

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/232708761>

Managing ICT-driven Innovation in the Health Care Industry: Evidence from an Empirical Study in Italy

CONFERENCE PAPER · SEPTEMBER 2009

CITATION

1

READS

64

2 AUTHORS:



[Mariano Corso](#)

Politecnico di Milano

88 PUBLICATIONS **967** CITATIONS

[SEE PROFILE](#)



[Luca Gastaldi](#)

Politecnico di Milano

45 PUBLICATIONS **86** CITATIONS

[SEE PROFILE](#)

MANAGING ICT-DRIVEN INNOVATION IN THE HEALTH CARE INDUSTRY: EVIDENCE FROM AN EMPIRICAL STUDY IN ITALY

Mariano Corso¹, Luca Gastaldi¹

¹ Department of Management, Economics and Industrial Engineering

Politecnico di Milano – Italy

luca.gastaldi@polimi.it

ABSTRACT

Health care organizations can gain a lot of value from ICT-driven innovations, but although there is a growing awareness of the potential benefits, results are often well under expectations. Evidence from a large empirical analysis (involving more than 150 Italian organizations, analyzed through a surveys and 60 case studies), suggests that the reasons for this lack of effectiveness are mainly two: (i) an organizational culture that still perceive ICT as a process support lever, and (ii) an ICT direction without the competences and capabilities required to play a real strategic role. To solve these problems health care organizations must work on the profile of Chief Information Officers (CIOs) and on the ICT department organization and governance mechanisms, with the objectives of bridging the gap between technological opportunities and clinicians' needs.

Keywords: Health Care Industry, ICT Strategic Management, ICT Governance, CIO Role, Innovation Management

1. INTRODUCTION

Health care is a complex industry facing great changes in its structure, organization, service delivery, operations, and many other aspects. Global attention to these themes is growing, together with resources allocated to them. As the World Health Organization stated, there have never been so many resources dedicated to Health Care: the global health economy is growing faster than the Gross Domestic Product, with a 35% increase in the world's expenditure on health from 2000 to 2005 (WHO, 2008).

Information and Communication Technology (ICT) has become indispensable for health care organizations – not only due to its increasing pervasiveness (Stegwee and Spil, 2001), but also because it can help answer the main innovation challenges of the sector: managerial and administrative processes rationalization (OECD, 2007), and clinical processes quality and risk management (IoM, 2001). The volume and the complexity of information to be managed make ICT essential for both running and innovating health care systems (Reidpath and Allotey, 2009). Despite this crucial role, most health care organizations barely give a second thought to ICT as an innovation source, and don't adequately analyze the organizational changes required to make all the benefits associated to ICT projects become a reality (Adler-Milstein, 2009).

2. THEORETICAL BACKGROUND

Analysis of innovation management literature illustrates little agreement among managers and academics, regarding what affects a company's ability to innovate. This absence of a common view implies the need to consider different innovation management theories for different situations (Shavinina, 2003).

The studies in the field of ICT-driven innovation have been characterized by two different perspectives: on one side, that of the researcher for whom ICT is a strategic lever (Ross et al., 1996; Porter, 2001; Broadbent, Kitzis, 2005; McAfee and Brnjolfsson, 2008); on the other, the studies which do not support the idea of a its strategic role (Farrell, 2003; Carr, 2003; Meyronin, 2004). Besides these differences, recent studies have shown that: (i) organizations across a range of industries were able to take advantage of new ICT capabilities only after making substantial changes (Adler-Milstein, 2009), and (ii) ICT is viewed as a platform to enhance automation, decision-making empowerment, control, coordination inside and outside the organization, and industry transformation. Therefore, there is a great emphasis on understanding how to:

- Integrate ICT with business processes;
- Increase the Chief Information Officer's (CIO) role in the development of ICT-driven innovations (Broadbent and Kitzis, 2005);
- Exploit external contribution to ICT-driven innovation (Dail and West, 2005);
- Experiment with innovative solutions of ICT organization (Agarwal and Sambamurthy, 2002).

The importance of all these challenges is highly perceived in the health care industry (Smaltz et al., 2006), but only marginal attention is paid to identify specific business areas, which can be innovated by ICT. Moreover, most of literature tends to ascribe gap in ICT innovation or effectiveness to one factor at a time: health systems' structure, costs of ICT, lack of fit between ICT applications and work practices (Avison and Young, 2007), CIOs' inefficacy (Smaltz et al., 2006), etc. Only recently, Herzlinger (2006) proposed a broad overview of six forces which can help or hinder efforts at innovation in the health care industry (industry players, funding, public policy, technology, customer, and accountability). Finally, literature is focused principally on U.S. health systems, and few papers analyze European ICT management solutions in health care.

3. RESEARCH QUESTIONS

Starting from these gaps in literature, the research aimed at understanding the dynamics of ICT-driven innovation in Italian health care organizations, and at identifying models to support ICT managers in interpreting and evolving their corporate roles. Research assumptions are:

- ICT can have a strategic role in the health care industry;
- ICT-governance's models should change according to the enterprise evolutions;
- Greater level of coherence between ICT management and health care organizations' strategy and governance is requested to exploit ICT-driven innovation;
- CIOs must be key players in the evolution of health care organizations.

Questions for the empirical research emerge directly from literature's analysis, and are:

- RQ₁: *What support for innovation is ICT giving to Italian health care organizations, and what trends can be identified?*
- RQ₂: *What are the barriers that represent obstacles to ICT-driven innovation in Italian health care organizations?*

- RQ₃: How is it possible to enhance the management of ICT-driven innovation in Italian health care organizations?

4. METHODOLOGY

The paper is based on a broader and continuative research initiative promoted since 2007 by the Politecnico di Milano School of Management, i.e. the *ICT in Health Care Observatory* (www.osservatori.net), which is specifically focused on the analysis of ICT-driven innovation in the Italian health care industry.

Given the nature of the specific research questions, qualitative research methodology was selected. In particular, *Grounded Theory* (GT) principles ([Glaser and Strauss, 1967](#)) were followed to emphasize the generation of theory from data collection during research. This research has been conducted using the process in Figure 1 1, and aimed to reconcile the *prima facie* divergence between the Glaserian concept of “theory emergence” ([Glaser, 1992](#)) with Straussian one of “theoretical sensitivity” ([Strauss and Corbin, 1990](#)). Multiple methods were used to obtain this goal: an Advisory Board, a panel of dynamic electronic surveys and case studies.

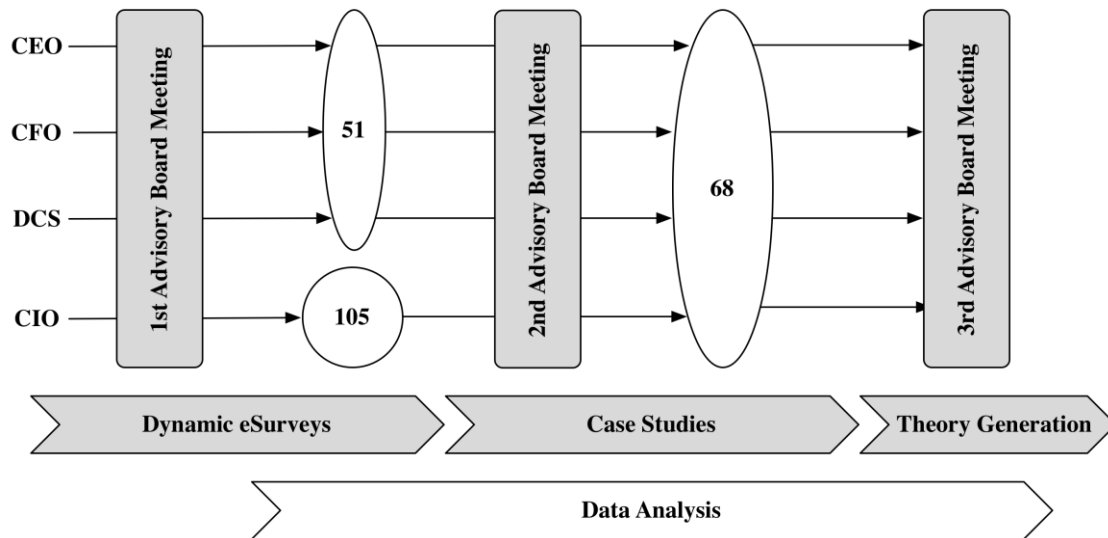


Figure 1: Research Process

4.1 ADVISORY BOARD

Advisory Group (AB) is a multidisciplinary group which advised and helped the research group in directing the focus of its study, in interpreting data, in anticipating future research issues and confirming results (social feedback). The group counted more than 40 representatives among which (i) CIOs of the principal Italian health organizations, (ii) national and international health technology suppliers, (iii) experienced professionals from Italian national health associations, and (iv) other research partners. The advantages of working with this heterogeneous group are not only the ability to gain a clear perspective of real sector problems, but also the creation of a community of interest formed around the observatory, with unique opportunities to bring together the health care industry supply and demand. In both cases, the contribution on the part of the AB was noteworthy, whereby creating great GT opportunities ([Glaser and Strauss, 1967](#)).

The AB contribution was organized around three meetings. The first one dealt with informal discussion about research objectives and priorities in the data gathering process.

In the second meeting, initial results were discussed, and the AB suggested potential best practices to be interviewed. In the last meeting, overall results and explanation were discussed to test, review and confirm them.

4.2 DYNAMIC ELECTRONIC SURVEYS

Starting from the research objectives, an electronic survey was designed and delivered to a sample of 454 Italian health care CIOs representative of different size and kind of organizations from different geographical areas. 105 out of the 454 completely answered the questionnaire (a response rate of 23%). The survey was designed with semi-closed questions in order to balance usability and speed with the possibility to give richer comments on every question. The main focus was on the strategic roles of ICT and CIOs, ICT strategy, budget, and the relationship between ICT department, strategic board and suppliers.

After positive results from pilot respondents for a comprehensibility and completeness test (Dilman et al., 2009) and further refinement with the AB, the survey was made available via web in a form which let CIOs: (i) suggest a collaborator who could answer a specific question for him (and then review the answer given), and (ii) see certain specific sections only if she/he gave particular threshold answers. These *dynamic features* are responsible for the CIO response rate of 23%, even with an extensive survey.

A second survey was delivered to the Strategic Board of the same health care organizations of responding CIOs to cross-validate given responses. Figure 1 shows that in 51 cases, at least one of three contacted, Chief Executive Officer (CEO), Chief Financial Officers (CFO) or Director of Clinical Services (DCS) answered the research questionnaire.

As expected, both surveys registered higher response rates in the *Northern* (63% of total responses) than *Southern* Italian regions. Motivations were structural, economical and historical (France et al., 2005). The higher percentage of *Public* (70% of total responses) rather than Private health care organizations is representative of the Italian system.

4.3 CASE STUDIES

Following the first analysis of data collected with the survey, a comparative analysis of 68 case studies was also performed. Target organization selection was based on dimension (measured with the rate of ICT Full Time Equivalent over organization employee), ICT strategic importance (measured in budget terms), ICT projects (both those developed and those in progress), and AB suggestions.

Data were gathered through semi-structured interviews organized face-to-face or by phone, and based on a common questionnaire and protocol. The advantages of this choice arise in the possibility of a direct focused dialogue, greater flexibility to interviewer and interviewed, collection of all required information, better real time code generation and concept revision (see also Figure 2). Another source of data came from the gathering process of organizational charts, ICT schemes, previous publication studies, and other important material interviewees shared with the research group. Even if Glaser (1998) does not encourage it, researchers decided to digitally record interviews, to check notes against registrations in doubtful situations – especially to triangulate the information obtained from different C-Level actors of the same organization (Yin, 2003).

4.4 DATA ANALYSIS AND THEORY GENERATION

In GT framework, theories emerge during data collection through a continuous comparison between great amounts of information, and according to the state of theory genera-

tion. The three methods just described assured a high-volume database from which to extract valuable knowledge. Following the suggestions of Glaser and Strauss, (1967) Figure 2 methodology was used to systematically generate theory during the research.

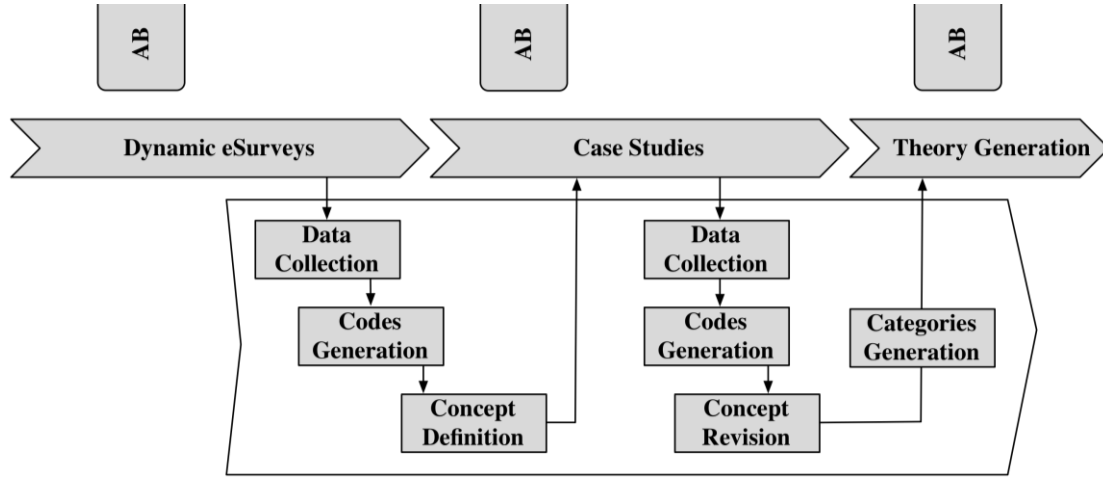


Figure 2: Data Analysis process

Surveys were delivered with an electronic platform that gave the possibility to analytically work on closed questions throughout data collection. The research team could thus identify anchors (*codes generation*) to guide future data gathering phases and identify connections between data for further theory generation (*concept definition*). These preliminary concepts could be brought to the AB's attention, together with all the answers CIOs gave to open survey questions, in turn opportunely coded by the research team.

Case studies focused explicitly on finding new, and revising existing connections between concepts (Yin, 2003). Starting from a combination of survey responses provided by CEO, CIO, CFO and DCS of the specific health care organization, a research group of an experience and a junior researcher jotted down next to each question, interesting insights elicited during interviews. Periodical meetings within interview groups were used to test code and concept reliability, share visions, as well as to formally group and compare key issues. When cases didn't add particular insight to data interpretation, broad collections of related concepts (*categories*) were combined, amongst each other and with available literature, to generate (Eisenhardt, 1989) a theory which could explain all the acquired data.

5. RESULTS

Each one of next three paragraphs will answer to a previously formalized research question. Following, results will be discussed and linked to empirical and theoretical background – pointing out the contribution of this paper to innovation practice and theory. Limitations and future development will end the dissertation.

5.1 ICT-DRIVEN INNOVATION LEVEL (RQ₁)

ICT-driven innovation is the innovation pushed and enabled by the application of ICT. To better understand its current state in Italian health care organizations, the research analyzed macro areas whose processes are supported by ICT. In Figure 3 these areas are specified. *ICT current support* and *investments priorities* for next twelve months were used as classification proxies. According to these drivers, the *ICT support priority ma-*

trix depicted in Figure 3 can be divided into four typologies of processes which follow the dynamic represented by black semi-circled arrows in its center.

The *Marginal* quadrant contains the largest number of areas, and refers to areas that are low in terms of both current level of support and investment priority for the future. In the *mature* quadrant we find areas with a higher level of *current support*, but lower *investment priority* for the future (acceptance, demission and supply management), while only (diagnosis) is in the *core* quadrant with *current support* and *investment support* both high. Finally the *growing* quadrant contains three areas (Cure, Management and Control Systems and Quality and Risk Management) that received comparatively less attention in the past, but have today a high level of investment priority.

Almost all health care organizations of the sample implemented ICT solutions in mature and core areas, mainly with the aim of increasing resource *efficiency*. Under this point of view it is interesting to consider the contribution that ICT gave in the last few years to time-consuming activities like acceptance or to “material expensive” activities in radiology or diagnostic laboratories (Bakker, 2002).

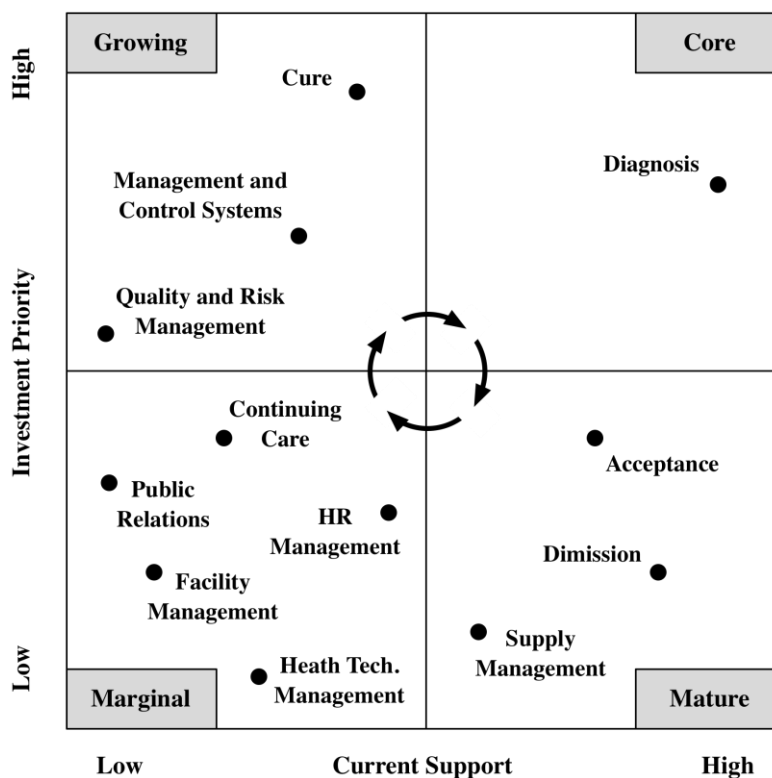


Figure 3: ICT Support-Priority Matrix for Health Care Macro-Business Areas

On the other hand, the contribution of ICT in *growing* areas is focused on the *combination* of *efficiency with efficacy*, providing solutions to problems with great influence on health care outcome. However, to reach this goal, a high level of *structural integration* within health departments' processes is needed. ICT can play this “linking” role (Stegwee and Spil, 2001; Kwankam, 2004), as 80% of organizations confirmed.

Thus the natural question that arises is: *what is the level of integration among different departments' processes in Italian health care organizations?* Unfortunately, the answer is: “still low”. Looking at information systems evolution – which create and enhance process integration – the situation seems almost fragmented. Drawing on evidence from

the interviews to CIOs, four increasing levels of *maturity status* of health information systems can be identified:

- *Embryonic systems* (12%): formed by ad-hoc solutions with a low level of process support, and almost no integration.
- *Isolated applications islands* (62%): high degree of departments' applications support, without great integration among them (asynchronous data exchange).
- *Application monad* (5%): management of one process, well integrated throughout different departments (e.g. Electronic Health Record).
- *Integrated information systems* (21%): both high level of support and integration (professional and synchronous data exchange, SOA and BPM mapping software).

For each stage, percentages in parenthesis show relative distribution in the observed sample. Approximately three out of four Italian health care organizations either aren't structurally integrated, or don't realize a level of integration able to lead to future ICT-driven innovation. On the contrary, strategic direction interviews confirmed that ICT is still seen as an operative support lever: a proxy to simple activities automation (*efficiency catalyst*).

5.2 ICT-DRIVEN INNOVATION BARRIERS (RQ₂)

Reasons for the lack of integration – and, thus, innovation – outlined are both *external* and *internal* to the ICT department. To evaluate them as homogeneously as possible, the external barriers were identified by CIOs and then compared with the opinions of CEOs, CFOs and DCSs; the determination of internal barriers followed the inverse emergence and ratification process.

5.2.1 EXTERNAL BARRIERS

As demonstrated in Figure 4, external barriers to ICT-driven innovation arising from the research process are mainly *organizational* and not *technological*.

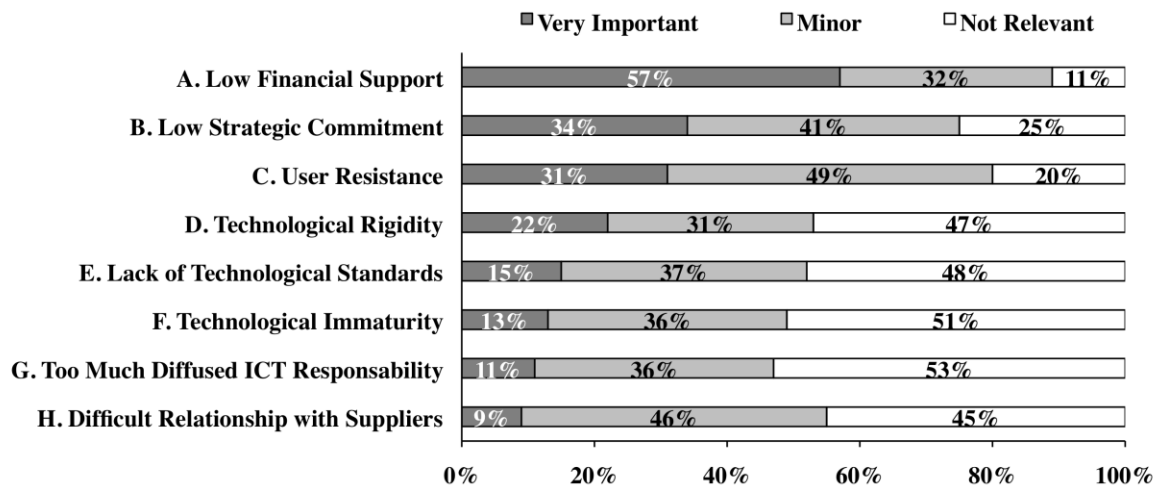


Figure 4: ICT-Driven Innovation Barriers in Health Care Industry (Barriers A, B, C, G and H are organizational; Barriers C, D and E are technological)

Low financial support (A) – often pointed out as the main problem – is mainly a reflection of the *low strategic commitment* (B) on the part of the strategic board, which

doesn't have a clear idea about how ICT can have an impact that goes beyond mere efficiency. Reasons are multiple and range from lack of a technological perspective on the part of CEOs, CFOs and DCSs, to the inability of CIOs to clearly propose all the advantages tied to ICT solutions, to the need for high investments to reach concrete organizational results. The common consequence is that the ICT Department is often seen as a cost center (more than 50%, in the sample), without a *clear responsibility on service provided* (G), let grow alone (Broadbent and Kitzis, 2005). From this point of view, it is interesting to note that 36% of analyzed organizations do not formalize an ICT budget (or relative strategic plan), and the remaining 64% do it forced by Italian State regulatory systems – and not due to a superior budget planning ability.

Another great organizational barrier is *user resistance* (C) to ICT-driven innovation. After the installation process of a solution is over, support given by the ICT department is often lacking, and few continuative initiatives of correct ICT usage are implemented to encourage adoption. In addition to these, there are still technology issues to face: *technology rigidities* (D), *lack of technological standards* (E) like HL-7, or *technological immaturity* (F) still present in some health care sectors like Clinical Governance, negatively influenced the usability of many software solutions, even if approximately 50% of CIOs in the sample currently do not deem these problems significant (Figure 4). Real criticalities are rather the *individuation of actual medical necessities and processes mapping*, mainly because head physicians tend to act almost autonomously, searching for local solutions to their needs – often without the involvement of ICT department. One last cause of user resistance is the *difficult relationship with ICT suppliers* (H). Few CIOs specified this cause because supplier involvement is almost always operational or consultancy-oriented. In the few cases in which the relation is continuative, CIOs don't delegate much, and work alongside them – even in highly outsourced operations.

5.2.2 INTERNAL BARRIERS

Internal barriers can be split into *resources* in the hands of the CIO, and the *CIO's own capabilities*. According to interviews given and literature analyzed (e.g. Hersher, 2003; or Smaltz et al., 2006), the former represent a great limitation to the innovative attitude of ICT department. Without a critical mass, ICT employees are forced to play help desk or hardware manager roles. Very few learning processes are initiated to enhance their technical skills. Leadership programs are practically inexistent. Turnover rate is very low, and many difficulties are found in attracting professionals from other sectors. CIOs tend to ascribe all these criticalities to exogenous causes, rather than internal inadequacy, and to blame operational workload instead of their own incapability to face it.

We found that the CIO himself often has a narrow strategic view, which impedes innovation potential due to: (i) low level of managerial capabilities, (ii) difficult alignment with corporate strategies and (iii) overuse of technical language in strategic board interactions. These empirical findings found confirm in Glaser and Williams (2007). To better analyze these topics, CIO's *activities* versus their *responsibilities* were investigated. Activities were divided into *operative* or *managerial*, according to what CIOs do in project management, problem resolution, supplier and strategic board coordination, end user and ICT employee training. Responsibilities were subdivided into three classes:

- *Infrastructural*: total responsibilities on hardware (servers, work stations, etc.), data transmission networks and telephony; shared responsibilities on other tasks.
- *Managerial*: infrastructural and common service (like email and administrative applications) total responsibilities; shared responsibilities on other tasks.

- *Complete*: managerial and diagnostic/clinical application total responsibilities.

The analysis of data led to the four different profiles (*technician, fac totum, Chief Technology Officer* and *true CIO*) of Figure 5. A first analysis of this illustration shows that responsibilities are essentially distributed over infrastructural and managerial issues (Ross and Feeny, 2000), and only partially cover diagnostic and clinical ones. It is true that other actors play a key role in the decisional processes regarding these last two fields, but CIOs cannot avoid considering them because of their support of core health care outcome. Figure 5 proposes also two possible evolutionary paths that current Italian health care *true CIOs* – professional managers involved in strategic board decision, and with complete responsibilities for ICT – followed in the past. These paths can help other CIOs to improve their strategic role, and foster ICT-driven innovation.

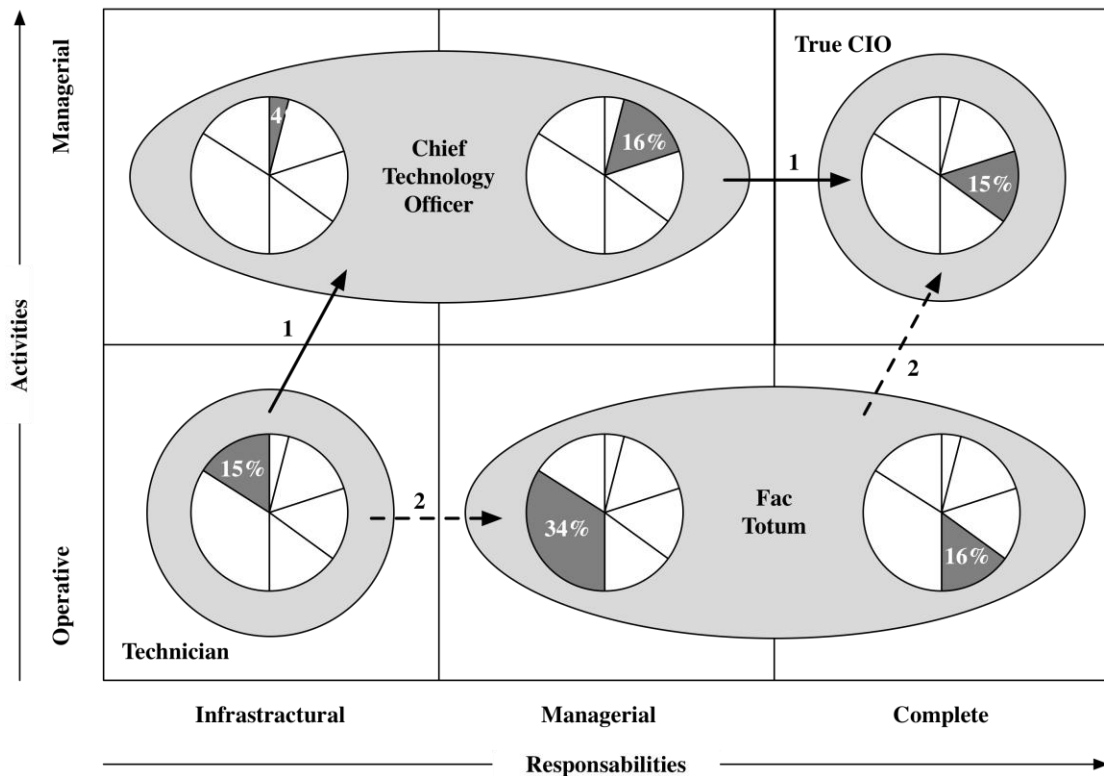


Figure 5: CIO Role Dynamics in Health Care Italian Organizations

5.3 ENHANCE ICT-DRIVEN INNOVATION IN HEALTH CARE ORGANIZATION (RQ₃)

Health care is an industry that potentially can derive great value from ICT-driven innovations. Unfortunately, the integration between departments' information systems that could enable these innovations is low, due to a difficult environment and to a fairly operative ICT department profile. Changing this situation is not easy, but the analysis done on the best performing Italian health care organizations suggests some possible solutions.

First, ICT departments must *increase its strategic role*. To effectively sustain this change health care organizations need to *work on their CIOs' capabilities*, as already done in other sectors (Broadbent and Kitzis, 2005). A longitudinal view of Figure 5 shows an operative role for 65% of CIOs. With these values it is impossible to achieve integration and, thus, innovation. Organizations could first work on the ICT department team, but it will be very difficult to get out of the operative vicious circle without a true C-Level di-

rector (Smaltz et al., 2006): a manager who continually searches for coherence within ICT and organizational strategies, and with a recognized corporate leadership. The matrix in Figure 5 can be useful to evaluate a CIO's position and to know how to evolve her/his role with a combination of greater responsibilities and activities.

Obviously this isn't sufficient: more CIO capabilities don't mean an ICT strategic role. The ICT department won't generate ICT-driven innovation until it has knowledge of clinical process, relational capabilities and ability to exploit external knowledge (Carmel and Agarwal, 2002). A Possible solution that combines these three aspects is the *change from a vertical to a horizontal ICT governance*. The former is completely focused on hierarchical relationship with strategic board – forced as ineffective, because of the historical CIO operative profile. The latter directs its attentions to core health care business, configures ICT department as the main interface between the supply and the demand of the health care organization, and more easily achieves the systemic innovations, the effectiveness, the confidence and the leadership to play a strategic role in health care organizations. In the most advanced situations studied, CIOs confirmed that good horizontal governance implied more objectives sharing and, thus, both more integration between departments, and more ICT-based innovation. Literature confirms these principles (Rockart et al., 1996; Broadbent and Kitzis, 2005; Herzlinger, 2006).

Reasonably, the change in ICT governance style will expose the CIO and ICT department to greater interaction with internal and external organizational actors. *To not lose focus* in these difficult tasks – which imply adapting to very different business needs – a *project priority framework* is needed. A simple tool which can be useful from this point of view is Figure 6's ICT opportunities diagram, constructed based on the well-known Kano model (Kano et al., 1984). A cross-comparison between *line of business' satisfaction* and *ICT performance* identifies three typologies of possible requirements, and thus opportunities, which can come to CIOs:

- a. *Must have requirements*: seen by users when performances fall under acceptable levels;
- b. *Linear requirements*: explicit requests given to ICT direction from end user;
- c. *Attractive requirements*: tacit needs which potentially can be great innovation sources.

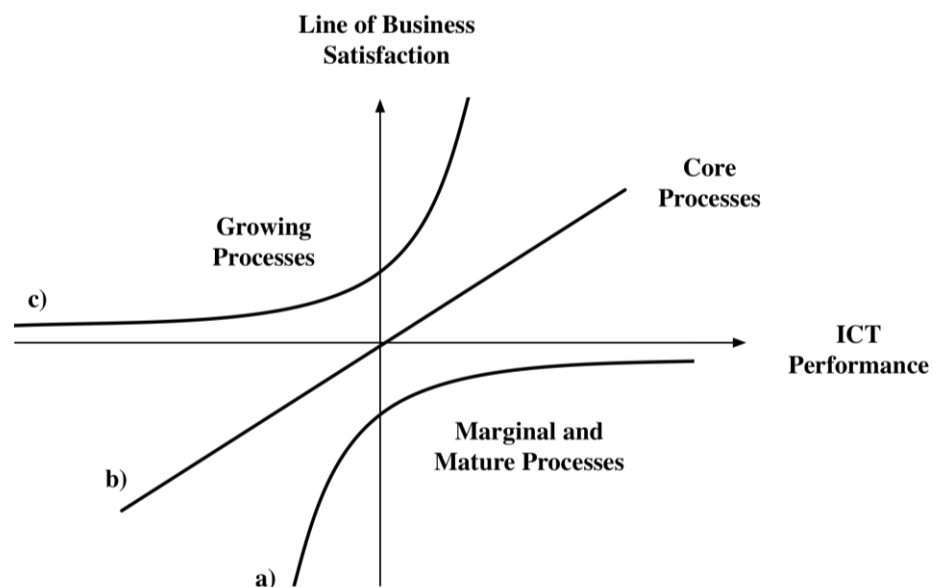


Figure 6: Kano Model of ICT Opportunities in Health Care Industry

With these categories in mind, the CIO can adopt the right behavior for each specific issue. For example it is possible to position Figure 3's macro-area processes over Figure 6 curves. This operation let to identify interesting objectives and short/long term actions (Table 1) whose implementation will lead ICT department to have enough time, partners and capabilities to play a *pivotal role of organizational innovation*.

	Requests	Areas of Interest*	Objectives	Action in the Short Term	Action in the Long Term
a)	Must have	Marginal and Mature	Consolidate and delegate	Define Service Level Agreement	Completely outsourcing
b)	Linear	Core	Efficiency and performance	Performance focus	Efficiency focus
c)	Attractive	Growing	Customer satisfaction	Processes mapping	Solution Co-Design with Clinicians

* See Figure 3 and Paragraph 5.1.

Table 1: ICT Opportunity Description for Health Care Organizations.

6. CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCHES

The research investigated topics related to fostering and managing ICT-driven innovation in the health care industry. Results obtained are interesting both from an empirical as well as a theoretical point of view.

First, the paper suggests experimenting *different multidisciplinary and collaborative research methodologies* to study innovation – especially when it involves high level of integration among different corporate actors, as in the case of an ICT-driven one. The definition of an AB, and the data collected from CEOs, CFOs, CIOs and DCSs gave the research team a deep empirical base from which to elicit extract the real problems faced by health care organizations in the implementation of ICT-driven innovations, and valuable suggestions to solve them. Naturally, research efforts need to be balanced with achievable results. However, it is also important to recognize that the construction of a community of interest around research and the use of the right tools can increase health care organizations participation, research value, and, thus, financial support.

Second, the work focuses on the necessity to consider a good mix of internal and external barriers to have a clear view of the problem of the lack of ICT-driven innovation in health care sector. A wide perspective is needed to better understand the highly constrained situation that almost every Italian health care CIOs faces everyday. The reasons of a lack of innovation aren't only in external environment or in ICT department capabilities to face its change. As health care industry suggests, a comprehensive perspective of ICT-driven innovation barriers is the best way to find true problems and solve them.

Third, the research suggests that a dynamic approach is needed to study ICT-driven innovation. Complex industries, like health care one, frequently change their ICT focus, and always request the adoption of a strategic ICT perspective on the supported processes to achieve effective innovation. Health care industry currently perceives ICT as a driver to overcome the traditional trade-off between (i) the improvements of health care outcomes and (ii) cost rationalization. Thus, future innovations will be mainly structural, and integration among different processes in a health care organization will

be the real proxy to let ICT play a true strategic role. In order to concretize this view, the paper:

- Analyzed the current supporting level given by ICT from which to begin any consideration, with the simple tool of the ICT support-priority matrix in Figure 3;
- Identified in a change of governance style the key solution to solve ICT department problems;
- Tested with ICT support-priority matrix the innovation readiness (and connected evolutions) of all the business areas supported by ICT;
- Proposed a tool (the matrix in Figure 5) to help health care CIOs in interpreting their strategic role, and different alternatives to enhance their contribution to corporate innovation;
- Reused a well-known framework (Kano model of Figure 6) to appropriately balance the solution portfolio in CIOs' hands, and orient their behaviour coherently with the strategic relevance of specific ICT processes.

Obviously, results at this stage are still preliminary, and need to be further refined and generalized. Future researches will have to increase the heterogeneity and the representativeness of health care organizations involved in the analysis. To achieve this goal, the respondents' rates need to be increased – especially the ones of CEOs, CFOs and DCSs. In addition, other actors at the administrative and government level will be interviewed to achieve a very heterogeneous perspective. To better analyze supplier and end-user strategic role, future researches will focus on practical ICT-based fields of analysis (e.g. Personal Health Records), while suppliers and clinicians AB participation will be enlarged. Many efforts need to be placed in the regularization of the geographical profile of the answers (currently too much oriented on Northern Italy), and in the experimentation of new methodologies to gain more reliable results.

REFERENCE

- Adler-Milstein, J. (2009) Health Care Requires Big Changes to Complement New IT *Harvard Business Review*, April: p. 20.
- Agarwal, R., Sambamurthy, V. (2002) Principles and Models for organizing the IT function *MIS Quarterly Executives*, March: pp. 1–16.
- Amaramasingham, R., Plantinga, L., Diener-West, M. Gaskin, D. J., Powe, N. R. (2009) Clinical Information Technologies and Inpatient: A Multiple Hospital Study Outcomes *Archives of Internal Medicine*, Vol. 169 No. 2: pp. 108–114.
- Armstrong, C., Sambamurthy, V. (1999) Information technology assimilation in Firms: the influence of senior leadership and IT infrastructure *Information Systems Research*, Vol. 10 No. 4: pp. 304–327.
- Avison, D., Young, T. (2007) Time to Rethink Health Care and ICT? *Communication of the ACM*, Vol. 50 No. 6: pp. 69–74.
- Bakker, A.R. (2002) Health care and ICT, partnership is a must *International Journal of Medical Informatics*, No. 66: pp. 51–57.
- Broadbent, M., Kitzis, E.S. (2005) *The new CIO Leader*, Boston, MA: Harvard Business School Press.
- Broadbent, M., Weill, P (1997) Management by maxim: How business and IT managers can create IT infrastructures *Sloan Management Review*, Spring: pp. 77–92.
- Carmel, E., Agarwal, R. (2002) The Maturation of Offshore Sourcing of Information Technology Work *MIS Quarterly Executives*, June: pp. 65–78.
- Carr, N.G. (2003) IT doesn't matter *Harvard Business Review*, May: pp. 41–49.

- Dail, B.S., West, A.S. (2005) Building stronger IT vendor relationship *The McKinsey Quarterly*, No.4, pp: 21 – 24.
- Dilman, D.A., Jolene, D.S. Leah M.C. (2009) *Internet, Mail and Mixed-Mode Surveys: The Tailored Design Method*, 3rd edition, Hoboken, NJ: John Wiley.
- Earl, M.J., Feeny, D.F. (1994) Is your CIO adding value? *Sloan Management Review*, Winter: pp. 11–20.
- Eisenhardt, K.M. (1989) Building Theories from Case Study research *Academy of Management Review*, Vol. 14 No. 4: pp. 532 - 550.
- Farrell, D. (2003) The real new economy *Harvard Business Review*, October: pp. 104–112.
- France, G., Taroni, F., Donatini, A. (2005) The Italian health-care system *Health Economics*, Vol. 14: pp. S187–S202.
- Glaser, B.G. (1992) *Basics of Grounded Theory Analysis: Emergence vs. Forcing*, Mill Valley, CA: Sociology Press.
- Glaser, B.G. (1998) *Doing Grounded Theory: Issues and Discussions*, Mill Valley, CA: Sociology Press.
- Glaser, B.G., Strauss, A.L. (1967) *The discovery of grounded theory: strategies for qualitative research*, Chicago: Aldine.
- Glaser, J.P., Williams, R.B. (2007) The definitive evolution of the role of the CIO *Journal of Healthcare Information Management*, Vol. 21 No 1: pp. 9–11.
- Hersher, B. (2003) The essential skills for the chief medical information officer *Journal of Healthcare Information Management*, Vol. 17 No. 1: pp. 10–11.
- Herzlinger, R.E. (2006). Why innovation in healthcare is so hard. *Harvard Business Review*, May: pp. 58 – 66.
- Institute of Medicine (2001) *Crossing the Quality Chasm*, Washington DC: National Academy Press.
- Kano, N., Seraku, N., Takahashi, F., Tsuji, S. (1984) Attractive quality and must-be quality *Journal of the Japanese Society for Quality Control*, Vol. 14 No. 2: pp. 39–48.
- Kwankam, S.Y. (2004) What e-health can offer? *Bulletin of the World Health Organization*, October No. 82: pp. 800–802.
- McAfee, A., Brnjolfsson, E. (2008) Investing in the IT that Makes a Competitive Difference *Harvard Business Review*, July-August, pp. 98–107.
- Meyronin, B. (2004) ICT: the creation of value and differentiation services *Managing Service Quality*, Vol. 14 No. 2–3: pp. 216–225.
- Nolan, R., McFarlan, F.W. (2005) Information Technology and the Board of Directors *Harvard Business Review*, October: pp. 95–106.
- OECD (2007) *OECD Health Data: Statistics and Indicator for 30 Countries*, Paris: OECD.
- Porter, M.E. (2001). Strategy and the internet *Harvard Business Review*, March: pp. 63–78.
- Reidpath, D., Allotey, P. (2009) Opening up public health: a strategy of information and communication technology to support population health *The Lancet*, Vol. 373 No. 9668: pp. 1050–1051.
- Rockart, J.F., Earl, M.J., Ross, J.W. (1996) Eight imperatives for the new IT organization *Sloan Management Review*, Fall: pp. 43–55.
- Roos, J., Beath, C., Goodhue, D. (1996). Develop long-term competitiveness through IT assets *Sloan Management Review*, Winter: pp. 31–42.
- Ross, J., Feeny, D. (2000) The evolving role of CIO: pp. 385–403. In: Zmund, R. (Ed.) *Framing the Domains of IT Management*, Cincinnati, OH: Pinnaflex.
- Schein, E.H. (1992) The Role of CEO in the Management of Change, In: Kochan, T.A., Useem, M. (Eds.) *Transforming Organizations*, Oxford, UK: Oxford University Press.
- Shavinina, L.S. (2003) Understanding Innovation: Introduction to Some Important Issues, In: Shavina, L.S. (Ed.) *The International Handbook on Innovation*, New York: Pergamon Press.
- Smaltz, D., Sanbamurthy, V., Agarwal, R. (2006) The Antecedents of CIO Role Effectiveness in Organizations: An Empirical Study in the Healthcare Sector *IEEE Transactions on Engineering Management*, Vol. 53 No. 2: pp. 207–222.

- Stegwee, R., Spil, T. (2001) *Strategies of Healthcare Information Systems*, Hershey, PA: IGI Global.
- Strauss, A.L., Corbin J. (1990) *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Newbury Park, Ca: Sage Publications.
- Spear, S.J. (2005) Fixing Health Care from the Inside *Harvard Business Review*, September: pp. 78–91.
- Tanriverdi, H. (2006) Performance effects of information technology synergies in multibusiness firms *MIS Quarterly Executives*, March: pp. 55–77.
- Yin R.K. 2003 *Case Study Research (3rd Ed.)*, Thousand Oaks, CA: Sage Publications.
- World Health Organization (2008) *The world health report 2008: primary health care now more than ever*, available at: <http://www.who.int/whr/2008/en/index.html> (accessed Jun 20, 2008).