

The Effect of Digital Technologies Adoption in Healthcare Industry: A Case Based Analysis, Business

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THE EFFECT OF DIGITAL TECHNOLOGIES ADOPTION IN HEALTHCARE INDUSTRY: A CASE BASED ANALYSIS

Abstract

Purpose – The purpose of this paper is to contribute to the extant literature about the exploitation of Digital Technologies by illustrating how such IT can influence the Business Process improvements in Healthcare industry.

Design/methodology/approach – The paper reports the case study of MSD Italy, the Italian subsidiary of USA based company Merck & Co., Inc. The group is active in Italy with the sharing of drugs for human use, but also with the veterinary (MSD Animal Health), with Vree Health, solutions and software-based services for Healthcare

Findings – The results show the adoption of Digital technologies could improve the performance of all the main healthcare business processes, in particular those processes that can be simplified with the adoption of Information Technology. More specifically, Digital Technologies are able to make services and processes more efficient and, at the same time, allow delivering better quality and reducing response times, with many benefits for several actors such as National Health Systems, clinicians and patient

Originality/value – Despite some studies report the necessity of an effective Business Process for a sustainable Healthcare Systems, there is a lack of studies about the specific implications of the adoption of such digital technologies on the BPM of healthcare firms. The paper tries to fill in this gap.

Keywords Healthcare industry, Digital technologies, Business process management, Business model, Healthcare processes

1. Introduction

Life gets longer, technologies are perfected, and medicines are spreading at extraordinary speed. Benefits are undeniable, as much problems and questions. Healthcare's evolution is, first of all, the evolution of a thought pattern: health should be seen as a social and economic investment, a growth driver that produces a circular well-being among those who provide technological equipment (companies), who uses it in emergencies and routine care (hospitals and the medical profession) and who benefits (the patients). The starting point can only be the cost, human and economic: the healthcare is sustainable if business models that increase the quality of service do not inflate expenses already at the limit of their availability. The challenge is tricky, given the growing demand for assistance in numbers (patients) and in technological (new services, new treatment methods and monitoring).

There is a consensus among practitioners, policy-makers and researchers that current systems of healthcare are not sustainable. The increasing average age and chronic disease, combined with rising expectations, have caused an increasing of costs. Many experts assert that reforms are needed and that healthcare system could be more efficient and effective with a larger employ of digital technologies allowing share information beyond organisational boundaries (Department of Health, 2008; Christensen et al., 2009). Such technologies, however, have been difficult to implement, but

they can support transformations in the way care is provided. However, this implies a deep understanding of how these technologies could change healthcare industry. Currently, studies about the topic have mostly focused on the way work routines and business models are changing, in particular, on disruptions to traditional workflows that reflect provider-centric models of care (Ford et al., 2016; Currie and Finnegan, 2011; Westbrook and Braithwaite, 2010).

The technological innovation, more specifically the digital revolution, is deeply changing the way healthcare processes are managed, promoting cooperation of several healthcare players. Healthcare processes strongly rely on both information and knowledge (Lenz et al., 2012; Lenz and Reichert, 2007). Therefore, information management could play an important role and a performing technology supporting processes becomes crucial.

At the same time, healthcare organizations, more than others, have to face with growing complexity of care, reducing resources, and increased regulative frameworks. Healthcare providers are trying to increase quality and, at the same time, to reduce costs in order to maximize value. Care for a medical condition often embraces multiple expertise and several interventions. Value for the patient is created by providers' combined efforts over the full cycle of care (Porter, 2010). Process management could simplify services and processes, making them more efficient and, at the same time, to deliver better quality and reducing response times.

Therefore, the enormous changes in healthcare environment are laying the foundations for a new business model, and this shift from volume-oriented organizations to value oriented organizations involves performance management in health care, which is moving from outcome-based approach to a system-based approach (Buttigieg et al., 2016). More specifically, clinicians and managers are paying more attention on processes in order to get better health system performance. Health care organizations are more frequently employing business process management (BPM).

In all other industries, the use of BPM has become crucial to determine higher competitiveness through improved processes able to add value (Weber et al., 2010), but if compared to manufacturing industries, process management in health care suffers some delay, even though it seems necessary to improve the quality of care. Furthermore, the health care industry is facing challenges that make necessary to adapt these processes (Rebuge and Ferreira, 2012). Historically, within health care applications, BPM is regarded as a tool to enhance processes with the aim of increasing the quality of health care delivery systems, starting from the application of Total Quality Management (TQM) principles, followed by continuous quality improvement (CQI) (Kenyon and Sen, 2015) with the application of six sigma, with a limited overall effect with small-scale improvements, which were not sustained (Liberatore, 2013). More recently, diminishing waste in organizations has become a necessity, promoting the use of techniques able to measure, improve and control process quality (Näslund, 2013). The IT, using software applications has totally revolutionized the way of working of processes into organizations

We contribute to this stream of research, analysing opportunities provided by digital technologies for the healthcare industry. More specifically, starting from the way new business models are changing in healthcare industry, we explore how a larger use of digital technologies could support process management in healthcare industry, as an important and implanted part of business models.

In particular, the study aims to answer the following Research Question:

How digital technologies improve healthcare clinical processes?

. Therefore, health informatics has established itself as a crucial element in the delivery of quality health care, by improving healthcare processes.

The paper proceeds as follows. In the second section, we examine the evolution of business models in healthcare industry, highlighting how life sciences companies, including pharmaceutical, medical device and diagnostic companies, health services providers have been compelled to review their value proposition in the market to adapt them to shifting requirements of their consumers. In the third section, we focus on an integrating part of healthcare business models, and on the implications of adopting digital technologies on Business Process Management, on the necessity of healthcare players to simplify services and processes, making them more efficient and able to deliver better quality and short response times. In the fourth section, we describe the approach employed in the analysis. In the fifth section, we report the case examined, MSD Italy, a company that can be defined as New Health Digital, and in the final section, we report conclusions and Managerial implications.

3. Process Management in healthcare industry and new digital technologies

The concept of Business Processes is often analysed in order to make organizations more efficient (van Rensburg, 1998), as it is considered as one of the main elements to be leveraged to enhance organizations' performance. Studies about Business Processes give several definitions for the concept (Pritchard and Armistead et al. 1999; Larson and BjØrn Andersen, 2001). One of the most employed is the definition of Davenport and Short (1990) who have defined business process as the whole of logically related activities performed to realize a determined business output. A more focused on a client-centered aspect of business processes is the definition provided by Hammer and Champy (1993) affirming that business processes are a set of activities that needs several kinds of input and realizes an output of value to the consumer.

Business Process Management is a field of knowledge resulting from the match between management and information technology, because it includes all resources: humans, organizations, applications, documents, and others (Fink and Grimm, 2008). For these reasons, Business Process Management has become a pervasive concept to be considered as a systemic method of understanding, analyzing, executing, and changing business processes and all resources related to an organization's capability to create value. It has acquired importance because organizations have started to recognize the necessity for a growing process orientation to improve value of their businesses (De Bruin and Rosemann, 2005). However, it needs the freedom to change organizational structures and remove activities unable to add value from core business.

In healthcare industry, in particular, this freedom is strongly limited because of the large variety of regulative frameworks managers have to face with, reducing freedom to re-examine the organizational structure in order to remove non-value adding activities (Becker et al., 2007)

At the same time, healthcare organizations, more than others, have to face with growing complexity of care, reducing resources, and increased regulative frameworks. Healthcare providers are trying to increase quality and, at the same time, to reduce costs in order to maximize value (Helfert, 2009)

Therefore, process management aims to simplify services and processes, making them more efficient and, at the same time, to deliver better quality and reducing response times. In the United States, for example, the patients' length of stay has reduced by 33 percent thanks to the introduction

of clinical process management (Buescher et al., 2004). These are the motives for health process management to be regarded as an important strategic task for all healthcare players.

After all, healthcare processes are complex; they include clinical and administrative tasks, large amount of data, and number of patients and actors. Medical processes need to be planned, appointments have to be organized as well as visits of physicians and documents have to be written, transmitted, and evaluated (Lenz et al., 2012; Lenz and Reichert, 2007). Therefore, the collaboration between players is a crucial aspect. The manual coordination, however, could lead to organizational and administrative problems that cause long waits by patients, cancellation and re-scheduling of appointments and consequent time losses. For all these reasons healthcare need for a support for such cooperative processes, and an important opportunity could derive from digital technology.

As other service firms, healthcare companies and organizations invest in information technology in order to enhance services performance, (Froehle and Roth, 2007) in terms of costs reduction or care quality improvement. The use of technology, IT in particular, is relatively more recent in the healthcare industry, especially if compared with other industries (e.g. financial services, travel or retailing), therefore literature about healthcare technology and process management is lacking. Researchers have tried to discover the relationship existing between capital investment for technology and business value ranging from operations management field and manufacturing flexibility (Anand and Ward, 2004; Gaimon and Morton, 2005), computer-integrated manufacturing technology (Groover, 2008), and enterprise resource planning (Hendricks et al., 2007).

Clinical processes are often distinguished between organizational processes and the medical treatment process (Lenz et al., 2012; Lenz and Reichert, 2007). In the first case, it deals with procedures such as medical order entry and result reporting, which requires cross-departmental healthcare communication and a number of integration and interoperability standards. In second case, it deals with a procedure involving diagnosis and therapy and consequently observation, reasoning, and action.

In this context, an important role in healthcare processes' improvement is played by technological innovation. If healthcare providers have to rely on paper, the sharing of information could be difficult, with significant and negative consequences for the correct management of vital knowledge of the patients' health history. Conversely, healthcare industry could have the opportunity to instantly share clinical information and diagnostic results with colleagues in the same building or across the country or continent (Omachonu and Einspruch, 2010).

Innovation could a crucial capability of all healthcare players: patients should be have the opportunity to immediately access to their own clinical informations even in order to transfer them from one healthcare organization to another (Lansisalmi et al., 2006).

Moreover, new digital technologies, nanotechnology and genetic engineering are radically transforming health care industry, invalidating old assumptions and creating new perspectives for innovation and improvement of business processes (Govindarajan, 2007). Lots of innovations in the healthcare industry aimed at improving life expectancy and quality, diagnostic process and the efficacy and efficiency of the whole healthcare environment (Mosadeghrad, 2014), including innovations in care delivery processes, medications, and surgical interventions.

Internet - based innovations are one example of how technology could advance healthcare, changing the way people exchange health information, and the (Tzeng et al., 2008) healthcare solutions are changing with the diffusion of Internet technologies.

First, Internet permits to access healthcare information and services on particular illness, treatment, and health management (HIMSS, 2003); it also allows improving medical practice thanks to the constant monitoring of health conditions through several digital tools, to increase sharing information between patient and physician therefore supporting clinical decision and disease management.

Another critical aspect is the most recent employments of information and communications technologies, from the Internet to mobile computing that have introduced a new e-health innovative application, the m-healthcare. "mHealth "is a new social health care model, aimed at the overall health of the citizen-patient, stimulated and implemented through a "strong" citizen/patient proactivity and realized through the use of mobile devices and multi-channel technology, such as mobile phones, smartphones, patient monitoring devices, personal digital assistants (PDAs) and other wireless devices (World Health Organization, 2011).

M-Health also includes the world of apps related to health condition and life-style, and it can be extended to so-called Health IoT (Internet of Things), that is to say to the world of surveys of biosignals and / or bioimaging resulting from access to medical devices or other sensors, as well as systems that provide information on the health or reminder SMS.

For example, mobile technologies are capable to enhance health care processes and give support to health care professionals (such as in diagnosis or patient management) or to facilitate the communication between health care professionals and end-users (i.e. reminders and test result).

Mobile technologies offers an important opportunity for improving health care processes because of their popularity and their mobility (Free et al, 2016). The large mobility of mobile devices has important implications: the possibility for people to carry their phone everywhere allows real-time communications able to call patients' attention or to deliver interventions every time and everywhere. One of the newest e-health application is m-healthcare, defined by a number of mobile technologies adopted in healthcare environments: wireless network technologies, mobile computing and handheld devices (Tessier, 2003). Probably, m-healthcare offers a great opportunity to increase the amount of e-healthcare applications (Meneghetti, 2013; Smaling, 2003).

According to a recent study (AISIS, 2014), clinical processes can strongly be improved by adoption of e-Health. The Order Entry process in the presence of mobile technologies, starts from the request by clinicians and/or nurses to of the services necessary for Diagnostic deepening. It happens in different circumstances: on rounds or in response to changes in the patient's medical condition, by using a mobile device; during the discussion of clinical cases, via mobile or fixed station.

The Order Entry is integrated with the Hospital Information System in order to provide the exact situation of admissions to convalescence ward.

Therefore, e-health requires mobile users, above all when devices are employed to collect, transfer and elaborate patients' information in real time. These procedures are particularly important for home patients remote monitoring or to ensure the access to medical information in a mobile and ubiquitous setting (Bergenti and Poggi, 2009). This access could allow the collection of medical information for use of healthcare practitioners, the acquisition of patient medical information, in case of telemonitoring patients' health condition at home.

More specifically, telemonitoring patients at home is one of the most crucial application within the field of e-health (Jankowski et al., 2017; Meystre, 2005). In fact, telemonitoring allows healthcare

organizations to monitor the therapies of their patients and to activate services in case of health emergency, through the constant monitoring of health conditions. Moreover, it can provide other services such as assistance, information and communications services, which drive the adoption of multi-agent systems for the realization of telemonitoring applications (Bergenti et al., 2016, Rialle et al., 2003). For example, one of the most interesting initiatives that use multi-agent systems is SAPHIRE (Laleci et al., 2007). SAPHIRE (Laleci, et al. 2007; SAPHIRE, 2017) is a project aiming at developing a multi-agent system for the monitoring of diseases both at home and at hospital. The system allows deploying and executing clinical guidelines through inclusion of several providers fragmented information. The automation of clinical guidelines support monitoring and medical decision through the development of computer models that are executed by several software agents, while the access to medical data occurs through semantically enriched Web services (SAPHIRE, 2017). The constant monitoring of clinical guideline execution occurs through user-friendly graphical interfaces, supported by mobile and Web based mechanisms for the healthcare professionals. The project has been applied in two pilot applications: for monitoring of cardiovascular patients in Emergency Hospital of Bucharest in Romania, and for homecare monitoring of cardiovascular patients in Schüchtermann-Klinik in Germany.

Furthermore, an important critical factor that is revolutionizing the conceptual architecture of Healthcare systems is the second incarnation of the Web, the Web 2.0 (Boulos et al, 2007), called the “social Web”, because it allows an easier and more democratic contents’ publication by users. Web 2.0 also facilitate online social interaction (Beldarrain, 2006) an higher degree of interactivity and group interaction. Web 2.0 can offer many opportunities for participation health care thanks to the access to practice-specific knowledge. Patients and healthcare players can access electronic records, increasing information exchange, communication and collaboration between several actors, enhancing healthcare outcomes and reducing costs. Furthermore, social networking services allows users to share information within a network of players linking users and physicians each other. Substantially, health care system is community orientated, going beyond the boundaries of organizations and including the way knowledge is shared between clinicians, with their patients and other players of healthcare system (Barsky and Purdon, 2006). These new technologies have created challenges for health care organizations, but have also provided opportunities to make deeper connections with their stakeholders, clients and supporters, including clinicians, patients and laypersons.

4. Methodology

This paper is based on a qualitative approach employing the case-study method. Respect than others, case-study has become one of the most used qualitative methods in technology management research and information systems studies (Myers, 1997; Myers and Avison, 2002, Benbasat, 1987). The case study research method is appropriate when the form of the research question is “how,” because it allows getting a better knowledge and a deep understanding of a complex problem, because it considers social processes and knowledge about managerial complexity as it is in the reality. According to Eisenhardt (1989), we have reviewed the contributions on the topic, and chosen the methodology (Miles and Huberman, 1984) which fits better with our aims, which is the understanding of two main questions related with the significant changes in healthcare industry (Yin, 2009).

The study employs secondary data, collected from documentation and archival records, contained in the official website, company reports and articles from professional magazines and journals. Both official reports and professional and scientific documents were considered.

As a base of case study, there were ideas to analyse several e-Health companies providing digital services supporting healthcare systems. Finally, to choose the company main features were defined: the variety of services delivered, the conformity with New Health Digitals traits, an innovative business model describing organizations redefining the meaning of healthcare services, by deploying technologies, networks and infrastructure to healthcare and care in general, focusing their strategies on digitally powered activities and entering in healthcare market catching opportunities offered by the gaps of new digital solutions for patients and providers (Elton and O’Riordan, 2016).

The company analysed in the study is MSD Italia, the Italian subsidiary of Merck & Co., the multinational pharmaceutical company founded 125 years ago, world leader in the health industry.

In particular, we analyse the portfolio of services provided by company included in a wide range starting from medicines, vaccines, biologic therapies, and health products animal to innovative health solutions.

Research design

The aim of the empirical research requires the observation and examination of several aspects, such as the comprehension of healthcare clinical processes, the adoption of digital technologies, the way new technologies can support the effective operation of clinical processes, making them more efficient and, at the same time, to deliver better quality and reducing response times.

To better describe the case, we followed the following step.

First, we try to identify the actors involved in delivered healthcare services: general practitioners, specialists, pharmacists and end-users. In healthcare field, organizational tasks often burden the work of physicians, nurses, and technicians. There is a strong need for planning and preparation of medical procedures, scheduling of appointments with service providers, the arrangement of physician visits from diverse departments, and for writing, transmission and evaluation of reports. In other words, cooperation between people from different field is a crucial as well as not irrelevant aspect. Therefore we think it’ is important to understand who are people operating within the case analysed, to what extent they are involved in clinical processes, and how they collaborate.

The next step has been represented by data collection. Archival documentation was the main source of data used in the research. Studies, reports, meetings and conference documentation, proposals, newspaper articles, and books were reviewed and analyzed. At the purpose, we have collected information about digital tools and instruments used to make more accessible by all users healthcare services as well as information about the nodes of digital ecosystem of the company. We have conducted an in-depth examination of events experienced by the company, by providers, community, etc.

Then, we have analyzed the clinical processes involved in the healthcare digital ecosystem: measurement made by patients at home, the communication of such data through a digital dash-board, the storing of these data in a database available to clinician employees, the medical decision making process according to the information received and the real time monitoring of healthcare patients’ condition. We tried to understand how these processes can benefit from the adoption of digital

technologies and how use of software, digital platforms and digital devices allow healthcare services improvements.

Thus, we have implemented a systematic way to look at the collected data, in order to reach a clearer understanding of what happened, why, and what was done about it.

5. Case Study analysis

MSD Italy is the Italian subsidiary of USA based company Merck & Co., Inc. It is present in Italy since 1956, through an integrated supply chain that provides investment in research, production and business activities. The company, through its prescription medicines, vaccines, biologic therapies, and health products animal, provides innovative health solutions, engaging in increasing access to health care. The group is active in Italy not only with the sharing of drugs for human use, but also with the veterinary (MSD Animal Health), with Vree Health, solutions and software-based services for Healthcare.

The company has built its identity on four fundamental pillars: innovation, which results in unique and distinctive projects and services with a strong digitalization; customer centricity, or the will to put the customer at the center, whether it is a doctor, a patient, a pharmacist or any other player in the healthcare ecosystem; the community, as the context where company operates; and human resources.

In addition to huge investments in scientific research, company's innovativeness is also expressed using new media channels, new technologies and unusual forms of communication, such as film or music, as well as through the provision of cutting-edge services to support doctors and patients, able to favor their interaction.

MSD Italy has developed several kinds of digital instruments, including sites of pathology and product for medical, educational sites for the patient, applications addressed at medical class both for patients and for the internal staff training purposes, social accounts such as Twitter, Youtube, Pinterest and Instagram.

The approach to innovativeness is customer-oriented, reflecting the attempt to make him part of the process in a different way through products, services, projects and tasks that respond to advanced requirements. For these reasons, the Company has been awarded for the third consecutive year, the Best Digital Company Award, reserved to company that has created the most efficient digital strategy, attentive to the stakeholders needs, thanks to strengthening and the development of long-term relationships.

5.1. MSD Salute Digital ecosystem to manage clinical process.

Within the digitalization process, MSD Italia has introduced the new portal for the doctor, which is MSD Salute, a virtual collection point for all digital services supporting the medical practice of General Practitioners, Specialists and Pharmacists, that can access through private credentials. The new hub account provides the following services:

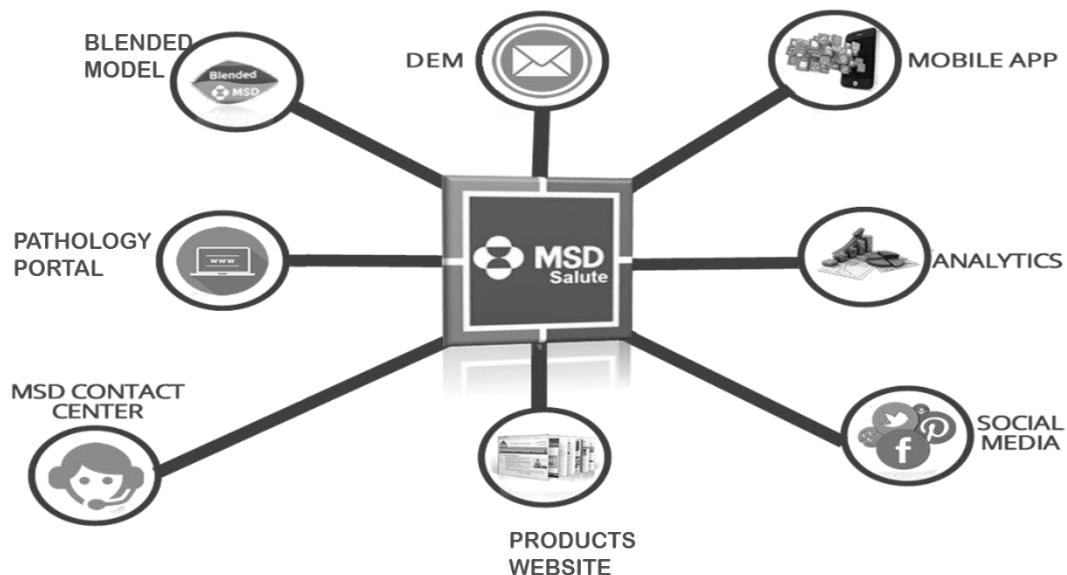
- Article Request: the ability to ask for full text articles from over 200 international journals;
- Laboratory analysis: a database of laboratory tests complete unit, reference values, descriptions and information;
- Drug interactions: a database containing information on interactions, adverse events and drug dosages;

- Editorials: Consultation of scientific and legal articles and abstract of the most relevant scientific articles;
- Daily News: daily updates on scientific and health care;
- App / product and pathology websites: it contains the App Catalogue provided by MSD and direct access to the store and product and pathology websites;
- MSD Product list: All products marketed by MSD with pages dedicated to all products offered.

The new portal is also visible from all types of digital tools (PC, tablet, smartphone) in order to be easily accessible by all users and in line with technological innovation. It is also supported and promoted through the account Twitter, LinkedIn and Periscope (MSD Italy official website, 2017).

The company carries out communication campaigns that integrate traditional channels with web 2.0 tools, and diversifies further the presence in the digital world by using tools such as Twitter account MSD Health Network to interact with the community of Health Professionals (Fig. 1).

Figure 1. Msd Salute Digital Ecosystem



Source: Forum dell’Innovazione per la Salute, 2016

The MSD Salute Digital Ecosystem is made up several nodes.

- The Blended Model aims at adequately inform and train the users, while controlling participation in courses promoted at corporate level, through e-learning, and promoting classroom courses locally, tailored on the different business roles, which allow users to lower the compliance in the different business areas specificity;
- The pathology portals provide solutions in many therapeutic areas, focusing on some that need for the major research efforts. Between these: oncology, virology, including both hepatitis C is HIV, diabetes, immunology, osteoporosis and acute care;
- MSD Contact Center is the service dedicated to the management and the timely resolution of all the requirements for access to MSD Health, to corporate portals and to all App made by MSD. It also supports the consultation of contents including the section regarding the request

of scientific articles, as well as the activation of online meeting, forums and restricted areas and its technical support;

- Products website are webpages containing informations about pharmaceutical products commercialized by the company;
- Social Media tools, such as Facebook, Twitter, YouTube, LinkedIn, Periscope;
- Analytics service is a laboratory test database complete with units of measurement, reference values, descriptions and information;
- Mobile App: the company developed over 22 apps dedicated to physicians and patients. They are for the clinical practice of medical instruments located directly on smartphones, or applications to support prescriptive pertinence;
- DEM: it is a Direct e-mail Marketing containing medical information; starting from the launch of MSD Salute, the company has sent Weekly e-mail and Special Edition focused on specific products or diseases.

The spread of smartphones and tablets are revolutionizing the medical and scientific communications. This means the provision of tools to healthcare professionals for clinical practice and to the patient innovative services for the management of their disease. The idea is to make the patient part of the process, working with him to develop products, services, projects and activities properly responding to clinical needs. This systems increase the knowledge of the doctor through the information that customers give about their needs, attitudes and preferences to sew a "tailor-made" service, updating medical-scientific and professional knowledge.

In addition, the main service developed by the company is Vree Health (Vree Health, 2017) a telemedicine service designed to support the players in the health care system, focusing on the integration of the actors and fostering greater clinical efficacy and improved management efficiency, such as reducing improper access and promoting integration the territory. The Vree Health of healthcare services are designed to combine ease of use and reliability in the result.

All services are based on a software for health care, designed to allow quick access to data and certificates of medical devices to ensure the reliability of clinical data.

5.2. BPM improvements in MSD Italy

The multi-channel approach adopted by the company does not represents only a pure technological exercise of "use of different channels", but as a real relationship strategy with users.

Strategy that could be effectively realized thanks to a careful assessment of the target audience, services and information to be accessed, the type of relationship to be established with the user, the physical or virtual locations where the relationship occur and the technological tools available.

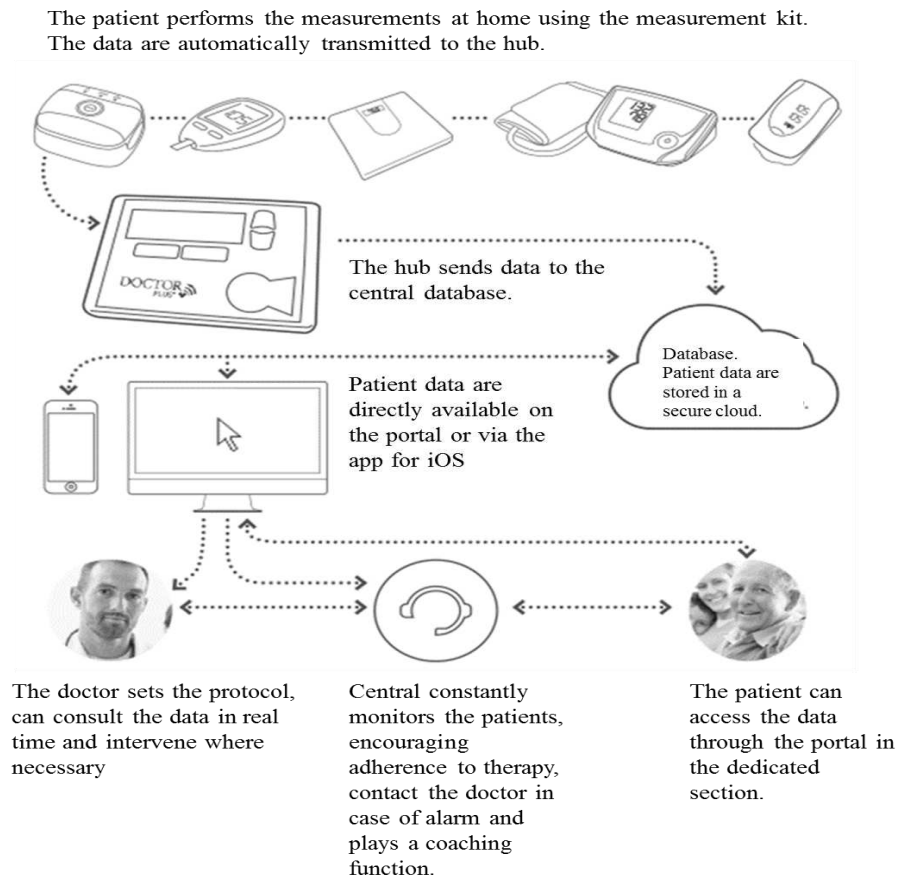
By adopting a multi-channel approach it is possible effectively address the growing need to communicate in any place, at any time thanks several tools and it has been possible, above all, meet the different target therefore moving towards a real customization the service.

Besides delivering general information on health services provided, the totems have allow citizens to access independently and safely to innovative electronic health functions and services, The whole process was accompanied by the introduction of organizational changes (processes and skills) and adoption of change-management policies (communication plans, training plans, customer satisfaction surveys). The development of a real-time web-based monitoring system is an integral part of this process for the release of various functions and various channels of the platform. A dash-board, to observe and study the behaviors and "habits" of users, promptly intercept failure and malfunction

of systems, evaluate the popularity of the various functions available, introducing continuous improvements and new services, maximizing while constantly performances on the field and user interfaces.

Therefore, the company provides a care pathway adaptable to the needs of individual customers (Fig. 2).

Figure 2. Healthcare workflow



Source: Vree Health Italy official website, 2017

The first phase of the service provides support to the doctor in the stratification of patients most at risk based on their medical history.

Subsequently, the service helps clinicians in identifying and training the most suitable patients that offer the service. These are given a certified medical device kit to perform simple measurements directly from home. Patient values are monitored constantly by an Operations Centre, composed of specialized nurses who, on the basis of a shared clinical protocol, intervene if alert clinicians occur and fulfill a coaching and training function to support patient empowerment.

The doctor gets involved where its expertise is required and, above all, he is able to see, directly from its management software, the clinical values of their patients on a daily basis.

The main benefits are the rational employment of specialist resources; the territorial extension of specialist skills with continuing learning opportunities for generic and nursing medical staff; saving

of economic resources (ambulances, clinics, costs induced by the patient); standardized information and data management, preparatory to the establishment of centralized databases for epidemiological and statistical studies; greater uniformity of medical treatment, through a capillary and effective application support for homogeneous protocols management; events tracking and monitoring, with the consequent increase in the efficiency of systems analysis and validation of the treatment protocols employed at the local, regional and national level; transfers reduction of patients who need specialist advice, limiting them to those cases requiring surgical treatment; reduction of risks related to the transport of patients.

6. Discussion

The case of MSD Italy offers interesting insights within new healthcare business models and new way of management business processes.

MSD Italy provides to local health units, private clinics, and generally to organizations and institutions, to National Health System, private customers, remote support services for management of patients with chronic diseases. The management model includes the provision to health organizations of primary care services, social assistance and social health in favour of patients enrolled in these tele-monitoring programs. Services are provided to companies employing medical devices. In particular, the services are addressed to home tele monitoring management and to educational support for parameter clinical control (such as blood glucose, blood pressure, weight, etc.). Measurements are carried out by patients remotely, via medical devices granted in use to patients themselves. MSD Italy is also engaged in the exploration of remote monitoring solutions and prevention in the healthcare industry. Several players can take advantage from this system:

- NHS could promote a more efficient use of healthcare resources (minors access to emergency care, decrease in hospital stays, etc.) and concrete support to the integrated management of Hospital and Territory;
- Clinician can exploit an innovative support in the daily management of their work together with better measurable clinical results over time;
- Patients could have an improvement in the management of the disease due to a better adherence to their care plan and to enhance awareness of their health conditions.

The case also shows digital technologies are crucial for improving the effectiveness and efficiency of a wide range of business processes in healthcare industry. The case shows that such improvements are possible by several conditions.

First, new digital services must necessarily be supported by an adequate communication strategy addressed to the citizen. It is essential that the same players and channels participate as a promotional vehicle for new services to tell the citizen who made a long queue for withdraw a report that it is possible to download the medical report from home via the web or on their smartphone.

Second, these projects are characterized by a high level of process innovation and a high-level technological innovation that make them critical. The literature (Hitt and Brynjolfsson, 1996; Mahmood and Mann, 1993; Devaraj and Kohli, 2002; Dameri, 2005) related to results of such projects does not allow a real assessment of the results achieved. It follows an opportunity to take special care in the planning phase of these projects and the evaluation of the results produced.

Furthermore, business directions need to be able to evaluate, with objective indicators, investment components and operation of the ICT by comparing costs with actual results of using the business information system in relation to expected benefits, with particular regard to the contribution that the system information is able to ensure. This requires the ability to measure the impact of information systems on business processes and the value of the service perceived by customers.

These business models try to carry on value propositions that are different from those of hospitals. These healthcare players embed into their business models the technologies able to simplify the work performed, assembling their resources, processes, and profit formulae in a different ways from more traditional business models (Hwang and Christensen, 2008). Focusing on specific portions of health care, they can offer care services at lower cost and with higher quality.

7. Conclusions

Healthcare processes are very complex, involving clinical and administrative tasks, large amount of data, and a large number of patients and personnel. Health-care processes are also very dynamic (Anyanwu et al., 2003), requiring the cooperation of several healthcare players. In this context, an effective process support is crucial (Lenz and Reichert, 2007). The main advancement achieved through emerging concepts in empirical BPM research shows an increasing interest in the research field (Houy et al., 2010), even because BPM acquires importance in the health-care organization as well as in the industry in general.

The shift in healthcare industry from volume-oriented organizations to value oriented organizations has led performance management in health care to move from outcome-based approach to a system-based approach (Buttigieg et al., 2016), and driven clinicians and managers to pay more attention on processes in order to get better health system performance. Health care organizations are more frequently employing business process management (BPM).

In all other industries, the use of BPM has become crucial to determine higher competitiveness through improved processes able to add value (Zairi, 1997). If compared to other manufacturing industries, process management in health care suffers some delay, even though it seems necessary to improve the quality of care. Few and fragmented are studies about the topic and even less are studies about the adoption of IT to support healthcare processes.

Therefore, this study develops an analysis aimed at proposing that healthcare organizations can and should utilise digital technologies through the development of advanced ICTs system and the employment of medical digital devices, which in turn are related to higher innovative clinical processes management.

Thus, this research aims at contributing to Business process management in healthcare industry and digitalisation of such processes literature providing new insights on whether and how digitalisation of clinical processes system can facilitate higher performance.

In this study, BPM was analysed in MSD Italy case in order to examine the resulting outcomes of establishing digital technologies in BPM within the organization. The results show significant improvements in the healthcare processes, simplifying services and processes, making them more efficient and, at the same time, to deliver better quality and reducing response times.

Theoretical implications

From a theoretical point of view, despite the existence of a large amount of studies on business process management, existing studies are largely focused to traditional manufacturing or services

industries, while process management in health care suffers some delay, even though it seems necessary to improve the quality of care. Furthermore, the health care industry is facing challenges that make necessary to adapt these processes (Rebuge and Ferreira, 2012).

Another crucial reason for the difficulties in clinical process management seems to derive from lack of communication and understanding between managers and clinicians, who often tend to concentrate on individual patient care at the expense of general health care services and performance of health systems in which they operate. (Lega et al., 2013).

In such a context, our research aims at contributing to theoretical literature by exploring opportunities provided by digital technologies for the healthcare industry. More specifically, starting from the way new business models are changing in healthcare industry, we explore how a larger use of digital technologies could support process management in healthcare industry.

We support that in the current healthcare environment, digitalisation of clinical processes offers opportunity to maximise resources and reduce waste without a reduction in the quality of patient care. In addition, we highlight that quality of care should be based on patient centeredness, accessibility, efficiency and effectiveness and that physicians and managers should identify clinical processes able to convey health care services in an integrated way. We also affirm that physicians and managers should cooperate, and that health care organizations need to continuously improve quality-of-care delivery.

Managerial implications

Managerial implications emerge from the case, too. As innovation plays a key role for the sustainability of healthcare systems, which can be considered a “Grand Challenge” (Foray et al., 2012), managers should understand whether new digital technologies - based approaches in healthcare can provide long-term economic benefits they expect. Health managers should be strongly encouraged to employ new digital technologies as well as innovative business models able to reduce personnel’s work and to promote a safer and more effective care to patients. This could produce a better opportunity of optimization and the possibility for patients to influence the healthcare organization.

From a managerial perspective, it emerges that organizations adopting digital technologies are more likely to convey improved clinical processes and a better quality of healthcare services and to open to new markets.

Behringer (2015) shows that IT will play a crucial role in the hospital of the future, supporting both the management of administrative tasks and medical data, and allowing cooperation with other organizations in order to make faster the access to diagnostic outcomes.

In addition, healthcare digitalisation processes could ensure customers right charge, thus improving the patient experience and creating material change in health care landscape (Stuart, 2015).

Indeed, digitalisation in health care is being used to predict and cure diseases and enhance quality of life (Marr, 2015): for example, mobile apps are used to support healthier lifestyles.

The digitalisation allows home-based health care delivery, allowing patients to stay out of hospital beds and significantly reducing costs (Intel, 2016). Distributed care at patients’ home, is the area of transformation in health care with higher potentiality. The development of a network of connected devices allows communication between patients and clinicians, wherever they are, can support the delivery of better quality healthcare services, at lower costs, to most people.

This research shows also the need for a higher patient orientation of health-care services development, supporting the idea that patients have not to be considered in a passive position, rather than they are the target for care able to give feedback and change their service provider.

In conclusion, healthcare digitalisation needs for an environment able to ensure sharing of information. Healthcare organizations enabling a solid IT and business strategy partnership obtain benefits, such as improved collaboration and problem solving, deliver higher levels of services and clinical processes efficiency.

Limitations and Future research

Of course, the study suffers from some limitations and there is still room for more investigations. The analysis highlighted the necessity to investigate deeper this field of research. Single case-study, in particular, suffers of limitations related to the methodological rigour, to researcher subjectivity, and external validity, making difficult makes difficult to propose MSD Italy as a replicable model. To get greater reliability and replicability the analysis should examine other cases-study, in order to understand findings' potential replicability.

Second, this analysis is not able to provide a construct for measuring the improvement of business processes, as an exclusively economic evaluation is not always favorable and appears a not appropriate measuring method, since it does not take into consideration certain strategic factors such as the increase efficiency and corporate performance, the increase in the quality of processes and business services, the value increase for end-users.

Therefore, future research should analyse the impact of information systems on business processes and the value of the service perceived by customers. In this context it is important to evaluate economic cost/benefits of a product/project/service in and the overall assessment, both quantitative and qualitative, of the impact on the healthcare company information system through a suitable measurement of the value of use of ICT in health through a multidimensional evaluation of projects, both at decision-making, through information that will facilitate the sharing and the authorization of the project, both in the evaluation of results.

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