between IC and sustainable strategy. Nevertheless, literature started to focus on the contribution of IC to organizations'

value creation, but also to society and the ecosystem by ways of organizations' interactions when IC is extended to include social and environmental concerns (Allee, 2000). In the healthcare sector, we assist at a gap concerning the analysis of the role of intellectual capital for sustainability of HCOs; nevertheless international institutions have urged these organizations to act for SD.

Based on the definition of sustainable healthcare (Jameton and McGuire, 2002), next section will propose a model of Sustainable Intellectual Capital in HCOs, where MERITUM taxonomy (2002) is used: the model allowed to analyze IC's contribution to HCOs' sustainability planning and implementation, based on the definition of human, structural and organizational capital. The model is presented in next section.

## **5 Sustainable IC in HCOs**

### ***5.1 Corporate culture, competences and clinical possibilities***

Bontis (1999, p. 450) stated that culture “constitutes the beliefs, values and attitudes pervasive in the organization and results in a language, symbols, and habits of behavior and thought”. With reference to organizational culture, many studies showed the relevance of an HCO's sensitivity to SD topics (Ball et al., 2014; Pinzone et al., 2012) as a condition to enact positive engagement of management and employees with sustainability. Ramirez et al. (2013) pointed out the need to train professionals at different stages of study and career, according to the specificities of organizational levels of HCOs, in order to mature competences to enact SD culture and processes. In this sense, possible collaborations with universities to develop specific curricula on integration between SD and healthcare could promote an increase in managerial competences in SD (Rich et al., 2013; Ramirez et al., 2013; Rogers et al., 2009; Sarriot et al., 2004, Schroeder et al., 2012). Moreover, cutting-edge education for healthcare professions should be offered in non-conventional matters so that they can acquire adequate expertise in dealing with matters of climate change (Frumkin et al., 2008). To implement these initiatives, academic institutions need to be transformative, to reorient their education processes and research, and to change their way of producing sustainability knowledge, focusing on adaptation and reflexivity (Miller et al., 2011). Finally, the mix of competences that healthcare professionals acquire at the operative level thus influences clinical possibilities (Weisz et al., 2011) that in turn affect the implementation of sustainable programs of care.

## ***5.2 Managerial philosophies***

When looking at organizations, the so-called sustainability champions can be propellers of SD culture; the literature has stressed managers' leadership as a sustainability driver (Ramirez et al., 2011), as well as promoting collaboration and employees' engagement in interdisciplinary projects for healthcare (Kira and Lifvergren, 2014; Lifvergren et al., 2008). The role of top management is to mediate with politicians on sustainability priorities for the healthcare system and to define strategic areas to be managed in order to foster organizational change. In addition, management determine projects' assignments, time to dedicate to SD, as well as financial and technical capacities to support projects, and can commit the whole organization toward SD by providing periodic feedbacks (Lifvergren et al., 2008). Leaders can also decide to create ad hoc organizational structures (Pinzone et al., 2012) dedicated to the implementation of SD goals and to propel change management practices (Lettieri et al., 2012; Pencheon, 2013) to make hospitals' operations more sustainable. SD-dedicated job positions can help organizations to define responsibilities and develop their commitment toward sustainability (Schroeder et al., 2012). Despite this, empirical evidence has shown that managerial approaches to dealing with sustainability are mixed: some managers prefer to approach sustainability decision making at the Board or at the operational level, while others prefer teams working toward SD that involve different functions in the hospital or teams composed of resource management members (Ling et al., 2012). Key decision makers determine the choices to be made for sustainability and thus the profile of activity (Olsen, 1998). Management has to face major constraints when looking at the actual conditions of the healthcare system; the increase in chronic diseases linked to the age of people has led to an increase in demand for healthcare services, but resources dedicated by the government to healthcare are insufficient to deal with new healthcare issues that place emphasis on hospitals becoming more efficient (Weisz et al., 2011; Balcezak et al., 2014; Schroeder et al., 2012) and to orient their activities to prevention. Moreover, leaders tend to be pressed by politicians to balance cost reduction with quality of services, leaving environmental issues forgotten (Chiarini and Vagnoni, 2016).

## ***5.3 Collaboration with stakeholders***

The mobilization of partnerships with stakeholders has been depicted as a fundamental step to foster hospitals' contribution to sustainability (Frumkin et al., 2008; Worley, 2012). Collaborations in the form of *megacommunities* (multinational partnerships) and *intelligent*

*communities* (local or regional communities) were seen as elements necessary to address challenges connected to wellbeing and sustainable growth (Passerini and Wu, 2008). Collaborations can focus on different levels of planning, such as local, regional or national, depending on the goal (Frumkin et al., 2008), and generally include NGOs, firms, community, academia and others. For example, collaborations with local firms have helped HCOs reduce their environmental impact (Gerwig, 2014). Moreover, collaboration between local authorities and hospitals not only deliver prevention campaigns on sustainable lifestyles, but also create the conditions in which to provide integrated care services. In Italy, the regulation introducing Healthcare Houses (specialized primary surgeries) to integrate social and healthcare services (OECD, 2014) was the result of a national laboratory project with local authorities. The scope of these new structures was to put together all the resources to treat citizens not only as patients, but to consider their health as depending on mental, physical and social status. Integrating public services in local territories with a personalized approach can indeed increase the wellbeing of people because it fosters their sense of belonging to a community and they do not feel abandoned. Actions taken in these primary healthcare centers include: a) the creation of self-help groups; b) the development of therapeutic alliances among professionals, patients and families; and c) continuous communication and mutual exchange between professionals on the improvement of the management of pathologies (Botturi et al., 2015). Other experiences with the same aim that can be attributed to shared decision making are health education groups (e.g. in the field of cancer prevention and treatment) that offer behavioral counseling, therapeutic education, and mutual exchange among patients (Botturi et al., 2015). Social capital proved also to be useful when institutionalizing organizational learning mechanisms toward sustainable healthcare: heterogeneous networks, which can be created externally and internally to a hospital, to stimulate sustainability knowledge sharing, development and exploitation for concrete projects (Albers Mohrman et al., 2013). Social innovation networks are important because they provide knowledge that can be used to make social systems adaptable (McElroy et al., 2006). This is particularly the case for healthcare networks if the goal is to shift the provision of healthcare services toward sustainability. By way of example, Lifvergren et al. (2008) showed that the involvement of professionals at various levels, as well as the commitment of employees and feedback from patients, triggered a learning process on care paths and contributed to the achievement of sustainability goals.

#### ***5.4 ICT and advanced technologies***

ICT and other advanced technologies are said to reduce indirect costs of treatments and to improve the quality of care by putting hospitals in close and continuous contact with patients (Lettieri et al., 2012); two major examples in this field are telemedicine, which enables the management of distances in patient care, and biomedical technologies, such as robotics for the rehabilitation of patients. However, technologies of this kind need strong enabling factors, such as infrastructure, the support of national health policies and training of the local health operators who have to deal with these new knowledge platforms (Shiferaw and Zolfo, 2012), as well as leadership and organizational support in the implementation of new programs (Whitten et al., 2010). Although technologies can be capital intensive in some cases, they can help increase standardization of work and decrease lengths of stay, as well as increase the possibilities of patients returning sooner to their normal life (Lettieri et al., 2012).

Integrated ICT can provide information and knowledge for SD (Mirghani et al., 2009). In the medical setting, integrated ICT can also: a) allow the exchange among healthcare institutions of patients' medical data to improve the quality of care, b) increase patients' awareness of their own diseases and involve them in a shared decision-making process, and c) orient patients to the best care services they need (Eysenbach, 2001). Moreover, such tools can serve to improve patients' and physicians' capability to manage diseases through real-time monitoring systems (Ball and Lillis, 2001). However, their potential is challenged by infrastructure costs, cultural interpretation of technology (Séror, 2001), the limited interoperability of such systems that can prevent physicians from exchanging data with other hospitals' facilities (e.g. laboratories) and threats to privacy represented by the fact that clinical data are exchanged over the internet (Anderson, 2007). In addition, the implementation of technological innovations requires communication among healthcare professionals for medical data collection, the development of competences to manage the adoption of innovations, the ability to give timely responses to the personalized requests of patients (Tamburisi, 2006) and acceptability from health professionals and patients based on the satisfaction that justifies their use (Moruzzi, 2016). Without any doubt, proper training and security systems that prevent patients and professionals from accessing uncredited information should be adopted (Ball and Lillis, 2001). Finally, the integration of global and local healthcare information systems in order to exchange clinical data requires a change in information architectures. For these reasons, the process of innovation of



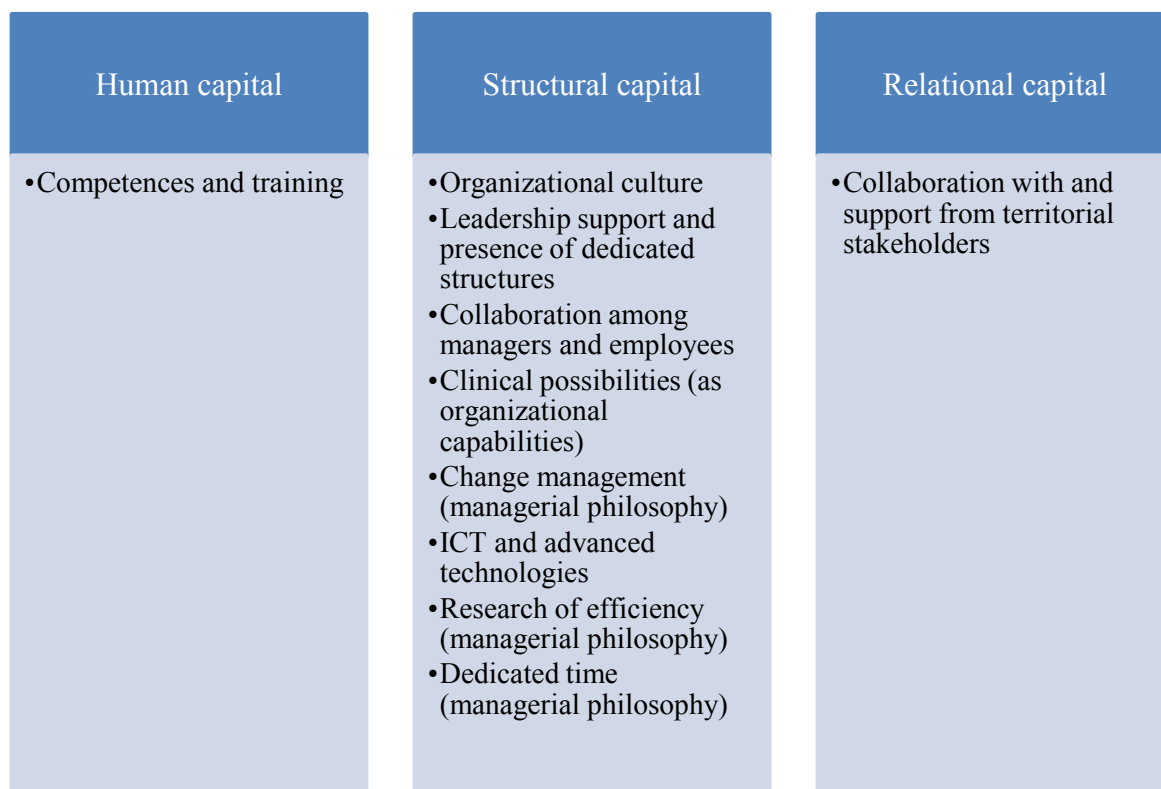
architecture should be oriented to eliminate niche software and non-communicating networks (Moruzzi, 2016).

To conclude, Séror (2001) described the role of ICT as follows: on one hand, personalized information for consumers could be made available from certified professionals' websites, on the other hand, the active participation of consumers will lead to major networking between patients and patients, patients and professionals, and among researchers to exchange data to foster interdisciplinary collaboration and improve clinical decision making. The control and checking of the accuracy of information could be guaranteed by standards and ethical protocols of behavior that could autonomously emerge on the internet, technology itself can preserve the integrity of data and regulate access, and institutions' intranet systems could allow access to data while diffusing hierarchical control mechanisms (Séror, 2001). Technologies are said not only to enhance centralized professional healthcare services while guarantying equitable access to information and care, but also to create decentralized consumer-driven networks that exchange medical information certified by independent evaluators (Séror, 2001).

### ***5.5 Framework of Sustainable IC for HCOs***

Based on key variables affecting the implementation of sustainability projects that emerged from a review of the literature, the author designed the Sustainability Model of IC for HCOs in which sustainability is social, environmental and financial. The framework is illustrated in Figure 1.

**Figure 1: Sustainable Intellectual Capital for Healthcare Organizations**



Although it has been recognized that the adoption of innovation by agile healthcare structures is fundamental to HCOs' sustainability strategy planning and implementation (Worley, 2012), empirical studies on the relevance of IC in the adoption of sustainable strategies are scarce and do not address the value of IC as a whole.

## **6. Methodology**

The above mentioned literature review revealed that IC assets (human, structural and relational capital) can help the implementation of sustainability projects in HCOs. For this reason the chapter aimed at investigating strategy planning for sustainability within the Italian PHS and to examine the incidence of IC in the adoption of sustainability projects. Another objective was to determine whether HCOs that adopted formalized sustainability

strategies were also the ones that attributed higher value to IC assets in the adoption of sustainability practices.

Following literature prescriptions (Floyd and Fowler, 2009), a questionnaire was prepared, pre-tested through a focus group with academics specialized in surveys for the healthcare sector and through three pre-colloquiums with General Directors (GDs) of HCOs. The items of the questionnaire were developed focusing on literature on sustainable healthcare. The questionnaire (whose sections are visible in the appendix with reference to the parts used for this study) was physically posted to a sample of 204 local health authorities and hospitals. The sample was almost equivalent to the total population of hospitals with juridical autonomy (legislative decree D.Lgs. number 502 of 1992). The sample did not include: a) the 21 public research institutes (“Istituti di ricerca a carattere scientifico”) as they have clinical research peculiarities that distinguish their internal organization from hospitals, and b) hospitals which do not have juridical autonomy as they are part of Local Health Authorities. The GD was chosen as the recipient of the survey because he or she would be responsible for strategic thinking, planning and momentum (Swayne et al., 2008). E-mails and phone calls were periodically made to solicit the answer of GDs and increase the response rate. Questions posed to GDs mainly concerned:

- ❖ whether the organization had or had not adopted a sustainability plan;
- ❖ whether the organization had an internal position that managed the hospital’s sustainability;
- ❖ whether the organization had put in place initiatives to increase the hospital’s sustainability;
- ❖ finding out the IC factors that conditioned the adoption of sustainability projects.

Thirty-one questionnaires were collected from the sample, equal to a 15% and were all completed. Data collected from the questionnaires were analyzed using a quantitative approach that enabled a stochastic ordering test for limited sample size to detect if HCOs with formally adopted SD strategies were also the ones that attributed to IC bigger contributions in promoting sustainability practices. The methodology is discussed in detail as follows.

The first stage of the analysis involved the collection of data related to strategy planning and the organizational structure adopted by the hospital to manage sustainability issues. The GDs were asked which organizational position with specific SD competences within the hospital was responsible for sustainability planning and implementation, and they were asked to indicate the degree of formalization and implementation of a SD strategy in

his/her organization choosing one of the following options: “not present”, “waiting for approval or implementation” and “implemented”. Each GD was then given a list of major key projects or actions that was based on an analysis of the literature on sustainable healthcare (Schroeder et al., 2012; Gerwig, 2014; Pelikan et al., 2001) and included: sustainable use of resources, sustainable canteen service, sustainable mobility, waste management, comfort and eco-compatibility of buildings, green public procurement, equal opportunity, projects to increase employment at the local level, health and security for hospital’s population, programs to promote sustainable lifestyles, prevention of drug use, personalized and eco-friendly care path, and economic and financial sustainability. They were asked to indicate from the list the major key projects or actions that were implemented in their organization, which they considered to increase their hospital’s sustainability; space was provided next to the list in the questionnaire in which the GDs could add more details to describe the initiatives undertaken. Finally, the GDs were asked to rate the contribution that each component of the “Sustainable Intellectual Capital for Healthcare Organizations” model, which was developed and discussed in section 4.5, had in favoring the implementation of their indicated sustainability projects using a 5-point Likert scale. The consistency of the rated answers was analyzed using Cronbach’ alpha through IBM SPSS statistical software.

The second stage of analysis concerned the use of the information on strategy implementation and on IC to conduct a stochastic ordering test. Statistical units were divided in three main groups: Group 1 (G1) included all the organizations that did not adopt sustainability plans, Group 2 (G2) included all the organizations waiting for approval or implementation of a sustainability plan, while Group 3 (G3) represented all the organizations that had already implemented a sustainability plan. Finally, a stochastic ordering test was conducted using NPC Test R10 software to evaluate whether there was a stochastic order presence among groups looking at the value of relevance GDs attributed to an IC component in adopting sustainability projects; for this latter, the relation tested was  $G3 > G2 > G1$  looking at the effect of each IC component individually and IC globally. The reasons for adopting a non-parametric approach as well as the presentation of the stochastic order test are explained in detail in the next subsection to aid the readability of the study.

### 6.1 Stochastic ordering test

In order to choose the method for data analysis, the normality of distributions of variables that comprise the IC model was first analyzed using the Kolmogorov–Smirnov test, which is suitable for a small sample size. The test indicated significant deviation from normality ( $p < 0.05$  significance level) for all the variables in the model. In this case, the literature suggests using a non-parametric approach for data analysis (Pesarin and Salmaso, 2010). The Non-parametric combination (NPC) methodology presents some advantages such as: a) the possibility to make an exact inference for a small sample, b) the inference can be made when missing values are present, and c) the precision of the test increases when information outcomes increase (Arboretti et al., 2015). According to the non-parametric solution, the testing of differences among the defined groups can be conducted using the stochastic ordering approach. The NPC test is conducted in two phases (Arboretti et al., 2015). First, the NPC methodology works through a decomposition of the verification problem of multivariate hypothesis that represents the number of outcomes to be analyzed for groups. Each partial test is designed to determine the marginal contribution of each response variable in the comparison between the different groups. The second stage consists of the combination of non-parametric partial tests in a single combined test called second order test, which serves to evaluate if differences occur globally between the multivariate distributions of the outcomes of the groups. For the first stage, to test the presence of a stochastic order among  $C$  populations, the test is made considering  $C-1$  sub-problems. Thus, testing can be made by comparing a couple of pseudo-groups through a two-sample one-sided test obtained by a pooling of the original samples. As Bonnini et al. (2014, p. 2229) argued:

Being  $Y^{(j)}_1 = X_1 \cup \dots \cup X_j$  and  $Y^{(j)}_2 = X_{j+1} \cup \dots \cup X_C$  the  $j$ -th pair of pseudo-groups, with  $j = 1, \dots, C - 1$ , and be  $\cup$  the symbol for pooling data groups, the null hypothesis may be expressed as equality in distribution and broken down into  $C - 1$  pairwise comparisons between pairs of pseudo-groups

$$H_0 : \{X_1 = X_2 = \dots = X_C\} \equiv \bigcap_{j=1}^{C-1} \{Y^{(j)}_1 = Y^{(j)}_2\},$$

where the symbols indicate that the null hypothesis is true if each null sub-hypothesis (equality in distribution between the responses of two pseudo-groups) is true.

The alternative hypothesis [...] can be written as follows:

$$H_1 : \{X_1 > X_2 > \dots > X_C\} \equiv \bigcup_{j=1}^{C-1} \{Y_{(j)1} > Y_{(j)2}\},$$

where the alternative hypothesis is true if at least one alternative sub-hypothesis of stochastic order between two pseudo-groups is true,

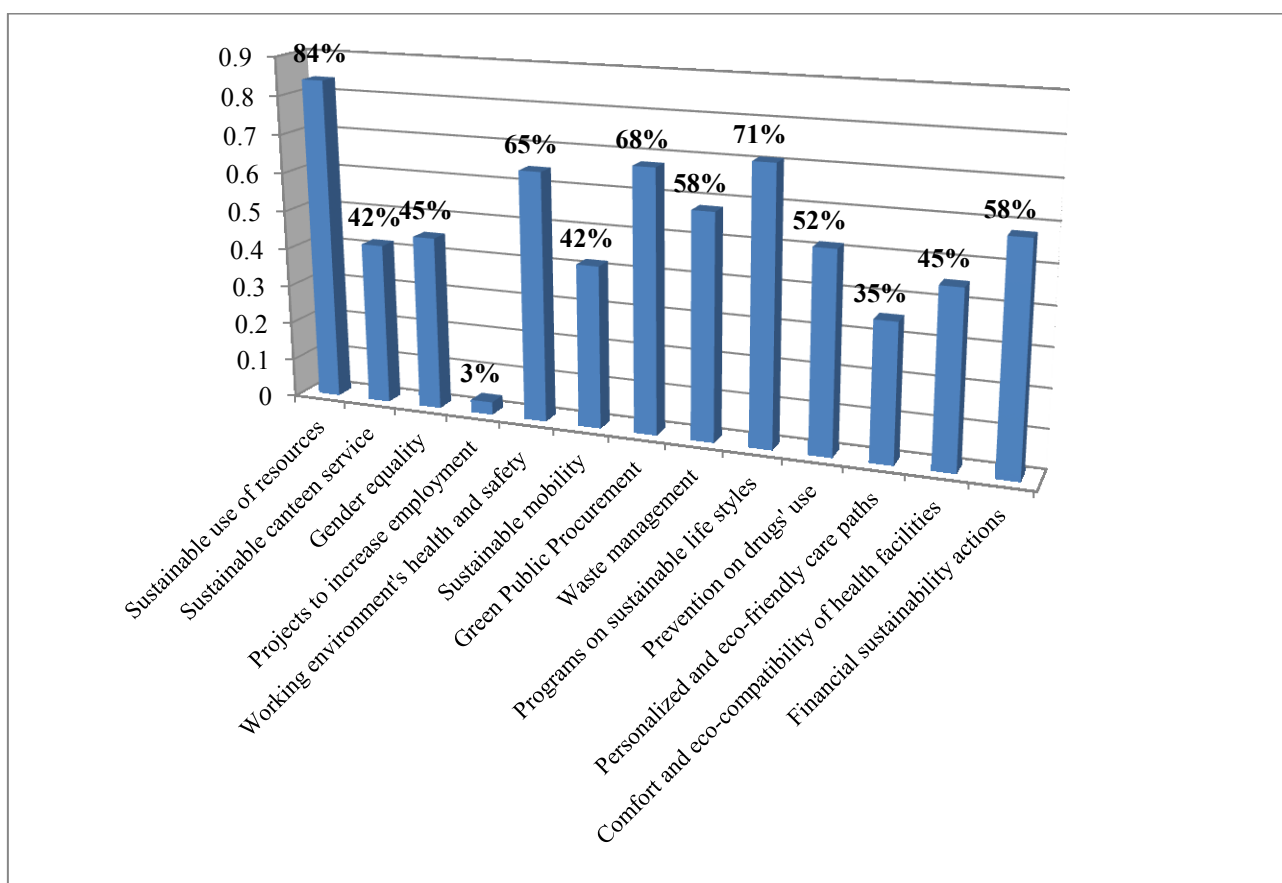
for the response variables considered. In this study, the response variables are represented by the single elements composing the IC model shown in Figure 1. I hypothesized (as the alternative hypothesis H1) a stochastic order presence of the kind  $G3 > G2 > G1$  among the defined groups for each of the response variables. The stochastic ordering test was conducted using the statistical software NPC Test R10. Fisher's combining function was used for partial tests (Pesarin and Salmaso, 2010), and 10,000 permutations on vectors of response variables of each statistical unit (each HCO) were performed using Monte Carlo conditional simulation. The NPC test methodology requires execution of the stochastic ordering test for each response variable, and comparison of the obtained p-value with the significance level (0.05). If the p-value is lower than the significance level the null hypothesis should be rejected in favor of the alternative hypothesis for each sub-hypothesis. Finally, to combine the conducted partial tests in one unique global test, Tippett's function was used (Pesarin and Salmaso, 2010). As a rule of thumb, the global alternative hypothesis should be accepted when the p-value of the test is lower than 0.05. The literature suggests looking at adjusted p-values to sustain the family-wise error rate, the so-called probability to erroneously reject the null hypothesis when it is true.

## 7. Results

The number of GDs answering the questionnaires was 31, which was a response rate of 15%; of these, 16 GDs responded to the first round of postal delivery, while 15 responded to the second cycle of recall and mailing. Of the 31 completed questionnaires, 14 declared they had adopted a SD plan, 7 were waiting for approval/implementation and 10 GDs affirmed they had not have yet adopted a sustainability plan. However, all the respondents stated they had adopted projects or actions to increase their hospital's sustainability. This

result revealed that in the analyzed setting, strategy planning for sustainability was not formalized; the most followed managerial approach seemed to have consisted of adopting fragmentary projects/actions that were thought to be beneficial to sustainability. The typology of implemented initiatives is shown in Figure 2 and mainly included the use of renewables or low-impact energy and heating sources, green public procurement, projects to decrease accidents in the workplace, promotion of sustainable lifestyles campaigns, waste management, cost containment on non-core activities while focusing on the provision of quality services.

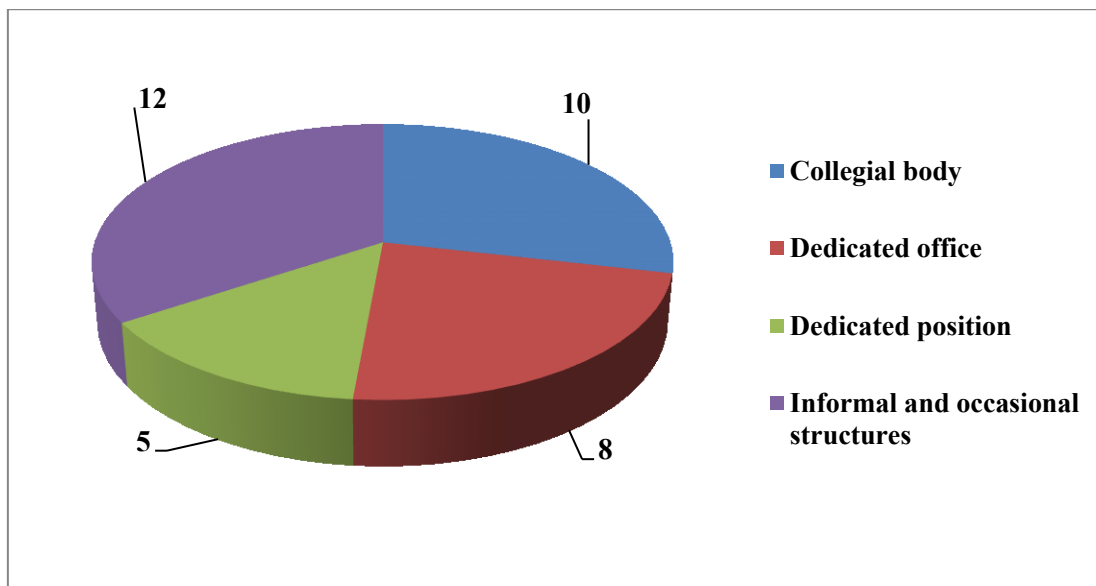
**Figure 2: Sustainability initiatives implemented by Healthcare Organizations (percentage of respondents per project)**



Respondents were also asked to indicate who is responsible inside the organization for the implementation of SD projects (please see Figure 3). There were 28 responses out of 31, of which 7 respondents included two options. The GDs who selected two options indicated the need for a collegial body supported by a budgeting and strategic control office, or coordination between technical offices and specific positions with sustainability competences. Twelve GDs affirmed that sustainability planning was a prerogative of

informal and/or occasional structures dealing with specific sustainability problems, whereas ten respondents underlined the relevance of a collegial body with interdisciplinary competences traditionally involving the GD, health directors and offices. This datum reveals that these organizations deal with sustainable development issues through existing structures exploiting competences that can relate with environmental, social and financial aspects, instead of creating new and permanent sustainability bodies. Only five GDs indicated the use of dedicated offices including quality, prevention and strategic control, and dedicated positions included energy and mobility managers operating within the hospital.

**Figure 3: Organizational positions dealing with sustainable development**



In this latter case, SD is perceived as under a single office's responsibility, probably due to the fact that some sustainability projects require a relevant technical component. Appointing single individuals within the organization to deal with sustainability might represent a risk for the creation of an organizational culture that stably commit to SD (Ling et al., 2012); moreover, coherently with Evans et al. (2015), IC does not show its full potential for sustainability planning as connections among different disciplines and specializations are not exploited for knowledge transfers (Evans et al., 2015). On the contrary, when the interdisciplinary approach is used to create team and collegial bodies it allows to overcome the disciplines' divide, and consequently, IC reach its maximum expression.



Therefore, the above mentioned findings about the variety of structures used to deal with sustainability problem-solving are coherent with Ling et al. (2012) who showed that PHS leaders have different preferences for organizational approaches to deal with SD. Finally, for organizations whose GDs argued to rely on informal and occasional bodies for sustainability decision-making, it can be presumed that SD in these HCOs is managed through piecemeal projects rather than through continuity and long term commitment.

### ***7.1 IC and sustainability***

Cronbach's alpha was equal to 78.6 % for the intellectual capital's items of the questionnaire (Section 1, question no. 7 of the questionnaire attached in the appendix) and, according to the literature (Hair et al., 2013), was considered acceptable for further data analysis. Cronbach's alpha would have increased to 79.6% if the item "Competences and training" was excluded; however, because the literature (Rich et al., 2013; Ramirez et al., 2013; Rogers et al., 2009; Sarriot et al., 2004, Schroeder et al., 2012) indicates that competences and training are relevant to sustainability planning in HCOs, the variable in the model was retained. The descriptive statistics for the variables of the IC model are shown in Table 1.

**Table 1: Descriptive statistics of variables composing the IC model**

	Organizational culture	Research of efficiency	Clinical possibilities	Collaboration between managers and employees	Competences and training	Dedicated time	Change management	ICT and advanced technologies	Leadership support and presence of dedicated structures	Collaboration and support from territorial stakeholders
Mean	3.47	3.79	2.97	3.52	2.67	2.90	3.30	3.35	3.34	3.10
Median	3.50	4.00	3.00	4.00	3.00	3.00	3.50	3.00	3.00	3.00
Mode	3 <sup>a</sup>	4	3	4	3	3	4	3	3	4
Std. deviation	.973	.902	1.033	1.151	1.295	1.076	.988	.877	1.010	1.155
Skewness	-.381	-.189	.070	-.603	.268	.547	-.432	-.473	-.549	-.063
Std. error of skewness	.427	.434	.427	.421	.427	.421	.427	.421	.434	.427
Kurtosis	.182	-.730	-.396	-.273	-.924	.096	-.441	.645	.546	-1.009
Std. error of kurtosis	.833	.845	.833	.821	.833	.821	.833	.821	.845	.833

a. Multiple modes exist. The smallest value is shown.

Table 1 shows that the scores of all the variables in the model were above the mean ( $m=2.5$ ) of the 5-point Likert scale: they were all considered important for the success of sustainability initiatives. The variable “competences and training” was given the lowest rating indicating that it was perceived to contribute less to sustainability initiatives ( $2.67\pm 1.295$ ); “research of efficiency” was given the highest rating indicating that it was perceived to contribute more to sustainability initiatives ( $3.79\pm 0.902$ ). With reference to competences and training, although the literature urged the development of special education programs that connect healthcare professionals with sustainability (Rich et al., 2013; Ramirez et al., 2013; Rogers et al., 2009; Sarriot et al., 2004, Frumkin et al., 2008; Schroeder et al., 2012), this study shows that competences and training were not considered so much relevant in implementing new projects for sustainability. This is due to the actual rigidity of the academic system that is incapable to deal with sustainability; indeed, what is currently recommended to academic institutions is a) to become able to produce socially robust knowledge based on the interaction among different epistemic cultures needed to face interdisciplinary SD projects; and b) to focus on real world problems which require this kind of interactions to be solved (Miller et al., 2011). With reference to research of efficiency, given the strong financial pressure exercised on hospitals, the rationalization of resources through efficiency and a lean approach can help hospitals be sustainable in the provision of quality services (Schroeder et al., 2012).

In the presence of normal distributions of variables the values of skewness and kurtosis are equal to zero; the bigger the departure from zero, the less the data are normally distributed. Table 1 shows that all the variables have values of skewness that depart from zero, except for “clinical possibilities” and “stakeholders’ support”. While for kurtosis, only the variable “dedicated time” has a value near to zero. The variable “culture” was bimodal; thus, normality of the distribution for the variable was excluded. To test the results, the Kolmogorov–Smirnov test was conducted and for all the variables in the model the test indicated significant deviation from normality (the significance level of all the items considered in the IC model were each less than 0.5). For these reasons the author opted for a non-parametric approach because it would be more suitable for non-normal distributions of variables and for small samples. The results of the stochastic ordering test are presented in Table 2.

**Table 2: Stochastic ordering test – variables’ level of significance**

<b>Variables</b>	<b><i>P</i> value</b>	<b>Adjusted <i>P</i> value</b>
Culture	0.4629	0.4629
Efficiency research	0.1950	0.1950
Competences and training	0.4629	0.4629
Change management	0.4629	0.4629
Leadership support and dedicated structures	0.4114	0.4114
Clinical possibilities	0.4629	0.4629
Stakeholders collaboration	0.4471	0.4471
Employees commitment and collaboration with managers	0.0639	0.1135
ICT and advanced technologies	0.0043**	0.0127*
Dedicated time	0.1809	0.1809
<i>Combined test</i>	0.0127*	0.0284*

\*  $p < 0.05$ , \*\*  $p < 0.01$

Table 2 shows a stochastic order presence by analyzing the combined test p-value (equal to 0.016). However, the stochastic order presence is attributable only to the response variable “ICT and advanced technologies” (p-value equal to 0.006) whose test is significant at a 0.01 level. This means that the higher values of relevance of ICT and advanced technologies for the implementation of SD projects were attributed by GDs belonging to G3, that is, the GDs who had adopted sustainability strategies. Results are confirmed when looking at the adjusted p-values for the partial test on ICT (p-value equal to 0.0127) and global test (p-value equal to 0.0284).

## **8. Conclusions**

The aim of the present chapter was to investigate strategic planning and implementation of sustainability in the Italian PHS and, in particular, to analyze the role of IC in sustainability development. The study aimed at fill the gap about the examination of the link between IC and organizations’ strategies (Vagnoni and Oppi, 2015; Lev, 2014). The results of the conducted survey showed that the majority of GDs had adopted or were planning to adopt a formalized strategy for sustainability. In addition, except for three organizations that did

not set dedicated internal positions for SD, the managerial approaches to deal with sustainability were various (coherently with Ling et al., 2012), and mainly pertained to the use of informal and occasional structures or collegial bodies that can mix their competences in favor of sustainability decision making. In the case of HCOs adopting informal/occasional structures, it can be presumed that sustainability is implemented through piecemeal projects rather than being the object of a continuous stable commitment. Despite clear organizational positions are needed to achieve the commitment of professionals to SD (Schroeder et al., 2012), the results showed that some HCOs confined sustainability problem solving to dedicated offices and positions. Appointing single individuals within the organization to deal with sustainability might represent a risk, as sustainability can become a problem of the individual; moreover, in consequence, this approach hinder interactive whole system participation which is one of the element that can favor members' stable commitment to SD (Ling et al., 2012). Therefore, the divide among specializations or disciplines (Evans et al., 2015) do not allow HCOs adopting this approach to fully exploit the potential of intellectual capital for sustainability planning and implementation.

More than a half of GDs implemented SD projects on the sustainable use of natural resources, waste management, Green Public Procurement, health and security projects within hospitals, promotion of sustainable lifestyles and prevention on the use of drugs, and actions to improve financial sustainability. Less attention has been devoted to projects such as sustainable canteen service, gender equality, actions to improve employment rate, sustainable mobility, personalized and eco-friendly care paths and comfort and eco-compatibility of healthcare facilities.

The results of the investigation of the role of IC in the implementation of sustainable projects showed that all the assets of the proposed "Sustainable Intellectual Capital for HCOs" framework were said on average to have contributed to the implementation of sustainability projects. Among IC assets, "competences and training" were perceived by GDs to make the least contribution to sustainability, whereas "research of efficiency" was perceived by GDs to make the most contribution to sustainability, probably due to the fact that the rationalization of resources in the Italian healthcare system has pushed HCOs to efficiency in order to guarantee a sustainable provision of quality care services. Leaner approaches can indeed help hospitals to maintain their sustainability (Schroeder et al., 2012). Furthermore, a stochastic ordering test showed that GDs who attributed higher values of relevance to ICT in the implementation of sustainability projects were also the ones implementing sustainability strategies. This finding is not surprising considering the

interpretation of sustainability emerging from the Italian PHS, where technologies and, in particular, informatics, have been claimed to promote a shift toward sustainability, not only for administrative services but also to improve clinical paths. In fact, technologies and ICT applications in particular, are considered enablers to sustainability in the healthcare sector (Ball and Lillis, 2001; Eysenbach, 2001). Technologies and ICT applications can be used in several ways: to assess appropriateness of care services and drug treatments; to improve physicians' decision making by the storage of a patient's entire clinical history; and to increase patients' ability to manage their own diseases with the direct and continuous supervision of healthcare professionals. Despite the above-mentioned benefits, concerns such as the security of patients' data, the limited interoperability of informatics systems and the higher costs of informatics platforms threaten their application in the healthcare context (Séror, 2001; Anderson, 2007).

Limitations of the present study concerns the limited number of respondents for the analysis of survey results. Moreover, the contribution of connectivity between different types of intellectual capital (human, structural and relational capital) to HCOs' sustainability planning and implementation has not been analyzed, and constitute a possible issue to unlock through further research. Future lines of research should also focus on comparative studies, to discuss how the principle of sustainable development has been interpreted and operationalized in different countries and contexts, as well as IC conceptualization that can vary across HCOs as they can be characterized by different mandates, histories and cultures (Evans et al., 2015). This will help policy makers to have a more complete view on healthcare sustainable development when setting new policies for the healthcare service considering the role of intellectual capital plays for value creation and organizational performance (Lerro, et al. 2014; Vagnoni and Oppi, 2015).

In addition, further case studies could explore the benefits and limitations linked to the implementation of technologies and ICT applications in SD, and more in general, the role played by different IC assets in the adoption of sustainability strategies, as recommended by literature that calls a) to critically discuss how IC works and is managed within organizations (Dumay and Garanina, 2013; Guthrie and Dumay, 2015), and b) to focus on connectivity which is the "glue" of human, structural and relational capital of HCOs (Habersam and Piber, 2003). The study has practical implications: first, the developed model of Sustainable IC for HCOs can help healthcare managers to focus on the assets that are needed to make their organizations more sustainable. The testing of the model in different contexts can help managers to focus on IC components that are more weak and need reinforcement processes in order to contribute to sustainability. The presented model

is not exhaustive and can be modified/extended to other IC components that can emerge from the organization's conceptualization of IC; as a matter of example, further research can look to personal experiences and attitudes of healthcare employees impacting to SD as part of the human capital of HCOs. The originality of the present work lies in the fact that it represents the first attempt to investigate the strategic management of sustainability in the Italian healthcare context, and to deepen the role of IC assets in promoting HCOs' sustainable development. The authors hope this study encourages debate on sustainability in the public sector because it currently represents an under-investigated topic.

## Chapter 4

### *Healthcare sustainability and the role of intellectual capital: evidence from the Emilia Romagna regional health service*

**The chapter represents a draft of a paper that has been submitted to the *Journal of Intellectual capital*. Do not cite without permission.**

#### **1. Introduction to the chapter**

The aim of this chapter is to investigate the role of intellectual capital (IC) in promoting the sustainable development (SD) program of the Emilia-Romagna Health Service. Based on the the analysis of the literature concerning intellectual capital in healthcare organizations, and on the analysis of the literature on assets contributing to SD in healthcare, the author identified the following potential enablers of sustainability in HCOs: leadership and competences, culture, performance measurement and incentives systems, social capital and technologies. Through a case-study approach, perceptions of a division of the Regional Directorate of Public and Social Health, the General Directors and healthcare professionals belonging to HCOs of the regional health system (the setting), were analyzed through interviews, focus groups, documentation and direct observation in order to investigate: a) the emerging definition of SD within the setting; b) the role of IC above mentioned assets, if any, in the achievement of the regional SD goals. Intellectual capital has been claimed to have the potential to help HCOs facing emerging performance challenges of accountability, transparency, cost efficacy and quality of services for competitiveness (Sillanpää et al., 2010). In addition, scholars have called to look at IC has including social and environmental concerns to allow organizations' as well as society and ecosystem's value creation (Allee, 2000). Indeed, intellectual capital in HCOs, especially human resources, can nurture the growth of relations with stakeholders as their primary mission (Pirozzi and Ferulano, 2016). Despite this, studies on the role of intellectual capital in non-profit organizations such as HCOs are limited in number (Sillanpää et al., 2010), while IC literature have urged researchers to analyze IC practices as well as how IC works or don't work in public organizations' setting (Guthrie and Dumay, 2015), challenging models and frameworks (Dumay et al., 2015). Therefore, it should be taken into account that different assets present different functionalities which can support their "opposing" strategies, and consequently, the role they play within the organizational strategy should be examined (Mouritsen, 2006). For these reasons, the study aims to fill the identified gaps discussing a



case study on the role of IC as enabler or hindrance to the implementation of a regional program for sustainable healthcare service. Indeed, single assets examination can provide insight on how to manage and measure these elements within the analyzed setting (Sillanpää et al., 2010). The chapter is structured as follows. Section 2 provides a brief outlook on studies about IC in healthcare organizations, with the aim to identify how IC practices have been investigated. This will help to detect the most important literature gaps the present study tries to overcome. While section 3 addresses the challenge of HCOs' sustainable development, advocating intellectual capital as a critical success factor that can stimulate organizational change towards SD; from the section, it is possible to define some IC assets that emerge as potential enablers of SD in HCOs. Section 4 revise the major literature on these assets' contribution to SD. Section 5 is about case study's presentation, while section 6 is on methodology used. In section 7 results are discussed, and in section 8 some conclusions are proposed.

## **2. Intellectual capital in HCOs: some lights**

Intellectual capital represents a key determinant of all organizations, contributing to value creation and competitive advantage (Lerro et al., 2014; Allee, 2000). In HCOs, IC can nurture the growth of relations with stakeholders (Pirozzi and Ferulano, 2016) being these organizations characterized by multiple missions including patients' care, teaching and research (Peng et al., 2007); moreover, IC can help HCOs to meet new performance challenge (Sillanpää et al., 2010) of high quality services in front of diminishing public funding and increasing transparency and accountability required by institutions and customers. This institutional context urges hospitals to effectively manage and measure their performance looking at care quality, volume of services and medical behavior while containing costs (Peng et al., 2007). Only recently scholars have examined IC within the public sector, especially healthcare, where little empirical investigation has been conducted (Peng et al., 2007; Sillanpää et al., 2010). The majority of these studies are based on MERITUM (2002) classification of IC that distinguish human, structural and relational capital as value creators within organizations. Human capital includes competences, personal experiences and attitudes that people mobilize within the organizations; structural capital represents routines, procedures, systems (including performance measurement) and technologies which characterize organizations' internal environment, while relational capital represents the connections the organization develop with its stakeholders. Indeed,

the taxonomy is robust (Habersam and Piber, 2003) and has been used to test the majority of IC management practices within HCOs at the current state of the art.

As a matter of example, Habersam and Piber (2003), studying two different HCOs extended the classification of MERITUM (2002) including connectivity capital, which represents relations among human, structural and relational capital contributing to knowledge growth within such entities. Moreover, examining IC practices within the cases-study the authors classified knowledge as quantifiable, literal (explainable), intuitive (explicable) and black box (not explicable), where literal, intuitive and black box knowledge capitals require new means of visualization to be accessed, other than financial/metric ones. Sillanpää et al. (2010) examined IC practices in different Finnish non-profit elderly care organizations: the study showed that, despite IC management was already adopted by the organizations under analysis, they lacked a comprehensive view of IC and needed better information and reporting tools to accomplish their strategic goals. Vagnoni and Oppi (2015) through action research examined the introduction of an intellectual capital reporting framework in a university hospital for strategic purposes; the involvement of different professionals proved to be useful to focus on strategic goals, visualizing intellectual capital variables that represented critical success factors to be managed, measured and reported. Pirozzi and Ferulano (2016) designed a framework to manage and measure intellectual capital with reference to financial and non-financial performance, and proposed it to be tested in a healthcare organization. Peng et al. (2007) studied healthcare managers' perceptions on human, structural and relational capital within the Taiwanese industry accounting for each resource's contribution to value creation. Moreover, the author, looking at how each resource got investments or provided returns to others found that: a) human capital, despite its primary importance, provided high value to organizational and relational capital, but got less investments from them; on the contrary, organizational capital attracted greater investment but provided less returns to other categories of capital (Peng et al., 2007). Human capital can empower both relational and organizational capital through top managers' decision-making capabilities and personal relations, doctors' reputation, capability to provide care services; however, regulatory pressures for cost control can disvalue human capital such as employees that were considered relevant key stakeholders of HCOs (Peng et al., 2007). Despite little evidence is present on IC's value for HCOs, studies in this line of research are warmly recommended: Guthrie and Dumay (2015) called to analyze IC practices as well as how IC works or don't work in public organizations' setting continuing in the tradition of public sector organizations' research; Dumay et al. (2015) pointed out the necessity to engage in public

sector research on intellectual capital to contribute to knowledge on IC that can benefit citizens with practical implications; Allee (2002) urged organizations to focus on the broader role IC can play with reference to society and ecosystem (thus at a macro-level) when it's entrenched with social and environmental concerns. Moreover, researchers are asked to continue third wave studies on IC practices (Dumay and Garanina, 2013), challenging frameworks and models in public sector contexts (Dumay et al., 2015), focusing on how different IC elements can behave within the same organizational strategy (Mouritsen, 2006) and on how to render exploitable knowledge that cannot be easily quantified and accessed (Habersam and Piber, 2003). HCOs as knowledge intensive organizations (Peng et al., 2007) provide a unique opportunity to fill these gaps investigating how different IC elements are intertwined and work for strategic goals, and in particular sustainable development' ones as suggested by recent literature (Allee, 2000).

### **3. Intellectual capital for HCOs' SD: potentialities**

In literature, the connections among Intellectual Capital (IC) and Sustainable Development (SD) have been mainly discussed looking at the firms' sector. This line of research includes: strategical role of IC (Mertins and Orth, 2012; Robinson et al., 2006; López-Gamero et al., 2011); the effects of intellectual capital on sustainable performance (Chen, 2008; Yahya et al. 2014; Liu, 2010), reporting practices (Pedrini, 2007; Oliveira et al., 2010; Dumay, 2016); green innovation and relational capital (De Marchi and Grandinetti, 2013).

Only recently, scholars have begun to discuss the potential of IC for sustainability's achievement with reference to the public sector, and in particular, in the healthcare context; examples for the Italian healthcare service are Botturi et al. (2015) and Lavallo et al. (2015). Despite the relevance, the topic has assumed at the international level, Botturi et al. (2015) argues that sustainability of healthcare systems can be achieved if urgent actions are taken to a) strengthen the role of social capital for sustainability by means of co-operation between citizens and professionals in planning and assessment of healthcare services; b) develop professionals' competences devoted to innovation for sustainability, c) change the healthcare organizations' culture and structure in order to overcome the main efficiency orientation of healthcare services and embrace SD, d) improve the exchange of health data with the use of ICT and social web that can increase patients' ability to manage their own diseases and support healthcare professionals during decision-making. Borgonovi and

Compagni (2013) discuss about the necessity to involve citizens and patients in shaping the healthcare system's capability to satisfy their needs and solicit to strength the personalization of care paths, as a support for diversity and inclusivity principles. Pencheon (2013) argues that three challenges exist within the healthcare systems to be addressed in order to enable sustainability: patients should be accompanied in the management of their diseases by collaborative approaches including the key role of healthcare professionals; technology should enable prevention by health data management and the provision of home care to patients; living with environmental resource limits should stimulate the capability to spend for value in healthcare and to enact environmental and social co-benefits (for e.g. if we prevent, we spend less on undue treatments; if we increase the rate of physical exercise and do not use transport, we improve our health's status and do not pollute our environment). For this purpose, a sustainable healthcare system requires to account for both the costs and the value in the long term (Pencheon, 2011) and to introduce incentive systems supporting sustainable model of care (Pencheon, 2015). On the same line, Naylor and Appleby (2013) argues that sustainability requires to change *where*, *what* and *how* healthcare is delivered; in detail, hospitals can contribute in different ways to sustainability: they can reduce the environmental impact of facilities and transports for staff and patients (*where*); they should focus on prevention and evidence-based care to minimize care necessities (*what*); they should change the general models of care furnishing (*how*), in particular promoting the integration between health and social care, reducing the inappropriate prescribing of drugs, exploiting technological innovations that can guarantee financial, environmental and social sustainability. The process of change is often a matter of leadership, especially when HCOs' managers have to overcome the traditional focus on costs and quality of service provision and to start including environmental concerns in their way of thinking and doing things (Chiarini and Vagnoni, 2016). Then, leadership challenge consists in introducing SD goals in HCOs' planning activities, structure, monitoring and accountability systems (Pencheon, 2015). Despite a huge potential of IC could be detected from previous literature inherent to the shift toward sustainable healthcare, research in this field has been overlooked. For these reasons, the present chapter aims at filling the gap, analyzing the contribution of intellectual capital to the Sustainable Development Program of a Regional Healthcare Service of Italy, the Emilia Romagna one, that started its commitment to sustainability in the year 2007, when a new policy agenda was set. From the above-discussed emerging context the following items were identified: leadership and competences, organizational culture on SD, performance measurement and incentive systems, social capital and technologies. Thus,

these items' contribution to SD was deeply investigated and presented in next section, before the conduction of the case-study.

#### **4. Literature review: Intellectual capital for hospitals' SD**

Intellectual capital's potential for sustainable healthcare has been critically examined by scholars discussing the role of:

- ❖ Leadership and competences in developing SD organizational culture;
- ❖ Performance measurement (PM) and incentives' system to reinforce SD decision-making and organizational culture;
- ❖ Social capital to enact sustainability projects;
- ❖ Technologies' contribution to organizational change toward sustainability.

With reference to the above-mentioned items it's possible to notice that: a) they all pertain to HCOs' intellectual capital (and its three components of human, structural and relational capital), and, b) they could become potential enablers of sustainable value creation in HCOs (Chiarini and Vagnoni, 2016; Pencheon, 2015; Botturi et al., 2015; Lavallo et al., 2015; Borgonovi and Compagni, 2013; Pencheon, 2013; Naylor and Appleby, 2013). Each element's role for healthcare SD is discussed in detail as follows, examining the major literature in the field.

##### ***4.1 Leadership and competences for SD***

When talking about culture, despite several works depict it as a necessary element to grow the ground of sustainable healthcare (Ramirez et al., 2013), empirical evidences showed how sustainability sensitiveness in HCOs has not been developed yet (Griffiths, 2006), and in some cases is one of the persisting barriers to achieve sustainable development goals (Ling et al., 2012). Despite the increasing attention posed by international institutions on environmental issues and on the need to reduce healthcare facilities' environmental impact, the introduction of green practices in hospitals remains subject to false myths and contradictions including the lack of complementarity between cost containment and profit strategies, and doubts on the economic convenience of green solutions (Topf, 2005). In order to destroy the barriers to SD culture's development, Topf (2005) proposes staff interdisciplinary and periodic classes to enable the dialogue on sustainability; this way organization's members can become aware about sustainability issues, can develop sustainability competences thanks to mutual exchanges with colleagues, can try try to implement green practices within their professional routines. In her vision of

organizational responsibilities enabling SD: administrators should lead the change; technicians can contribute to teach the staff to apply green practices with the right means; external auditing should help develop new environmental capabilities; clinic professionals and nurses can try to apply green innovations within care paths (Topf, 2005). Interdisciplinary teams are more able to face relevant challenges such as to orient staff toward sustainability sensitiveness: the involvement of communities of practices (such as facilities management, nurses and physicians) within the hospital make possible to program for sustainability aligning organization's environmental goals with the ones of the departments (Albers Mohrman et al, 2013). Staff teamwork combined with the presence of a strong organizational culture on sustainability can be an effective driver for eco-innovations (Milić, 2014). Employees' commitment in turn, depends on the leadership's capability to communicate how sustainability affects hospitals' core activities, and to make clear which are the available tools to measure and incentivize health professionals' sustainable performance (Ling et al., 2012). Leadership and management policies represent the necessary elements to commit people to sustainability strategy (Goh and Marimuthu, 2016). However, studies pertaining to this research strand showed that senior management sometimes prioritize the fitness of SD with hospital's budget constraints (Sandrick, 2009; Naylor and Appleby, 2013), and do not set goals in accordance with technicians (for ex. engineers) who are the main providers of sustainability competences (Hrickiewicz, 2016). As a result, organizational commitment to sustainability cannot become effective and sustainability competences development cannot progress. As Albers Mohrman et al. (2013) argued, sustainability requires to develop new capabilities, that cannot be present in the organization, through internal and external networking in order to exploit sustainability knowledge.

#### ***4.2 PM and incentives: relationship between SD culture and decision-making***

At the current state of the art, sustainability performance measurement in hospitals has scarcely developed; as a way of example, Grose and Richardson (2013) argue that the available tools to evaluate the performance of the hospitals' sustainable supply chain are mainly ignoring social impacts or are based on poor data to assess local impacts of purchasing practices. In other cases, hospitals are not measuring environmental performance, while interviews shown that evaluation is especially needed when new projects are developed and have to get the approval from senior executives: in particular, the assessment of costs and health benefits of environmental projects can prove their usefulness and thus, can help overcome the resistance of the General Director

(Hrickiewicz, 2016). Several performance measurement systems exist in other sectors, but they need to be adapted to contextual characteristics of health and social care (Naylor and Appleby, 2013). In the healthcare setting, examples of the tools combining social, economic and environmental performance are few. However, the transition to sustainability means to define goals, assess the performance and be accountable to allow these initiatives becoming stable ones (Albers Mohrman et al, 2013). Moreover, the development of sustainability accounting models in the public sector has been highly recommended given the potential it has to orient national policies (Ball and Bebbington, 2008). When discussing the role of incentive system to which performance measurement is strictly connected, individual incentives can be positive enablers of sustainability change agents when applied to training initiatives (Albers Mohrman et al, 2013). However, the scarcity of literature in the field does not allow to identify which kind of reward should be provided to personnel developing sustainability competences or adopting best practices. Moreover, studies show mixed results: as a way of example, senior managers tend to perceive team-based incentives as more effective of individual ones, while financial incentives are of low impact compared to the ones based on reputational reward (Ling et al., 2012).

#### ***4.3 Social capital in sustainability projects***

Evidences of the potential of IC for sustainable development are present also in the literature pertaining social capital. The concept of social capital in healthcare has been discussed by Helliwell and Putnam (2004) and new literature developments recognize social capital as fundamental to achieve sustainable healthcare services (Botturi et al., 2015). In literature the so called *grassroots innovations*, defined by Seyfang and Smith (2007; p.585) as “*networks of activists and organizations generating novel bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved*” are found with reference to hospitals’ sustainability. Hospitals have started to be involved in partnership with NGOs to promote campaigns on local food consumption. Moreover, Walker and Preuss (2008) report cases of healthcare Trusts networking with local SMEs to develop local procurement projects and Private Finance initiatives (despite private finance to be suitable for HCOs requires not only to be cost efficient, but also environmental impact reduction providing benefits to the local community). Networking can thus represent a way to incorporate and develop sustainability knowledge deriving from the external environment inside HCOs, and is mutually beneficial to the extent it impacts on local development in terms of increased

employment or improvement of the community health status (Albers Mohrman et al, 2013). As a way of example, in the construction of new hospitals' buildings, to consider patients' exigencies can guarantee better accessibility to the service for which the building is constructed, and thus, continuity of care (Sandrick, 2009). Social networks between healthcare professionals and patients might benefit community's health and sustainability; in rural areas, where secondary healthcare services are decreasing, the medical contribution of GPs and nurses is fundamental as they are the ones who develop the greater understanding of the local context and can enable a sustainable community's health (Farmer et al., 2003).

#### ***4.4 Technologies' contribution to shift toward sustainability***

Literature has depicted technological innovation as one of the main lever that can support healthcare systems to shift toward sustainability, by renewing care pathways as well as making administrative work more efficient. Ling et al. (2012) showed how healthcare leaders perceive technologies as relevant in reducing the environmental impact of the hospital, but benefits connected to their introduction are not always clearly recognized by the individual; where technology is well-known and its potentialities are of public domain, it tends to be accepted by the healthcare population and more easily implemented. Internet communication technologies can also incentivize new care paths as well as home care and allow patients to independently manage disease with the supervision of qualified health professionals (Pencheon, 2015). However, their adoption depends strictly on incurred costs (Ling et al., 2012; Séror, 2001), to competences for making them functioning (Tamburisi, 2006) and investments in corporate culture (Séror, 2001) to effectively adopt and use innovation.

### **5. Case study's presentation**

The Emilia Romagna Healthcare System was chosen as the setting of the analysis, as it represents one of the first attempts to introduce SD policy-making in an Italian regional healthcare context. The case is exploratory in nature (Scapens, 2004), being the role of intellectual capital for HCOs' sustainability not approached before with reference to the Italian context. SD in the health policy of the Region became relevant when the Directorate of Health and Social Policy, through the D.G. R. no. 686 of 2007 ("Delibera di Giunta Regionale"), activated the Program called "The Regional Health System for Sustainable Development". The role of the Region on these issues was to provide to local health



authorities and hospitals guidelines to be applied for specific SD topics. The purpose of the program were specified by D.G.R. no. 602 of 28 April 2008, whose role was to constitute two working groups driving goals' setting: one worked on the rationalization in the use of energy, and the other studied the implementation of an environmental management system for healthcare organizations to help map consumptions and impacts of hospitals in the use of natural resources as well as in the production of waste. As stated in the D.G.R. no. 686 of 2007, the primary goals for energy management were: to set strategies for energy procurement in order to optimize savings while ensuring the continuity of procurement; to help hospitals gain incentives for the use of renewable resources and support energy stewardship through guidelines on the rational use of energy; to favor the technology transfers through partnerships with universities. To this trail, sustainable development program was said from one side, to activate primary prevention strategy reducing environmental impacts of hospitals, and from the other side to improve efficiency. Following up the action areas defined by the resolution, many interventions were implemented overtime by the working groups: as a way of example, guidelines for waste management and disposal were set and applied by local care facilities, energetic requalification of buildings towards co-generation and tri-generation plants was realized, and best practices on the use of natural resources were spread through educational campaigns. After nine years of interventions, the Region renewed its engagement on SD, however, at the current state of the art, little is known about the emerging interpretation of sustainability within the regional health service (referring to regional, organizational and operative levels), and thus, how it affects strategy formulation and implementation. In addition, the role of intellectual capital in mediating the introduction of sustainability practices within the regional healthcare system has not been yet investigated. Thus, the study tries to answer two main research questions: a) How *sustainability* is perceived in the Emilia Romagna Healthcare Service?, and b) Which is the role of intellectual capital, if any, in the implementation of the regional *sustainability* program inside HCOs?

## **6. Methodology**

To answer the above research questions, the author investigated the perceptions of actors at different hierarchical levels of the regional health service through semi-structured interviews and focus groups. The author conducted an interview with the Head of the Service "Facilities and technologies in health and social care" of the Directorate of Health and Social Policy pertaining to the regional healthcare service (indicated in the Results

section as RH), and one with the regional waste manager (RWM). The author also conducted five interviews with GDs of Local health authorities and university hospitals (GD1 to GD5) and two focus groups with healthcare professionals at the operative level, including physicians, pharmacists and nurses working inside healthcare facilities (there were 21 participants in the first focus group and 20 in the second focus group, respectively indicated as F1 and F2). The literature suggests to use purposive sampling to select the study's participants depending on the research aims (Ritchie et al., 2003; Suri, 2011); the interviewees from the regional Directorate and the General Directors were chosen as they all deal with the strategic management of and making decisions about sustainability within the regional healthcare service, and thus, they sufficiently know which are the factors affecting sustainability performance in health care organizations (homogeneity criterion).

The focus groups' participants were chosen on the base of homogeneity and opportunity sampling techniques (Patton, 1990; Ritchie et al., 2003). Then, focus groups were composed by healthcare professionals attending academic advanced training programs to become managers of health structures (such as HCOs' departments). Based on the literature (Suri, 2011), opportunistic sampling was also considered suitable to explore the research topic (intellectual capital for HCOs sustainable development) as it is currently in an early stage of development. Moreover, it was considered as useful to look at different hierarchical levels to overcome the bias of the so-called interpretations of image-conscious informants (Eisenhardt and Graebner, 2007). Thus, multiple samples can be used for *comparison* and *control* purposes (Ritchie et al., 2003). The interview protocol focused on the following issues:

- ✓ The interviewees' interpretation of "sustainability" which is affected by the context in which healthcare professionals operate.
- ✓ The policy orientation with reference to SD in the regional healthcare system, as it can affect people's perception of how to act in a sustainable manner.
- ✓ The sustainability projects actually implemented by HCOs.
- ✓ The role of human, structural and relational capital in supporting sustainability initiatives inside HCOs with reference to the assets' theoretical framework developed in the literature section.

The interviewees were informed about the aims of the research and gave their availability to participate in the project. Interviews were recorded with the permission of the interviewees, and notes were also taken to help the researcher reconstruct the whole process of enquiry. The interview process lasted approximately 15 hours with an average

time per interview of 45 minutes. Interviews with GDs and with the Directorate of Health and Social Policy (RH and RWM belonging to the “Facilities and technologies in health and social care” Service) were held at their workplace; focus groups were organized for practicality at the researcher’s workplace. Interviews were then transcribed and coded to identify themes to be discussed. To conduct the case study the methodology proposed by Eisenhardt (1989) was followed; at the beginning, a within case study analysis was conducted to identify the preliminary themes with reference to: a) participants’ interpretations of sustainability and b) perceptions on the role of IC in achieving sustainability within HCOs.

The preliminary themes and subthemes identified based on the literature review are presented in Table 1; they were refined during the content analysis process.

**Table 1: Themes and subthemes for the content analysis**

<i>Themes</i>	<i>Subthemes</i>
Interpretation of Sustainability	Personal definitions of SD
	Personal approach to deploy SD in healthcare
Leadership Support	GD’s attention (sensitivity) to SD topics
Competences	Organizational positions with SD competences
	The relationship between staff and organization’s <i>sustainability champions</i>
Social capital	Partnerships with external stakeholders
Organizational culture	Staffs’ sensitiveness to SD topics
Monitoring systems	The tools to assess SD performance
	The focus on economic performance
Technologies	The role of innovations in moving towards sustainability

Subsequently, a cross-case pattern search was conducted to find shared concepts and discordant ones. Reiteration and updates to widen the interview protocols were also processed to enrich the picture of the whole case and define final constructs reaching saturation (Suri, 2011). Confronting case study’s findings with current literature was then useful to refine theory (Eisenhardt, 1989). To increase the internal validity and reliability of the case study, triangulation was conducted (Merriam, 1995) using archival data from HCOs including interviews released in local newspapers, regional policy documents (such as the Waste Management Plan of the Region), presentations in national conferences and

training courses, booklets describing sustainability training projects and initiatives developed within the SD Program and HCOs' websites. Questionnaires were also developed and sent to GDs who were not available for interview in order to capture their perceptions on SD. Moreover, direct observation was also used to examine the interviewees' lectures (for the GDs level) during academic medical courses in which the researcher took part and in which the GDs were invited as guest key note speakers. The time dimension was relevant to verify whether there had been modifications in the perceptions of the interviewees. Questionnaires to GDs were also used to compare findings with interviews in order to find analogies and discrepancies: seven questionnaires were collected from a total of 14 regional HCOs.

## 7. Results:

To improve the readability of the study, the findings from the case-studies are organized around the main themes emerging from the analysis of interviews and archival documents (please see table 2).

**Table 2: Summary of the case studies' findings.**

The detected themes	Main findings
SD interpretations and organizational culture	<ul style="list-style-type: none"> <li>• From the Region's point of view, the main goal of a sustainable healthcare system is to provide the level of care defined by law. Environmental sustainability is secondary to this.</li> <li>• A residual part of GDs and some of the healthcare professional seen sustainability as a problem of resources to be allocated to care.</li> <li>• Staff has not yet developed awareness on environmental issues (despite the author found evidences on proactivity to develop sustainable practices) or perceive them to be distant from their competences.</li> </ul>
Factors impacting on sustainability cultural	<ul style="list-style-type: none"> <li>• Environmental protection is not seen</li> </ul>

development	<p>as a primary prevention strategy.</p> <ul style="list-style-type: none"> <li>• SD projects are not systematic and not perceived as a core activity; this prevents hospitals from developing a stable engagement on SD;</li> <li>• From some GD's point of view, environmental sustainability expertise and best practices are not considered by healthcare professionals as critical attributes for the provision of health services.</li> <li>• Incentives are not sufficient to enable staff commitment for SD, but can make personnel more aware of their contributions in term of sustainable provision of care.</li> <li>• The permanent dialogue on sustainability should be incentivized by the General Director.</li> </ul>
Who are the potential facilitators?	<ul style="list-style-type: none"> <li>• GDs proved to be sufficiently active for sustainability project implementation</li> <li>• Technicians can cover an informative/training role to increase the capability of hospital's populations to deal with sustainability.</li> <li>• Initiatives driven by facilitators were not sufficient to develop a culture of best practices at the operative level (the one of healthcare professionals).</li> </ul>
Technologies' contribution to organizational change for sustainability	<ul style="list-style-type: none"> <li>• Technologies would be able to support the shift toward sustainability through several</li> </ul>

	<p>applications ranging from administrative to clinical settings.</p> <ul style="list-style-type: none"> <li>• GDs recognize the need to invest more in clinical setting but also to accurately assess the investment in innovations from multiple points of view: the economic, cultural, and competences' ones.</li> <li>• Health data management through technologies can support prevention strategies.</li> </ul>
Monitoring and reporting system	<ul style="list-style-type: none"> <li>• For the managerial levels, cost accounting has a preponderant role in monitoring activities. While the need to introduce stable sustainability performance measurement systems that combine social, environmental and economic spheres is stressed.</li> </ul>
Collaboration with territorial stakeholders	<ul style="list-style-type: none"> <li>• Main partnerships with firms and local municipalities have been developed over time to reduce environmental impact of hospitals, to favor local growth, to sustain new care paths that see the integration with the local territory.</li> </ul>

Each theme is discussed in details below.

### ***SD interpretations and organizational culture***

Interpretations on sustainability given by all level of interviews tend to be attributable to social, economic, and environmental dimensions of sustainable development, although with some differences on the way each dimension contribute to sustainable healthcare. From the Regional division's point of view and from the majority of GDs who were

interviewed it emerged as the main goal of sustainability to ensure the provision of the sufficient level of care (the so called “Livelli Essenziali di Assistenza”) as defined by the Legislative Decree no. 502/1992, and more in general, sustainable welfare over time. Budget constraints represented major limitations to the delivery of care services, but environmental sustainability policy driven by the Region was seen as instrumental to cost savings. The message conveyed by the Sustainable Development Program was thus to free resources that could be used for hospitals’ core activities and help the NHS to satisfy the emerging patients’ needs. Moreover, environmental sustainability was also considered as instrumental to health, but collateral to the main targets of ensuring care provision.

*The key objectives of a sustainable healthcare system are to ensure levels of essential care to all.[...]so let's say that environmental sustainability is secondary to the targets of health provision of the Regional healthcare service. Then, to ensure people's health is the main objective, and we can contribute to it for example with less pollution.. environmental sustainability contributes to the health of citizens, not only through care but also through prevention strategies [...]. It is not the savings that moves us, but the rational use of resources. Healthcare organizations have budget constraints. If we are able to rationally use energy what we save we can invest elsewhere, for example in core activities such as citizen care (RH).*

For two of the General Directors interviewed sustainability in healthcare was especially a political problem of resource allocation. Conversely, environmental impact reduction for one of the GD is not considered as a traditional core activity in which he often intervenes and thus, it does not represent a priority. For the other, the Region has started to be attentive to environmental sustainability, setting objectives in the Regional Mandate of General Directors; in this case,

*regional guidelines are applied each time it's necessary to redevelop or build new buildings, or optimizing the use of resources inside health facilities, coherently with budget.*

In this latter case, environmental sustainability is perceived as a strategic goal, but definitely not systematic, as it is limited to new construction projects.

Sustainability is put to the test of whether an insufficient resource allocation corresponds to a universal care provision when analyzing health professionals’ insights from focus groups. Half of the participants argued that Region should revise the level of care offering enacting co-payment strategies. But when stimulated to talk about eventual projects including

potential social, economic and environmental interactions of hospitals' activities, they presented initiatives that were already in place, and suggested how to improve the ones pertaining to their own clinical routines. To this trail:

*Through the centralization of the lab for personalized preparation of cancer cares and the adequate programming we guarantee the use of drugs without waste. This means that expensive therapies [...] can be used with zero waste [...]. Moreover, we have therapeutic education projects in which our patients periodically meet a multidisciplinary health professionals' team; it has the role to help them overcoming the criticalities of a cancer care path. (F1)*

This assertion revealed that sustainable healthcare is deployed mainly looking at social and economic sphere, while less attention is posed on environmental dimension, whose relevance is not yet well understood by all the healthcare facilities' staff. Staff has not yet developed the awareness on environmental problems or perceive them to be distant from their skills. To this end:

*We and patients get problems with the reduction of hospitals' parking..we discovered that the hospital has a mobility manager and after that actions were made to improve the accessibility.. (F2)*

For these, reasons, despite progress has been achieved by the Region within the Sustainable Development Program, culture of environmental preservation and its link with economic and social benefits in healthcare cannot be said to have fully spread. This is consistent with studies of Griffiths (2006) and Topf (2005) arguing that steps have already to be made in order to enact SD organizational culture in healthcare system through personnel involvement. Moreover, the leaders' focus on resource allocation's dimension of sustainability risk to overhang the benefits that could be achieved through the integration of environmental and social spheres; when leadership is more attentive to resource allocation, environmental projects which could be developed, remain subject to the assessment of economic feasibility and are not seen as long-term investments that can positively affect health. This is consistent with the works of Sandrick (2009) and Naylor and Appleby (2013) arguing that budget constraints represent for healthcare leaders one of the major barrier to sustainability implementation and improves our knowledge on the importance of removing these constraints in order to help HCOs to carry out their social function.



### ***Factors impacting on sustainability cultural development***

A major problem affecting the development of SD culture is that environmental protection is not seen in connection with health, and in particular, is not considered as primary prevention for the healthcare system under analysis, at least at the operative level.

Talking about the possibility to acquire an Environmental Management System Certification for HCOs, the Waste Manager said:

*To me, this it (EMS certification) represents primary prevention. However, to the majority of people, it's seen as a way to divert resources from the healthcare system. This is because there isn't a diffuse culture on prevention and on the way you can achieve it managing environmental impacts. (RWM)*

In addition, major obstacles to sustainability implementation are that: a) projects on SD are not systematic, not perceived as a core activity, but remained isolated, determining a permanent lack of networking to increase individuals' commitment and to contribute to the growth of the culture ground for SD; b) environmental sustainability expertise and best practices are not considered as critical attributes for the provision of health services by some healthcare professionals<sup>1</sup>.

*Healthcare professionals do not perceive environmental competences as contributing to the quality of their performance. However, these competences are transversal and must overcome the level of personal attitudes, they have to become competences that characterize their performance.(GD2)*

In terms of intellectual capital, the lack of relational capital among different professionals within HCOs do not allow knowledge transfers for competences improvement, and consequently, impedes the growth of the organizations' sustainable knowledge. The lack of a cultural ground impedes also cross-fertilization among different assets of structural capital, as sustainability thinking is not routinized in processes, structures and systems to support sustainable development goals.

Some GDs argued that organizations' engagement towards sustainability should be joint by leaders' capability to communicate and spread best practices, as well by the incentive systems able to recognize the value of the results achieved. Some attempts were thus made to growth organizational capital through the introduction of rewarding system, although

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<sup>1</sup>While to GDs, hospital's technical and supporting services are more inclined to be engaged in sustainability because it has a direct link with their core activities.

they represented isolated practices within the setting of analysis. In addition, the power of incentives is not clear; some of the healthcare leaders - think that introducing sustainability goals in wards' budget serve to make clear to professionals that such goals are part of the measurement, and thus, they contribute to operative units' performance. Indeed, the introduction of sustainability in budget formats to one GD has been depicted as increasing healthcare professionals' awareness about their contribution to SD. Others think incentives alone are not sufficient to sensitize staff on sustainable development issues, and should be accompanied by a clear vision by the top management on the importance to include these issues in hospitals' operations. To this end:

*When I arrived there I had to slam my punches, but at the end, I made it [...] communication it's all..the leader has the capability to convince professionals about the importance of sustainability and to actuate best practices (GD2)*

The quote emphasized the need for a better support from leadership; leaders indeed, can orient personnel behavior and sensitiveness to SD acting as an example, and spread best practices throughout the organization. Relational capital between leaders and healthcare professionals should be strengthened with the support of organizational capital: managerial philosophies of SD should be oriented to reach individuals at various level of the organization and promote a process of change. In order to enact this process is essential to develop a permanent dialogue on sustainability issues that affects hospitals' operations with staff: organizing periodic and interdisciplinary meetings can help people to overcome the difficulties to deal with SD, to favor the growth of a SD cultural ground (Topf, 2005) and to develop the right competences to make sustainability work (Albers Mohrman et al, 2013). Moreover, the lack of a shared vision (and of healthcare professionals' involvement in setting strategic priority) on sustainability within the HCOs under study affects also the contribution of different IC assets can provide for SD. Indeed, healthcare professionals' competences are not exploited, as the organizations lack mechanisms to let knowledge emerge from them. From the case was also possible to notice that incentives system processes have just started to be applied at the operative unit level, but the need to explore other incentives' typologies is suggested given the mixed results of studies pertaining to this research area.

### ***Who are the potential facilitators?***

Two key players were detected by interviewees as potential facilitators for the promotion of a culture of sustainability inside healthcare organizations: the General Director and the technicians belonging to supporting staff, responsible for the management of resources within facilities. Thus, human capital in terms of competences and personal attitudes to sustainability was seen as essential to develop specific projects, although limited to managerial and supporting services' levels and not including clinicians and other health professionals' one. GDs, from interviewees' perceptions, proved sufficiently attentive to environmental problematics; as a way of example the interviewees from the regional Service "Facilities and technologies in health and social care" discussed about positive experiences in energy conservation and heating management being applied in all the healthcare facilities of the territory; interventions were taken in the renewal of old buildings as well as in the design and construction of new ones and solutions ranged from photovoltaic to co-generation and tri-generation practices. Regional campaign on limiting waste in energy consumption led GDs to adopt a series of training initiatives directed to healthcare professionals to raise awareness about the importance of reducing hospitals' environmental impact. The monitoring system introduced to assess resource consumptions of regional healthcare facilities was also said by Regional interviewees to stimulate competition among healthcare structures and therefore, in case of a negative performance, ensured that the GDs gave explanations on the base of their regional mandate. From conferences speeches, booklets and Regional Policy documents was possible to track the progress that was underlined by interviewees on the actions taken under the supervision of the General Directors. However, it was also noticed by the Head of the regional Service "Facilities and technologies in health and social care" that:

*with reference to energy management, the cost of consumption currently impacts in a poor way on the budget of HCOs (representing 1.5% of regional funding)... then, the attention of GDs to environmental themes is parameterized to that.*

In addition, for one of the GDs, economic burdens were seen as monopolizing the attention and did not allow to spend time for sustainability projects, despite the will to act.

The other person that was identified by interviewees as a potential promoter of sustainability culture was the technician that is responsible for resources' management in hospitals (the so called energy manager, mobility manager, or the Head of the Health Direction for waste management). Technicians' experience in networking with local

municipalities and other partners, and competences they make available in setting new projects can help them becoming *sustainability champions* in HCOs. The interviews revealed that the role played by these professionals was essential when implementing best practices' initiatives that are dedicated to engage hospital's staff (e.g. the rational use of energy, the correct waste disposal, etc.). Indeed, the educational and informational role they cover is necessary when trying to commit hospital's population to SD.

The technicians also participated in the definition of the general orientations of the Sustainable Development Program at the Regional level through temporary working groups. To this end:

*If we have to set guidelines for maneuvers in cardiac surgery it's clear that we do not call for the executive or regional official, but we ask the collaboration of professional who works in the hospital like heart physicians. By analogy, when it came the time to plan the rational use of energy or sustainable mobility we called energy and mobility managers as well as health directions for waste from the local health institutions as experts, to help setting the guidelines.(RH)*

Goals that are fixed at the regional level, are then reported and discussed in each healthcare organization with the GD for their implementation at the operative level. To this trail, the organization's representatives (energy managers, health direction and mobility managers) are the *transmission belt* between the Regional Division and top management, proving the value of relational capital in spreading change for sustainability. During time the working groups have been rationalized in number to allow more efficient and faster decision-making; however, while final decisions on implementation of new SD practices are made in plenary session at the presence of all the original components of each group. Generally, there are no permanent and dedicated internal structures in health organizations that deal specifically with sustainability, showing a lack of support from the structural capital perspective. Despite the active role of the facilitators in promoting sustainability initiatives, the lack of involvement of the operational level (*the healthcare professionals' level*) meant that the organizational culture on sustainable development did not develop within HCOs. Sustainability communication by senior managers has not always been sufficient to enact positive engagement from professionals, and the occasional sustainability initiatives (such as training courses) taken by technicians made it impossible to develop a permanent staff's commitment to SD. The lack of dialogue and interdisciplinarity among leaders, technicians and the operative level of healthcare professionals as a barrier to SD culture's development

is confirmed by Topf (2005) that proposes interdisciplinary meetings to win possible conflicts and perplexities impeding the introduction of sustainability practices.

### ***Technologies' contribution to organizational change for sustainability***

Technologies would be able to bring great benefits to the organization of the Regional HS as recognized by all interviewees. Their application ranges from the dematerialization of administrative procedures to clinical settings such as teleconsultation, to more complex and supra-regional areas such as the Italian Agency of Drugs' Authorization (AIFA)'s platforms for monitoring the effectiveness of innovative and expensive drugs that drives reimbursement policies. For the Region's perspective, investing in technologies requires the ability to disinvest in low-value and non-core activities. Then, environmental sustainability has been configured as instrumental to innovations: if the organization is able to save money by rationalizing the use of energy it can also free up resources that allow to acquire medical technologies to satisfy complex patients' need.

However, the majority of the interviewees think that technology currently is not expressing its full potential.

*Technologies hide a huge potential that we have started to explore only in a small part..you can start thinking about the uses of technologies other than those for which they were born, some days ago I attended a conference in which psychiatrists have tried to use tablets as a way to communicate with children presenting severe diseases, with incredible results. We need to invest more in that.(GM5)*

Factors hindering their implementation are not represented by the lack of platforms integration used by different health units, as the technical possibilities are able to bypass these difficulties. Also cultural acceptability of new technologies by elderly patients was not considered as a limit that discourages the introduction of innovations.

In any case, investment planning based on cost-benefits analysis were considered as a key to introduce the proper level of technologies inside HCOs. As a consequence, managerial philosophies such as cost containment and efficiency are balanced with utility for patients, combining economic and social perspectives for what concern sustainability, and connectivity between structural and relational capital for what concerns IC. Indeed, to avoid technologies' duplications was considered as the primary target for GDs in order to guarantee sustainability. A potential cause of unsustainability was represented by the fact that health professionals would have available the best options for innovations related to

care delivery, and they do not consider costs related to innovations' implementation and maintenance.

*The problem is that practitioners would develop technologies in a certain way but sometimes you are forced to let him take note that this is incompatible with available resources. There is an attention to the correct use of resources. When we buy a new technology we now require a plan that shows it is used efficiently; otherwise it means duplication and thus, increase costs and waste. (GD4)*

On the contrary, healthcare professionals tend to under-estimate the value of administrative platforms which are often perceived as innovations that increase the amount of work.

*For health services, if new administrative ICT platforms are not well supported, the risk is that the doctors perceive them as bureaucracy; these innovations require strong homogenization and standardization of activities. If we don't accompany personnel in the shift, innovations are perceived as rigid. (GD3)*

In addition, intangible costs related to competences, culture and infrastructures needed to make technologies work were considered by GDs when deciding to implement innovations, in line with the discussed literature on technology introduction in healthcare (Séror, 2001; Tamburis, 2006; Ling et al., 2012). Then, connectivity of different kind of knowledge assets was emphasized as necessary to make technology work for SD coherently with Habersam and Piber (2003).

Technologies' potential were also discussed for the management of healthcare data in line with Pencheon (2013), as it can support the shift toward a prevention based sustainable healthcare system, despite this requires the proactive role of healthcare personnel.

*To date 50% of the patients with chronic conditions in our province do not follow pathways of care. We are lucky to know who, through our information systems, suffers from a certain disease. With these data available, we have to "go out", and we have to bring them into care pathways. In this sense technology can help us change the way we manage patients. (GD5)*

### ***Monitoring and reporting systems***

In 2007, a monitoring system was created to collect data on health organizations regarding energy consumption and fuels and to monitor the production of medical waste. At the national level prevention policies stressed the intersection of the environmental and

epidemiological data for accurate decision-making. Despite the good proposals, the region recognized that such an ideal was not realizable in the brief term, and also at the international level, few relevant experiences in this field can be found. Monitoring other than economic and financial performance was considered in a pioneering stage: the tools used to assess territorial impacts such as environmental performance and stakeholders' satisfaction are not comparable among HCOs. Furthermore the kind of indicators used is less tested, new and poorly understood. In any case, General Directors stressed a willingness to strengthen this evaluation and adopt it in a stable manner, being the institutional mission of HCOs to increase population's health: thus, relationship with patients and the standards of care furnished should start to be monitored. To date, attempts to measure social and environmental sustainability have at least been introduced: for example in the *bilancio di missione*, sections on rational energy use, patient satisfaction, and community and firms' partnerships are found, but they are still in their infancy and have the main impact on internal management practices with small effect outside the hospitals. Some GDs underlined that with the introduction of accounting practices based on responsibility centers, "*new public management logics have emerged and totalize the attention of managers*" shifting the focus on cost items. This suggests that HCOs' relations with national and regional health authorities calling for cost containment and efficient resource allocation can hinder the development of sustainability performance measurement systems as part of structural capital. This confirms the findings of Peng et al. (2007) about the potential damage of such performance objectives to the leverage of intellectual capital within HCOs. However, given the social purpose of health organizations, respondents recognized the need to overcome cost accounting, and to start monitoring sustainability issues. These results are consistent with Grose and Richardson (2013) who argue about the need to assess social impact of activities, as well as with Naylor and Appleby (2013) affirming that the tools used to assess sustainability performance of hospitals can be borrowed from other sectors but they need to be contextualized to the specificities of healthcare. As a matter of fact, in the healthcare context we do not assist to generally accepted metrics to measure environmental impact. Moreover, directors are often driven to focus on short-term goals given the highly politicized environment and on annual budget constraints as they represent the characterization of the whole healthcare system (Naylor and Appleby, 2013). To consider the specificities of this particular context, and thus, balancing the knowledge on patients' needs with expertise on environmental matters, is essential to promote HCOs' sustainability (Ryan-Fogarty et al., 2016).

### ***Collaboration with territorial stakeholders***

By the time the interviews have highlighted the high degree of collaboration with companies as pertaining to relational capital that pushed energy projects for hospitals' plants; public-private partnership was the kind of collaboration mainly developed with reference to projects for the reduction of hospitals' environmental impact, as private partners can financially support building interventions. General Directors underlined that partnerships with firms were also beneficial for these latter: to buy local services was seen as a mean to increase the economic growth of the local community. Steps in this direction have also been confirmed by the literature presenting cases of collaboration between firms and hospitals, such as the one of Walker and Preuss (2008). Other interviewees cited local municipalities as the reference partner for sustainable mobility, in line with the need to set initiatives in accordance with the geography of the territory and with service possibilities that could be locally implemented (for example, parking for bikes, low CO<sub>2</sub> impact cars, for public transport' s subscriptions at preferential prices, etc.). Collaboration with local authorities was also seen fundamental when talking about the emerging models of care based on Health Houses, and promoting the integration with the territory to help patients access primary and social care (the Health House ("Casa della Salute") is indeed an *"organizational and structural solution aimed at fostering unified and integrated social and health care services"*, introduced by Balduzzi Law No.189 of 2012 (OECD, 2014: p.103)). This finds confirmation in Botturi et al. (2015) arguing that the actions taken within these new care paths are based on the development of social capital which aims to develop alliances among professionals, patients and caregivers to improve disease management and reduce the access to emergency care. In accordance with Albers Mohrman et al.'s (2013) study, networking in the analyzed case allowed progress on knowledge to implement sustainability practices that revealed to be widely beneficial for all the partners involved.

### **8. Conclusions**

The present work contributes to theory development on the role of intellectual capital assets play for healthcare sustainability reinforcing their value in front of few available evidence. Healthcare setting represents a suitable setting of analysis because IC management can support these organizations in dealing with new performance challenges emerging within the institutional context; these require HCOs to satisfy a plurality of missions (including sustainability). Moreover, the present study responded to the recent



call of scholars about the need to know how different IC practices work or not within the public sector context (Guthrie and Dumay, 2015), how they interact (Habersam and Piber, 2003) and behave within the organization's strategy (Mouritsen, 2006), how they can create value for society and ecosystem (Allee, 2000). Indeed, it represents the first attempt to look at the contribution of different IC assets pertaining to human, structural and relational capital to a Sustainable Development Program for a regional healthcare service. The study is geared to investigate the relationship between IC and SD in the healthcare context, where sustainability has traditionally concerned resources allocation problems for care provision; despite the findings show that the debate is still impelling, hospitals are starting to consider environmental sustainability at least as collateral to the provision of care. However, the present work underlined that to pursue environmental sustainability is not yet perceived by HCOs as a prevention strategy. Thus, the benefits of an integrated decision-making, considering the link between health and environmental impact reduction are not yet clear nor well supported by HCOs' monitoring systems. The study also contributes in providing some policy indications for the considered cases-study: in the analyzed setting, after nine years of programming, a permanent culture of sustainability has not grown. In line with scholars urging for research that benefit society with practical implications (Dumay et al., 2015), this finding represents a strong signal that institutions should consider when defining guidelines to enable sustainability planning and implementation within local HCOs. In detail, it emerges from the cases, that the operative level, the healthcare professionals' one, is not committed to SD given the lack of dialogue among the regional policy, the managerial levels, the technicians and the healthcare professionals' ones. The communication process enacted by managers stops with the technicians, that can contribute as human capital to educate staff to best practices; however, because of sustainability projects are not systematic, they do not permit to growth staff awareness on sustainability issues, to create networking activities to share ideas and practices on sustainability, and thus, to develop a SD organizational culture. Moreover, a lack of a shared vision on sustainability among the different members of HCOs (and of healthcare professionals' involvement in setting strategic priorities) affects the contribution of other IC assets for sustainable development: as a way of example, it does not allow the expression of clinicians' potentialities (competences and attitudes) as components of human capital to HCOs' sustainability. This could represent a relevant issue for the regional healthcare service, since the interviewed professionals will cover managerial roles within the analyzed structures. For these reasons, institutions and hospitals' top managers should enact a shared decision-making process, through which the

professionals are made aware of a) how sustainability affects the performance of the health system; b) how they can contribute to the sustainable provision of care services; c) how a sustainable provision of services requires a sustainable management of technologies as well as how to leverage assets that make these technologies work (for e.g. competences, culture, infrastructures, etc.). Creating a permanent dialogue, as prescribed by Topf (2005), can help overcome the traditional barriers that impede SD deployment within hospitals and develop a space in which different competences are integrated and put at the service of sustainability by way of interactions, and connectivity not only with reference to different IC categories of capital, but also within a same category, thus extending the contribution of Habersam and Piber (2003). This way, intellectual capital will show its maximum expression for the achievement of sustainable healthcare systems. Social capital if combined with structural innovations can be also relevant when centralizing the role of patients within emerging care paths, based on the integration with the local territory, strong relations with healthcare professionals, and communication technologies for health data management. Connectivity between relational and structural capital can strengthen the organizations' capability to achieve sustainability goals. Indeed, this combination enables patients to independently manage the disease with the necessary supervision of health professionals, but also with major awareness on care paths' criticalities. Networking with a system-wide approach has revealed to be beneficial both for hospitals and the local community (Albers Mohrman et al, 2013). Furthermore, the present study gave some insights regarding the assessment of sustainability performance of HCOs; although progress was made to expand the evaluation in social and environmental impacts areas, cost accounting was considered the predominant method to assess hospitals' performance; on the contrary, interviewees emphasized the need to introduce stable and comparable indicators to overcome the sole economic focus and begin to look at other sustainability areas. The tools adopted by HCOs to assess social and environmental performance were mainly used for internal reporting and did not generate an external dialogue with local stakeholders. Moreover, despite it has been emphasized that sustainability evaluation was also peculiar for the renewal of General Directors' mandate, it is not clear how it affects a) regional judgements on the adequateness of managerial actions and b) strategy's optimization through improvements. In this sense, relations with institutions' channel calling for cost control causes the prioritization of cost accounting tools, and hinders the spread of sustainability performance measurement systems as a part of organizations' structural capital. This work urges institutions and researchers to act for the development of assessment frameworks that can be shared between hospitals and their relevant

stakeholders, as sustainable healthcare requires assessment to go beyond the financial focus and reach its social mission. Limitations of the study resides in the low number of healthcare professionals involved in the analysis, and on the sampling method adopted to select the focus groups, in part due to research opportunity. Despite this, it represents, at the time of writing, one of the first attempts to investigate GDs' and healthcare professionals' perceptions with reference to sustainability implementation in healthcare. Further research should increase the number of participants and the involvement of other hospitals' representative stakeholders groups to increase the richness and quality of findings, as well to analyze their perception about the role of IC for sustainable healthcare. In addition, to extend the analysis to other Italian regional healthcare services could allow to compare different regional approaches to SD, being sustainable healthcare a discourse which is currently under development in this particular setting. The present study gave an outlook of the behavior of different IC assets for HCOs' sustainable development, providing evidences of connectivity across and within IC categories, as well as potential conflicts between them. Further research should deepen these issues trying to identify assets' combinations that can contribute more to sustainability, and signal potential conflicts among different IC assets to be solved in order to reach SD strategic goals.

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**Appendix 1: Questionnaire to analyze SD operationalization in Italian healthcare organizations: “Lo sviluppo sostenibile nelle aziende sanitarie italiane”**

**“LO SVILUPPO SOSTENIBILE NELLE AZIENDE SANITARIE ITALIANE”**

**SEZIONE 1: LO SVILUPPO SOSTENIBILE IN AZIENDA SANITARIA E SUA IMPLEMENTAZIONE**

**Questions no.1 and 2 are omitted.**

**3.L’azienda è dotata di un piano d’azione per lo sviluppo sostenibile? Per piano si intende il piano delle performance o piano programmatico, o in generale un processo di pianificazione che sia ufficializzato in un documento strategico. Barri il riquadro corrispondente.**

- adottato stabilmente
- in progresso (approvato e in attesa di implementazione)
- in attesa di approvazione
- non adottato

**4.Chi si occupa dello sviluppo sostenibile in azienda?**

- organismo collegiale a ciò dedicato (specificare: \_\_\_\_\_)
- ufficio a ciò dedicato (specificare: \_\_\_\_\_)
- figura professionale a ciò dedicata (specificare: \_\_\_\_\_)
- strutture organizzative informali o occasionali (specificare: \_\_\_\_\_)

**5.Rispetto a quali campi sono state implementate azioni di sviluppo sostenibile?**

- riduzione dell’impatto ambientale tramite il controllo dell’uso di energia e delle risorse naturali quali acqua, gas, etc.
- gestione del servizio mensa e della fornitura di cibo
- pari opportunità
- aumento dell’occupazione
- sicurezza e salute per la popolazione dell’ospedale
- trasporti sostenibili
- public procurement, gare, appalti
- gestione dei rifiuti e riciclaggio
- programmi per la promozione di stili di vita sostenibili
- prevenzione anche sull’utilizzo dei farmaci
- percorsi di cura/prestazioni sanitarie personalizzati, e/o eco-friendly
- comfort ed eco-compatibilità delle strutture sanitarie
- sostenibilità economico-finanziaria temporale
- nessuno di essi

**6.Se ha contrassegnato almeno uno dei campi precedenti, scelga quello che secondo Lei contribuisce maggiormente alla realizzazione di uno sviluppo sostenibile. Spieghi**



brevemente in che cosa consiste l'azione o le azioni implementate per quel campo.

<b>7. In che misura ritiene che i fattori seguenti possano aver favorito l'adozione dei progetti da Lei indicati? (indichi un valore da 1 a 5 come riportato in tabella).</b>					
<i>Fattore</i>	<i>Intensità</i>				
	Affatto =1 Estremamente=5				
Cultura aziendale	1	2	3	4	5
Disponibilità di risorse finanziarie	1	2	3	4	5
Ricerca dell'efficienza interna	1	2	3	4	5
Collaborazione tra leadership e dipendenti; partecipazione attiva	1	2	3	4	5
Presenza di competenze di sostenibilità dettate da formazione universitaria specifica e progetti di apprendimento	1	2	3	4	5
Adozione di pratiche di <i>change management</i>	1	2	3	4	5
Presenza di ICT ed innovazione tecnologica	1	2	3	4	5
Supporto della leadership e presenza di strutture dedicate	1	2	3	4	5
Tempo	1	2	3	4	5
Possibilità cliniche	1	2	3	4	5
Collaborazione e supporto degli stakeholder del territorio	1	2	3	4	5
Fattori architettonici	1	2	3	4	5
Altro (specificare) _____	1	2	3	4	5
Altro (specificare) _____	1	2	3	4	5
Altro (specificare) _____	1	2	3	4	5

Questionnaire's sections from 2 to 4 are omitted.

