

Title: “Healthcare sustainability and the role of intellectual capital: evidence from an Italian Regional Health Service”

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Abstract:

Purpose: The aim of the article is to investigate the role of intellectual capital (IC) in promoting the sustainable development (SD) program of the Emilia-Romagna Health Service. The contributions of the following assets were investigated: leadership and competences, culture, performance measurement and incentives systems, social capital and technologies.

Design and Methodology: The case study was conducted following a hierarchical approach: perceptions of the Regional Directorate of Public and Social Health, the General Directors and healthcare professionals of the regional health system (the setting), were analyzed through interviews, focus groups and documentation in order to investigate: a) the emerging definition of SD within the setting; b) the role of IC, if any, in the achievement of the regional SD goals.

Findings: SD culture did not expand at the operative level because of the lack of involvement of healthcare professionals in a permanent dialogue for sustainability. Sustainability projects were not systematic which restricted the development of staff awareness of sustainability issues. Social capital enabled environmental projects and medical projects that increased patients’ involvement in disease management. Technology could help the shift toward sustainability, but it requires consideration of tangible and intangible costs for its successful adoption. SD performance measurement and incentives were in their infancy; cost accounting continues to dominate the healthcare sustainability debate.

Research limitations/implications: Despite the low number of healthcare professionals involved in the focus groups, the paper represents one of the first attempts to frame their perceptions on SD implementation in healthcare.

Practical and social implications: Regional institutions should consider new ways of enacting SD which should be more inclusive of healthcare professionals. The establishment of a permanent interdisciplinary dialogue on sustainability would develop human, social and structural capital for sustainability. Health care organizations (HCOs) should monitor the environmental and social effects of their operations to enact their primary mission: the promotion of health.

Value: The paper contributes to theory development related to the role of IC for SD in the public sector context and, in particular, in the healthcare sector where evidence is currently limited.

Article classification: Case study

Key words: Intellectual capital; Sustainable development; Healthcare

1. Introduction

The literature on the connections among intellectual capital (IC) and sustainable development (SD) mainly looked at the private sector. It includes: the strategic role of IC (Mertins and Orth, 2012; Robinson et al., 2006; López-Gamero et al., 2011); the effects of IC on sustainable performance (Chen, 2008; Yahya et al., 2014; Liu, 2010), reporting practices (Pedrini, 2007; Oliveira et al., 2010; Dumay, 2016); and the relation between environmental innovation, intellectual capital and corporate reputation (De Leaniz and Del Bosque, 2013).

It is only recently that scholars have begun to discuss the potential of IC for the achievement of sustainability in all kind of organizations including also public sector ones (Allee, 2000) and, in particular, in the healthcare context where sustainability has been discussed as a major challenge to address (United Nations, 2015). Indeed, public sector organizations (such as HCOs) as social services providers can play a relevant role in implementing and assessing tracks towards SD (Ball and Bebbington, 2008). They also have relevant responsibilities to support the shift of the whole society towards sustainability as their activity substantially impacts on the public (see as a matter of example World Health Organization (2009) for hospitals). Moreover, they can act as *change agents* promoting sustainability initiatives that can benefit their stakeholders. In HCOs, implementing SD requires to balance concepts of cost containment with quality of services and with reduction of environmental impacts of healthcare facilities (Jameton and McGuire, 2002). Focusing on examples of research about the role of IC for SD in the Italian healthcare service the studies of Botturi et al. (2015) and Lavallo et al. (2015) can be considered as pioneering, given the limited number of evidences about intellectual capital role for HCOs' SD. Botturi et al. (2015) argued that sustainable healthcare systems can be achieved if urgent action is taken to: a) strengthen the role of social capital for sustainability through cooperation between citizens and professionals in the planning and assessment of healthcare services; b) develop professionals' competences devoted to innovation for sustainability; c) change the culture and structure of healthcare organizations (HCOs) to overcome the main efficiency orientation of healthcare services and embrace SD; and d) improve the exchange of health data with the use of information and communications technology (ICT) and social web to increase patients' ability to manage their own diseases and support healthcare professionals during decision making. Borgonovi and Compagni (2013) discussed the necessity to involve citizens and patients in shaping a healthcare system's capability to satisfy their needs, strengthen the personalization of care paths, and as a support for diversity and inclusivity principles. Pencheon (2013) argued that healthcare systems face three challenges that need to be addressed 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; environmental resource limits should stimulate awareness of value in healthcare expenditure and lead to environmental and social co-benefits (e.g. if we prevent, we spend less on treatments; if we increase the rate of physical exercise and do not use transport, then we improve our health status and do not pollute). Naylor and Appleby (2013) argued that sustainability requires change to *where*, *what* and *how* healthcare is delivered; in detail, they argued that hospitals can contribute to sustainability by: reducing the environmental impact of their facilities and transport for staff and patients (*where*); focusing on prevention and evidence-based care to minimize care necessities (*what*); changing the general models of care furnishing (*how*), in particular promoting integration between health and social care, reducing the inappropriate prescribing of drugs, and 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 the huge potential of IC described in the literature that is inherent to the shift toward sustainable healthcare, research in this field has been overlooked. For this reason, the present paper aims at filling that gap by analyzing the contribution of IC to a SD program in a regional health service of Italy; the author selected the Emilia-Romagna Regional Health Service that started its commitment to sustainability in 2007 when a new policy agenda was set. The paper analyzes the emerging interpretation of SD within the regional healthcare system at the regional, organizational and operative level and the role of IC in the design and implementation of sustainability initiatives within local HCOs. The paper is structured as follows. Section 2 presents a review of the literature in which the author critically examined the potential of IC in the healthcare context, while section 3 focuses on the role of IC for healthcare organizations' sustainable development. Section 4 summarizes the history of SD in the Emilia-Romagna Regional Health Service. The methodology is described in Section 5. The results are presented in Section 6 and conclusions are drawn in Section 7.

2. Intellectual capital in HCOs: some lights

Intellectual capital represents a key determinant of all organizations, contributing to value creation and competitive advantage (Iazzolino and Laise, 2016; 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. Literature review: IC for the SD of hospitals

In a critical examination of the potential of IC for sustainable healthcare the author discusses the role of:

- ❖ leadership and competences in developing a 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 the concept of HCOs' intellectual 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. Each element constituting intellectual capital is discussed in detail in the following four subsections.

3.1 Leadership and competences for SD

Several works stated that organizational culture is a necessary element for sustainable healthcare (Ramirez et al., 2013); there is empirical evidence that sustainability awareness in HCOs has not been developed yet (Griffiths, 2006) and in some cases is one of the persisting barriers to the achievement of SD goals (Ling et al., 2012). Although international institutions have focused increasing attention on environmental issues and on the need to reduce the environmental impact of healthcare facilities, the introduction of green practices in hospitals remains subject to false myths and contradictions including a lack of complementarity between cost containment and profit strategies, and doubts about the economic convenience of green solutions (Topf, 2005).

To remove the barriers to the development of a SD culture, Topf (2005) proposed periodic interdisciplinary staff classes to encourage a dialogue on sustainability in which staff could become aware of sustainability issues, develop sustainability competences and implement green practices within their professional routines. Her vision of organizational responsibilities enabling SD is: administrators lead the change; technicians contribute by teaching the staff to apply green practices with the right means; external auditing helps develop new environmental capabilities; clinical professionals and nurses try to apply green innovations within care paths (Topf, 2005). Interdisciplinary teams are more able to meet challenges such as orienting staff toward sustainability awareness: the involvement of communities of practices (such as facilities management, nurses and physicians) within a hospital enables a program for sustainability in which the organization's environmental goals are aligned with the goals 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 the hospital's core activities, to inform the employees of the available tools, and to measure and incentivize health professionals' sustainable performance (Ling et al., 2012). Leadership and management policies are necessary to commit people to a sustainability strategy (Goh and Marimuthu, 2016). However, studies pertaining to this strand of research showed that senior management sometimes decides to implement SD if it fits with hospital's budget (Sandrick, 2009; Naylor and Appleby, 2013), and do not set goals in accordance with technicians' goals (e.g. engineers); technicians are the main providers of sustainability competences (Hrickiewicz, 2016). As a result, organizational commitment to sustainability cannot become effective and sustainability competences are not developed.

3.2 PM and incentives: relationship with SD culture and decision making

Sustainability PM in hospitals has scarcely developed; for example, Grose and Richardson (2013) stated that the available tools to evaluate the performance of a hospital's sustainable supply chain mainly ignore social impacts or the assessments of local impacts of purchasing practices are based on poor data. In other cases, hospitals do not measure environmental performance. Interviews showed that evaluation is particularly needed when new projects are developed and require 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 (GD; Hrickiewicz, 2016).

Several PM systems exist in other sectors but they need to be adapted to the contextual characteristics of health and social care (Naylor and Appleby, 2013). There are few tools in the healthcare setting that combine social, economic and environmental performance. However, the transition to sustainability requires definition of goals, performance assessment and accountability (Albers Mohrman et al., 2013). Moreover, the development of sustainability accounting models in the public sector has been highly recommended given its potential to orient national policies (Ball and Bebbington, 2008).

PM is connected to incentives systems; 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 enable identification of the kinds of reward that should be provided to personnel to develop sustainability competences or best practices. Moreover, studies show mixed results; for example, senior managers tend to perceive team-based incentives as more effective than individual ones, while financial incentives have less impact than incentives based on reputational reward (Ling et al., 2012).

3.3 Social capital in sustainability projects

Evidence of the potential of IC for SD is present in the literature pertaining to social capital. Nahapiet and Ghosal (1998) argue that social capital is composed by three facets: structural dimension relating to network ties and structure, relational dimension influenced by trust, obligations and norms and cognitive dimension representing the shared values and schemes characterizing the network; they all affect the access of individuals in the network, as well as the exchange and combinations of knowledge as intellectual 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 the achievement of sustainable healthcare services (Botturi et al., 2015). Social capital in HCOs has been defined through the concepts of recognition, horizontal and vertical trust, reciprocity between healthcare professionals groups, and its relevance for engagement in clinical improvements has been proved (Strömngren et al., 2016). However, when examining the potential of social capital for SD, the concept of social capital has been discussed considering also the relationships with external stakeholders to promote sustainable healthcare. As Hendryx et al. (2002; p.82) argue "*communities are assuming more responsibility for improving the health status of citizens by initiating new collaborative institutions such as community care networks, which combine available assets in more efficient and effective ways*". To this line, *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 begun to be involved in partnerships with NGOs to promote campaigns on local food consumption. Moreover, Walker and Preuss (2008) reported cases of healthcare trusts networking with local SMEs to develop local procurement projects and private finance initiatives (despite the fact that to be suitable for HCOs the private finance must not only be cost efficient, but also generate environmental impact reduction that provides benefits to the local community). Networking can thus represent a way to incorporate and develop sustainability knowledge derived from the external environment, and is mutually beneficial to the extent it impacts on local development in terms of increased employment or improvement of the community’s health status (Albers Mohrman et al., 2013). For example, patients’ exigencies should be considered in the construction of a new building for a hospital because it would improve access to the service for which the building is constructed (Sandrick, 2009). Social networks between healthcare professionals and patients might benefit a community’s health and sustainability; in rural areas, where secondary healthcare services are decreasing, the medical contribution of general practitioners and nurses is fundamental because they develop a greater understanding of the local context and can sustainably improve the health of a community (Farmer et al., 2003). Although social capital (Nahapiet and Ghosal, 1998) and relational capital as a part of IC (tripartite definition of MERITUM, 2002) refer to different literature conceptualization, both of them rely on the organization’s capacity of networking for value creation. In this study, the author chose to investigate the contribution of networking activities to SD, and thus, focused on relational capital as a component of the threefold definition of IC.

3.4 Technologies’ contribution to the shift toward sustainability

The literature has depicted technological innovation as one of the main levers that can support the shift of healthcare systems toward sustainability, by renewing care pathways as well as making administrative work more efficient. Ling et al. (2012) showed that healthcare leaders perceive technologies as relevant in reducing the environmental impact of hospitals, but the benefits connected to their introduction are not always clearly recognized; in situations in which the technology is well known and its potentialities are in the 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, the adoption of technology depends on incurred costs (Ling et al., 2012; Séror, 2001), on competences for making them functional (Tamburis, 2006) and investments in corporate culture (Séror, 2001) to effectively adopt and use innovation.

4. The setting

The healthcare system in Emilia-Romagna was chosen as the setting for our investigation of the role of IC for SD. SD in the health policy of the Region became relevant when the Directorate of Health and Social Policy, through a Resolution of the Regional Council (“*Delibera di Giunta Regionale*”), the D.G.R. number 686 (2007), activated a program called “*The Regional Health System for Sustainable Development*”. The case was exploratory (Scapens, 2004), being the role of IC for sustainable healthcare not approached before with reference to the Italian context. The role of the

Region in the SD program was to provide local health authorities and hospitals with guidelines to be applied to specific SD topics. The purpose of the program was specified by D.G.R. number 602 (2008), whose role was to constitute two working groups that drove the setting of goals: one worked on rationalization in the use of energy, and the other studied the implementation of an environmental management system for HCOs to help map the consumption and impacts of hospitals in their use of natural resources as well as in the production of waste. As stated in D.G.R. number 686 (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 technology transfers through partnerships with universities. On the one hand the SD program activated a primary prevention strategy to reduce the environmental impacts of hospitals and, on the other hand, it improved efficiency. Many interventions by the working groups were implemented in the action areas defined by the resolution; for example, guidelines for waste management and disposal were set and applied by local care facilities, energy requalification of buildings toward cogeneration and trigeneration 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 to SD; however, currently, little is known about the emerging interpretation of sustainability within the regional health service (referring to regional, organizational and operative levels) and, thus, its effect on strategy formulation and implementation is not known. In addition, the role of IC in mediating the introduction of sustainability practices within the regional healthcare system has not yet been investigated. Thus, our two main research questions are:

RQ1. How is *sustainability* perceived in the Emilia-Romagna Regional Health Service?

RQ2. What is the role of IC, if any, in the implementation of the regional *sustainability* program inside HCOs?

5. 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 the Regional waste manager (RWM). The author 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). It was considered useful to look at different hierarchical levels to overcome the bias of the so-called *interpretations of image-conscious informants* (Eisenhardt and Graebner, 2007). The interview protocol focused on the following issues:

- a) The personal interpretation of “sustainability” which is affected by the context in which healthcare professionals operate.
- b) The policy conducted with reference to SD in the regional healthcare system that affects people’s perception of how to act sustainably.

- c) The sustainability projects implemented by HCOs.
- d) The role of intellectual capital, as emerging in the theoretical framework, in supporting sustainability initiatives within HCOs. For clarity, the author adopted the concept of human, structural and relational capital as main dimensions of IC (MERITUM classification, 2002) to discuss the results.

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 took place during the whole month of October 2016 and 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 and took place in the month of May 2016. 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.

<Please insert table 1>

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. Confronting case study’s findings with current literature was then useful to refine theory. 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 to 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. The enquiry process continued until the reach a level of saturation had been reached.

6. Results

To improve the readability of the paper, the findings from the case studies are organized around the main themes that emerged from the analysis of interviews and archival documents (please see Table 2).

<Please insert table 2>

Each theme is discussed in detail below.

6.1 SD interpretations and organizational culture

Interpretations on sustainability given by all levels of interviewees tended to be attributable to social, economic and environmental dimensions of SD, although with some differences in the way each dimension contributes to sustainable healthcare. From the Regional Service's point of view and from the majority of GDs who were interviewed, the main goal of sustainability was to ensure the provision of a sufficient level of care (the so-called "Livelli Essenziali di Assistenza") as defined by the Legislative Decree number 502 (1992) and, more generally, 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 to free resources that could be used for hospitals' core activities and help the health service to satisfy the needs of patients. Moreover, environmental sustainability was also considered instrumental to health, but secondary 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 health 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 GDs interviewed, sustainability in healthcare was especially a political problem of resource allocation. Conversely, environmental impact reduction for one of the GDs was not considered a traditional core activity in which he often intervened and, thus, it did not represent a priority. For the other GDs, the Region has started to be attentive to environmental sustainability, setting objectives in the Regional Mandate of GDs; in this case, regional guidelines are applied each time it is necessary to redevelop or build new buildings, or to optimize the use of resources inside health facilities coherently with their economic possibilities and physical conditions of the estates.

Health professionals in the focus groups considered whether insufficient resource allocation corresponds to universal care provision. Half of the participants argued that the Region should revise the level of care offering enacting co-payment strategies. But when stimulated to talk about forthcoming projects including potential social, economic and environmental interactions of hospitals' activities, they presented initiatives that were already in place and suggested ways to improve the ones pertaining to their own clinical routines. For example:

Through the centralization of the lab for personalized preparation of cancer care and adequate programming, we guarantee the use of drugs without waste. This means that innovative therapies that can cost 56 euro per milligram can be used with zero waste...economic and environmental waste. Moreover, we have therapeutic education projects in which our patients periodically meet a team of multidisciplinary health professionals; its role is to help them overcome the criticalities of a cancer care path. (F1)

The above mentioned findings revealed that sustainable healthcare is deployed mainly in the social and economic spheres, while less attention is paid to the environmental dimension, whose relevance is not yet well understood by all the staff of healthcare facilities. Staff have not yet developed an awareness of environmental problems or they perceive them to be distant from their skills. To this end:

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

For these reasons, although progress has been achieved by the Region within the Sustainable Development Program, a 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 the studies of Griffiths (2006) and Topf (2005), who argued that steps have to be made to enact a SD organizational culture in healthcare systems through personnel involvement. Moreover, the leaders' focus on resource allocation's dimension of sustainability can risk overshadowing the benefits that could be achieved through the integration of environmental and social spheres; when leadership is more attentive to resource allocation, then the environmental projects that 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) who argued that for healthcare leaders, budget constraints represent one of the major barriers to sustainability implementation.

6.2 Factors impacting on sustainability cultural development

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

Talking about the possibility of acquiring Environmental Management System Certification for HCOs, the RWM said:

To me, this is an investment that 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 by managing environmental impacts. (RWM)

In addition, major obstacles to sustainability implementation are that: a) projects on SD are not systematic and are not perceived as a core activity but remain isolated, which leads to a lack of networking to increase individuals' commitment and to contribute to the growth of the culture of SD; b) environmental sustainability expertise and best practices are not considered critical attributes for the provision of health services by some healthcare professionals¹.

¹While to GDs, hospitals technical services are more inclined to be engaged in sustainability because it has a direct link with their core activities.

Healthcare professionals do not perceive environmental competences as contributing to the quality of their performance. However, these transversal competences have to become competences that characterize their performance. (GD2)

In terms IC, the lack of relations 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 toward sustainability should be joined by leaders' capability to communicate and spread best practices, as well by incentive systems that are able to recognize the value of the results achieved. Some attempts were thus made to growth structural capital through the introduction of rewarding system, although 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 a ward's budget serves to make clear to professionals that such goals are part of the measurement and, thus, they contribute to an operative unit's performance. Others think that incentives alone are not sufficient to sensitize staff to SD issues, and they should be accompanied by a clear vision from the top management on the importance of including these issues in a hospital's operations.

We set sustainability goals inside our budget format, to make the departments more aware of their contribution to achieving the objective. (GD4)

When I arrived I had to bang my fists on the table, but in the end, I made it [...] communication is all...the leader has the capability to convince professionals about the importance of sustainability and to actuate best practices. (GD2)

The quotes emphasize the need for a better support from leadership; leaders can orient personnel behavior and awareness of SD, they can act as an example and spread best practices throughout the organization. Relational capital between leaders and healthcare professionals should be strengthened with the support of structural capital: managerial philosophies of SD should be oriented to reach individuals at various level of the organization to promote the process of change. In order to enact this process it is essential to develop a permanent dialogue with staff on sustainability issues that affect a hospital's operations: organizing periodic interdisciplinary meetings can help staff to overcome the difficulties in dealing with SD, can encourage growth of a SD culture (Topf, 2005) and help staff 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 affect 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. The case study showed that the processes of an incentives system 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 from studies in this research area.

6.3 Who are the potential facilitators?

Two key players were detected by interviewees as potential facilitators for the promotion of a culture of sustainability inside HCOs: the GD and the technicians who are part of the 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' one. Interviewees perceived GDs to be sufficiently attentive to environmental problems; for example, the interviewees from the Regional Service of "Facilities and technologies in health and social care" discussed positive experiences with the energy conservation and heating management that was being applied in all the healthcare facilities of the territory. Interventions included the renewal of old buildings, there were interventions in the design and construction of new buildings and solutions ranged from photovoltaic to cogeneration and trigeneration practices. A regional campaign on limiting waste in energy consumption led to general managers adopting a series of training initiatives directed to healthcare professionals to raise awareness of the importance of reducing hospitals' environmental impact. The monitoring system introduced to assess the resource consumption of regional healthcare facilities was also said by regional interviewees to stimulate competition among healthcare structures, and in the case of a negative performance, it ensured that the GDs gave explanations on the basis of their regional mandate. From conference speeches, booklets and regional policy documents it was possible to track the progress that was underlined by interviewees on the actions taken under the supervision of the GDs. However, the Head of the Regional Service of "Facilities and technologies in health and social care" reported that with reference to energy management, the cost of consumption currently has a negative impact on the budget of HCOs (representing 1.5% of regional funding), and the attention of GDs to environmental themes was parameterized by energy costs; being environmentally sustainable was not a priority. In addition, one of the general managers saw the economic burden as monopolizing their time and the burden did not allow moments to be spent on 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 responsible for resources management in hospitals (the energy manager, mobility manager or the Head of Health direction for waste management). Technicians' experience in networking with local municipalities and other partners, and the competences they make available in setting new projects can help them become *sustainability champions* in HCOs. The interviews revealed that the role played by these professionals was essential when implementing best practices initiatives dedicated to engage the staff of the hospital (e.g. the rational use of energy and correct waste disposal). The educational and informational role they cover is necessary when trying to encourage a hospital's population to commit 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. For example:

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 professionals who work in the hospital such as heart physicians. By analogy, when it came to the time to plan the rational use of energy or sustainable mobility we called energy and mobility managers as well as the head of health services (for waste management) from the local health institutions as experts, to help set the guidelines.(RH)

Goals that are fixed at the regional level are reported and discussed in each HCO with the GD for their implementation at the operative level. The organization's representatives (energy managers,

head of health services and mobility managers) are the *transmission belt* between the regional Service of “Facilities and technologies in health and social care” and top management. Over time the working groups have been rationalized in number to allow more efficient and faster decision making; however, final decisions on the implementation of new SD practices are made in plenary session in the presence of all the original members of each group. Generally, there are no permanent and dedicated internal structures in HCOs that deal specifically with sustainability. Despite the active role of the facilitators in promoting sustainability initiatives, the lack of involvement of the operational level (healthcare professionals) meant that a SD organizational culture did not develop within HCOs. The communication of sustainability 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 did not develop into a commitment to SD by the permanent staff. The lack of dialogue and interdisciplinarity among leaders, technicians and the operative level of healthcare professionals as a barrier to the development of a SD culture is confirmed by Topf (2005); Topf (2005) proposed interdisciplinary meetings to overcome possible conflicts and perplexities impeding the introduction of sustainability practices.

6.4 Technologies’ contribution to organizational change for sustainability

All the interviewees recognized that technologies would be able to bring great benefits to the organization of the Emilia-Romagna Regional Health Service. 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’ (“Agenzia Italiana del Farmaco”) platforms for monitoring the effectiveness of innovative and expensive drugs that drives reimbursement policies. For the Region, investing in technologies requires the ability to disinvest in low-value and non-core activities. 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 free up resources that allow the acquisition of medical technologies to satisfy patients with complex needs. The majority of the interviewees thought that the full potential of technology currently has not been used.

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 designed, 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. (GD5)

The lack of integration of platforms used by different health units is not a factor hindering the implementation of technology because these difficulties can be bypassed. Also, cultural acceptability of new technologies by elderly patients was not considered to discourage the introduction of innovations.

Investment planning based on cost-benefits analysis was considered key to the introduction of the correct 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. In fact, avoiding duplication of technologies was considered the primary target for GDs to guarantee sustainability. Potential unsustainability was represented by the

fact that health professionals would have the best options available for innovations related to care delivery and they do not consider costs related implementation and maintenance of innovation.

The problem is that practitioners would develop technologies in a certain way but sometimes you are forced to let them take note that this is incompatible with available resources. There is 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, increased costs and waste. (GD4)

Healthcare professionals tend to underestimate 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 costs of 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 and capitals was emphasized as necessary to make technology work for SD coherently with Habersam and Piber (2003).

The potential of technologies was 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; however, it 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)

6.5 Monitoring and reporting systems

In 2007, a monitoring system was created to collect data on HCOs 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 short term and few relevant experiences in this field could be found at the international level. Monitoring other than economic and financial performance was considered to be 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 kinds of indicators used are less tested, new and poorly understood. GDs stressed a willingness to strengthen this evaluation and adopt it in a stable manner because the institutional mission of HCOs is to increase the 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 been introduced; for example in the *bilancio di missione* (the hospital's mission report), sections on rational energy use, patient satisfaction, and community and firms' partnerships are found, but they are still in their infancy and their main impact is on internal management practices with little effect outside 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 reported a need to assess the social impact of activities, as well as with Naylor and Appleby (2013) who affirmed that the tools used to assess sustainability performance of hospitals are often borrowed from other sectors with limited results and 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).

6.6 Collaboration with territorial stakeholders

The interviews highlighted the high degree of collaboration with companies 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 could financially support building interventions. GDs underlined that partnerships with firms were also beneficial to the firms and buying local services was seen as a way to increase the economic growth of the local community. Steps in this direction were also confirmed by the literature, which presented cases of collaboration between firms and hospitals (e.g. 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 (e.g., parking for bikes, cars with CO₂’ low impact and public transport subscriptions at preferential prices). Collaboration with local authorities was also seen as fundamental when talking about the emerging models of care based on Health Houses², and promoting integration with the territory to help patients to access primary and social care. This finding confirms the finding of Botturi et al. (2015) who argued 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 access to emergency care. In accordance with the study of Albers Mohrman et al. (2013), networking in the analyzed case study helped to develop knowledge to implement sustainability practices that were revealed to be widely beneficial for all the partners involved.

7. 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

² Health House (“Casa della Salute”) is 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).

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, that requires HCOs to satisfy a plurality of missions (including sustainability). Moreover, the present study responds 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 underlines 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.). As prescribed by Topf (2005), creating a permanent dialogue can help to 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. To this end, interactions and connectivity not only with reference to different IC categories of capital, but also within a same category, represent key issues, extending the contribution of Habersam and Piber (2003). This way, intellectual capital will show its maximum expression for the achievement of

sustainable healthcare systems. If combined with structural innovations, relational capital 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 to 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. Survey on a larger base of participants could also be used for hypothesis testing in order to confirm or confute the results of the present study, as prescribed by exploratory case-study methodology (Scapens, 2004). Further qualitative research could also focus on the involvement of other hospitals' representative stakeholders groups to increase the richness and quality of findings. 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. Future line of 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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Tables

Table 1: Themes and subthemes for the content analysis

Themes	Subthemes
Interpretation of sustainability	Personal definitions of Sustainable Development (SD)
	Personal approach to deploy SD in healthcare
Leadership support	General Director’s attention 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	Staff’s awareness of SD topics
Monitoring systems	The tools to assess SD performance
	The focus on economic performance
Technologies	The role of innovations in moving toward sustainability

Table 2: Summary of the case studies’ findings

The detected themes	Main findings
SD interpretations and organizational culture	<ul style="list-style-type: none"> • 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. • Some General Directors (GDs) and some healthcare professionals see sustainability as a problem of resources to be allocated to care. • Staff have not yet developed awareness of environmental issues (despite the author finding evidence of proactivity to develop sustainable practices) or perceive them to be distant from their competences.
Factors impacting on sustainability cultural development	<ul style="list-style-type: none"> • Environmental protection is not seen as a primary prevention strategy. • Sustainable Development (SD) projects are

	<p>not systematic and not perceived as a core activity; this prevents hospitals from developing a stable engagement with SD.</p> <ul style="list-style-type: none"> • From some GDs' point of view, environmental sustainability expertise and best practices are not considered by healthcare professionals as critical attributes for the provision of health services. • Incentives are not sufficient to enable staff commitment for SD, but can make personnel more aware of their contributions in terms of sustainable provision of care. • The permanent dialogue on sustainability should be incentivized by the GD.
Who are the potential facilitators?	<ul style="list-style-type: none"> • GDs proved to be sufficiently active for sustainability project implementation. • Technicians can cover an informative/training role to increase the capability of a hospital's populations to deal with sustainability. • Initiatives driven by facilitators were not sufficient to develop a culture of best practices at the operative level of healthcare professionals.
Technologies' contribution to organizational change for sustainability	<ul style="list-style-type: none"> • Technologies would be able to support the shift toward sustainability through several applications ranging from administrative to clinical settings. • GDs recognize the need to invest more in the clinical setting but also to accurately assess the investment in innovations from multiple points of view: economic, cultural, and competences. • Health data management through technologies can support prevention strategies.
Monitoring and reporting system	<ul style="list-style-type: none"> • For the managerial levels, cost accounting has a preponderant role in monitoring. While the need to introduce stable sustainability performance measurement systems that combine social, environmental and economic spheres is stressed.
Collaboration with territorial stakeholders	<ul style="list-style-type: none"> • Partnerships with firms and local municipalities have been developed over time to reduce the environmental impact of hospitals, to favor local growth, to sustain new care paths that integrate with the local territory.