ERP implementation in public healthcare, achievable benefits and encountered criticalities – an investigation from Italy

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Abstract: Enterprise resource planning has been mainly implemented in private industries and there are few inquiries of implementation in public healthcare, particularly in Europe. Hence, this paper aims to enrich the debate concerning public healthcare by investigating one of the first applications in Italy. The research aims at highlighting the benefits brought by the implementation as well as the criticalities encountered. We found that benefits can be classified into four theoretical categories: patients’ satisfaction, stakeholders’ satisfaction, operations efficiency, and strategic and performance management. Whereas criticalities such as complexity of the project, process reengineering and staff’s involvement can impede the implementation. The novelty and value of the paper lie in a new classification of benefits and criticalities concerning enterprise resource planning implementation in public healthcare. The classification is particularly useful for practitioners and managers who want to implement structured enterprise resource planning in complex organisations such as large public hospitals. We concluded with the limitations of this research and the new avenues of research opened.

Keywords: enterprise resource planning; public healthcare services; service operations efficiency; it implementation; Italy.

1 Introduction

In the last few years, enterprise resource planning (ERP) systems have been implemented in public healthcare to improve management of healthcare processes. However, the phenomenon is not as widespread as it is in private industries (Sheu et al., 2004; Olson et al., 2005). In fact, criticalities such as economic and financial resources, integration of different departments and organisations, and people’s involvement can sometimes impede the implementation of an ERP in the public sector. Moreover, according to some authors (Spano and Bellò, 2012; Hintsch, 2013; Scheckenbach et al., 2014) service industry aims at transferring systems of traditional manufacturing companies such as ERP to service providers and this can sometimes cause projects to fail. For instance, one of main issues is to integrate the patients’ routing which, by its nature, can cross several departments (Wijewickrama and Takakuwa, 2012; Ali and Alolayyan, 2013; Chiarini, 2012, 2013b, 2013c; Azadeh et al., 2014; Chiarini and Vagnoni, 2014; Sepehri et al., 2015). Integration can mean relationships with different operations system (Karpinnen et al., 2014; Kenett and Lavi, 2014) and stakeholders such as suppliers, professionals, physicians, universities and local government institutions.

The process is usually time consuming and costly. Public administrations often have to struggle with significant cuts in funding; therefore, managers within public healthcare organisations are uncertain whether or not it is worth implementing an ERP and, in particular, what the achievable benefits would be.

This paper aims to enrich the debate concerning the implementation of ERP systems in public healthcare by investigating one of the first successful applications in Italy. The main purpose of this research is to analyse what benefits public healthcare could achieve and, at the same time, potential criticalities and pitfalls which can be encountered during the ERP implementation path. For doing this the implementation path of a complex ERP has been investigated by means of a qualitative inquiry. In particular some managers who have been directly involved in the ERP development and use were interviewed.
Based on Ferrara’s public University Hospital (FUH) case study analysis, the paper highlights the benefits brought by the ERP implementation as well as the criticalities encountered.

The remainder of this paper is organised as follows. The next section reviews the literature on ERP implementation in general and then in healthcare in particular. The following sections analyse the background, the case study and the research methodology; then two specific sections will discuss the project and the achieved categories of benefits and criticalities. Finally, the conclusions section will summarise the results, the generated theoretical novelties and the lessons learnt from ERP implementation within this public healthcare case study. The conclusions will also present an agenda for future research on the subject.

2 Background: ERP implementation, from private to public industry, benefits and pitfalls

There are many papers dedicated to ERP implementation in general. Starting from the end of 1990s many private industries have replaced their information systems with ERP class systems. According to Legare (2002), the phenomenon is mainly due to the need to improve the linking of organisational processes within a company. According to several authors (Legare, 2002; Barker and Frolick, 2003; Chau and Chang, 2008; Amid et al., 2012; Tsai et al., 2012; Shaul and Tauber, 2013; Chang et al., 2015), ERP implementation is usually a time consuming and costly process. However, if the implementation project is well planned and managed then the benefits obtainable are several (Chou and Chang, 2008).

Chou and Chang (2008, p.149) argued that ERP improves operational efficiency by integrating business processes and providing better access to integrated data across the entire company. Other authors investigated benefits in terms of the strengthening of internal control mechanisms and improved managerial decisions (Esteves, 2009; Goel et al., 2013; Ruldeviyani and Sandhyaduhita, 2013). Other benefits are achieved within the more operational processes and can vary depending on the kind of industry.

However, ERP implementation also has a negative side. According to several authors (Al-Mashari and Al-Mudimigh, 2003; Barker and Frolick, 2003; He, 2004; Motwani et al., 2005; Law and Ngai, 2007; Chau and Chang, 2008; Amid et al., 2012; Christofi et al., 2013; Tian and Xu, 2015) there have been many failures in the implementation of ERPs. The main reasons are incorrect planning of the project, an initial lack of process analysis and reengineering, an inadequate involvement of the staff (i.e., training), as well as a too hierarchical approach or by contrast no management commitment (Sumner, 2000; Willcocks and Sykes, 2000; Brown and Vessey, 2003; Ifinedo, 2008; Staehr, 2010; Chiarini, 2013; Teittinen et al., 2013). According to Chou and Chang (2008, p.149) the failure rate of ERP implementation can range from 40% to 60%.

Lastly, other authors analysed resistance from staff when new complex systems such as ERP are implemented (Ross and Vitale, 2000; Martinsons, 2004; Ahmed et al., 2006; Selander and Henfridsson, 2012).

ERP has been also implemented in the service industry including healthcare organisations (Soh et al., 2000; Head, 2003; Maguire, 2007). Grimson et al. (2000)
demonstrated that ERP has been implemented in healthcare, including public healthcare, to try to get benefits mainly in terms of process integration.

Ellingsen (2001) reported that in a large public university hospital, ERP implementation positively affected the quality of the information in the patients’ electronic records. Ellingsen also analysed and discussed the implementation of SAP® ERP in five Sweden large public hospitals, drawing attention to the main benefit of centralisation and integration of the different information systems.

Trimmer et al. (2002) conducted their research in small and rural public hospitals. They concluded that to have a successful implementation of ERP, the hospitals have to previously analyse what the critical success factors are and stay focused on them during the implementation project.

Van Merode et al. (2004) highlighted the importance of ERP for patient management. According to the authors it seems that ERPs are suitable when diagnostic and treatment phases are not that different among patients and in general ERP systems are not the best-suited systems under variable circumstances. However, this particular issue has not been discussed in any other reviewed paper.

Stefanou and Revanoglou (2006) analysed a case study in a Greek public hospital. After dealing with the well-known benefits of process integration, they also found interesting benefits in terms of inventory and procurement management, opening an interesting debate concerning the integration of public hospital processes with the supply chain.

Botta-Genoulaz and Millet (2006) researched the differences between ERP implementation in manufacturing and service industries including hospitals. They found that in the healthcare there is usually a less level of integration among the different processes. In particular, they noticed that in the healthcare industry it is more difficult to involve all the staff due to physical and ergonomic obstacles especially in operating theatres and remote locations. Moreover, it is more difficult to integrate the different operations systems customised for single departments. The benefits achievable from a correct implementation of ERPs within hospitals are summarised by Botta-Genoulaz and Millet (2006, p.210):

“improved quality of customer care (in terms of complete, accurate and usable information available in real-time), improved efficiency (saving on labour costs and materials, better use of resources) and better access to large quantities of information recorded in a uniform way.”

More recently Poba-Nzaou et al. (2012) investigated 180 healthcare organisations which had adopted an ERP system. They claimed that these organisations decided to implement an ERP for three main reasons: business, clinical or institutional.

To summarise, ERP implementation in healthcare can surely bring benefits in terms of integration of different operations systems and data related to patients and the clinical decision is one of the most important drivers (Ali et al., 2013; Mashhadiabdol et al., 2014). It is also difficult to manage different and customised processes typical of public healthcare. Other achievable benefits and encountered difficulties did not emerge in a similar clear manner; therefore they need to be investigated further.
3  **FUH case study**

The ERP implementation at FUH started in 2004 with a system developed by SAP®. The university hospital has around 800 beds, including day-hospital care beds and it is organised into eight health departments. Considering the high level of specialty of the university hospitals, at FUH medical staff include both physicians and academics.

The hospital implemented SAP® ERP across-the-board. A team made up of the information and communications technology (ICT) department, several physicians and nurses worked together with the SAP consultants especially for mapping and assessing the processes and operation systems. A strong sponsorship and commitment by the general director and the health director has been a clear feature since the start of the project. Furthermore, to involve the hospital staff from the beginning of the implementation process, the team launched an internal communication plan aiming at sharing the ERP’s implementation steps and the potential benefits. The implementation of the different ERP modules has led to a widespread training schedule during and after the applications.

3.1  **Integration as a fundamental key: the design**

FUH started its project with the aim to mainly pursue clinical operational and strategic goals bound to the integration of patients’ routing. Following a detailed assessment of the departments, their processes and interfaces, the hospital designed an implementation approach based on the results of the analysis. Figure 1 shows the design of the ERP modules which have been implemented and their organisational links.

![Figure 1  ERP implementation design: the modules and their links](image)

The integrated clinical routing named ‘Cunico’ is the most important cross-functional module that integrates different operations systems. FUH had to integrate in the new ERP a number of different information systems already implemented such as software dedicated to patient admission and hospitalisation, and software dedicated to the patients’ routing through operating theaters including medical report management. ‘Cunico’ also integrates a new module dedicated to machine, ward and operating theatre planning.
The core module ‘Cunico’ was then linked with other modules dedicated to finance and management accounting, material management, production planning, and finally research and funding. Specifically, the material management module is dedicated to the relevant processes of purchasing and warehouse management. In addition, a new and peculiar module dedicated to research projects was developed and integrated in order to manage received funds from external institutions such as the regional authority of the local government. Moreover, a new module has been introduced specifically for managing the information flow and relationships between the hospital and an important outsourcer. The outsourcer has to manage patients from the wards to the radiology department. During this process, activities such as ward request, transport organisation, tracking down of the patient and his or her records, patient’s return to the ward have to be carried out.

4 Research methodology

The research process is based on a typical qualitative inquiry; data have been gathered mainly through semi-structured interviews (Barriball and While, 1994).

In a semi-structured interview the interviewer does not strictly follow a formalised list of questions. For this research we designed an interview guide according to the Appendix; in any case the interviewer does not necessarily ask them all, or touch on them in any particular order. In some cases, the interviewer has only a list of general topics to be addressed.

The design of the interview guide can enable comparison among the various answers and gives to the interviewer the possibility of ‘grand tour questions’ (Leech, 2002).

For this research two kinds of grand tour questions have been used: typical and specific grand tours. The first one tries to catch an average sense of the issue, whereas the second can enter the issue with more details, usually set by the interviewer (Gordon and Gill, 1992).

In order to gather more information and broaden the points of view concerning the ERP implementation a group sample of 13 managers from FUH were interviewed as follows. Two interviews were carried out with two ICT project managers who belong to the internal team appointed by the top management for the implementation. In this way the organisational planning and technological point of view was investigated. Furthermore, three senior managers, heads of a department, were interviewed to improve understanding of the impacts from a cross-functional and hierarchical organisational point of view. Lastly, eight physicians acting as users of the system were interviewed in order to investigate from an organisational and user’s point of view. The interviews were carried out from February 2013 to June 2014. Table 1 summarises the characteristics and skills of each interviewee.

For the interview a first guide was sketched out with regard to the following issues:

- achieved benefits
- stages and organisation of the project
- organisational and technological issues
- pitfalls and encountered criticalities.
The interview guide with the grand tour questions is presented in the Appendix. After having interviewed the 13 managers using this guide, due to the different specialisations of the managers, new specific grand tour questions emerged. In this way, the same 13 managers were interviewed a second time in order to confirm and discuss the new questions.

The interviews produced much data, and the practice of coding qualitative data (Lofland and Lofland, 1995) was used to label and assign theoretical meaning to parts of the answers. An initial coding generated several categories from the responses. A second coding known as focused coding was used to reduce the number of initial coded categories by eliminating the less useful ones.

We decided to accept coded sentences reported at least six times out of 13. In this way, it can be claimed that qualitative codes are essence-capturing and essential elements of the research development that, when grouped together according to similarity and regularity, they facilitate the inductive process of developing new theory.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Characteristics and skills of the different interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interviewed figure</strong></td>
<td><strong>Characteristics and skills</strong></td>
</tr>
</tbody>
</table>
| ICT project manager | Project manager of the ERP implementation  
ER trainer  
Knowledge about SAP as a whole and its modules  
Knowledge of the specific databases within the hospital  
Knowledge about project investments and timeline  
Knowledge about economic and financial benefits achieved  
Knowledge about PMSs  
Knowledge about internal/external interfaces of the ERP  
Knowledge about organisational problems in general |
| Head of department | Team leader for the ERP implementation  
Knowledge about specific SAP modules  
Relationships with top management  
Relationships with physicians and nurses as users  
Relationships with external institutions and professionals  
Reporting to top management  
Knowledge of medical and diagnostic issues  
Knowledge of patients’ satisfaction  
Knowledge about clinical and diagnosis performances  
Knowledge of operations management  
ERP user |
| Physician from department | ERP user and tester  
Patients’ routing manager  
Reporting to the head of department  
Involved in the ERP team implementation  
Knowledge of medical and diagnostic issues  
Knowledge of patients’ satisfaction  
Relationships with physicians and nurses as users |
5 Discussion of the results

5.1 Relevant benefits achieved from the hospital

After coding the interviewees’ answers we found that the benefits can be classified into four theoretical categories: patient satisfaction, stakeholders’ satisfaction, operations efficiency and strategic and performance management. Table 2 summarises the benefits achieved grouped in the above mentioned four categories.

Table 2 The benefits achieved through the ERP implementation

<table>
<thead>
<tr>
<th>Theoretical category</th>
<th>Coded benefit</th>
<th>No. of references</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Patents’ satisfaction</td>
<td>1.1 Reduction of patients’ waiting list time</td>
<td>11/13</td>
<td>84.6</td>
</tr>
<tr>
<td></td>
<td>1.2 Reduction of patients’ routing time</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>1.3 Reduction of medical report issue time</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>1.4 Reduction of medical report mistakes</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>1.5 Increasing privacy for the patient</td>
<td>6/13</td>
<td>46.1</td>
</tr>
<tr>
<td>2 External stakeholders’ satisfaction</td>
<td>2.1 Better integration with NHS information system</td>
<td>13/13</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>2.2 ‘Clan’ control</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>2.3 Improved relationships with general practitioners</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>2.4 Better support to academic clinical research</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>2.5 Better integration with INAIL (Italian National Agency for the insurance against work-related Injuries)</td>
<td>7/13</td>
<td>53.8</td>
</tr>
<tr>
<td>3 Operations efficiency</td>
<td>3.1 Increase of staff’s productivity</td>
<td>12/13</td>
<td>92.3</td>
</tr>
<tr>
<td></td>
<td>3.2 Increased use of operation theaters</td>
<td>11/13</td>
<td>84.6</td>
</tr>
<tr>
<td></td>
<td>3.3 Increased use of healthcare machines</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>3.4 Improved relationships with suppliers</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>3.5 Improved accuracy of clinical diagnosis</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>3.6 Reduction of product stock</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td>4 Strategic and performance management</td>
<td>4.1 Promptness in gathering data and information</td>
<td>13/13</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>4.2 More frequent and accessible reporting</td>
<td>13/13</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>4.3 More accurate accounting results</td>
<td>12/13</td>
<td>92.3</td>
</tr>
<tr>
<td></td>
<td>4.4 Increased measurability of the resources employed</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>4.5 Cross-functional PMS</td>
<td>10/13</td>
<td>76.9</td>
</tr>
</tbody>
</table>

According to the interviewed managers, it can be claimed that the above benefits are substantially bound to the integration of the different databases and the creation of a unique flow of data and information among the different organisational parts of the hospital. The next subsection describes in detail what has been coded and grouped within the four theoretical categories.
5.2 Patients’ satisfaction

ERP implementation has surely brought many benefits in terms of patients’ satisfaction. Under the direct supervision of the Health Director one of the most pursued objectives was time. The integration of the different databases and processes has improved in particular patients’ routing (10 answers out of 13) and waiting list times (11 out of 13). Indeed, the ICT project managers stated that integration of the different databases which affect patients’ routing allows a precise monitoring of the operational process time. The stages of the routing are more visible and traceable along with the interfaces among the different organisational parts. This allows to cut down not only waiting list times but even patients’ queues in between different processes. The cause is often related to a not synchronisation of the different processes within patients’ routings. By means of a unique database, patients can be better synchronised and scheduled all along routings.

And in the matter of interfaces, 10 managers out of 13 underlined how integration reduced the possibility of medical report mistakes; this is an issue particularly perceived in healthcare organisations. Mistakes are usually due to data exchange between different databases with a manual data entry from one system to another one. In 2013 medical report mistakes were equal to zero. Moreover some managers (6 out of 10) reckoned that a reduction in manual activities and an increase in codified information regarding patients means more privacy for the patients.

5.3 External stakeholders’ satisfaction

Not only patients’ satisfaction has been positively affected by the ERP implementation. According to all the interviewed managers the ERP was also developed with the purpose of increasing integration with other relevant external information systems. In this way relationships with external stakeholders such as the regional authority of the NHS, INAIL (Italian National Agency for the insurance against work-related Injuries), general practitioners and the local university have been dramatically improved. In fact, according to the ICT managers there are specific projects carried out with the regional NHS. All of the interviewees (13 out of 13) declared a better integration with the NHS information system.

These external stakeholders are also relevant from a regulatory point of view. For example, the two interviewed ICT managers reported that the ERP has brought about a standardisation of reporting and measurement useful for the NHS; data from FUH can be analysed, compared and managed more easily. For 7 respondents out of 13, the ERP implementation has improved also the relationship with INAIL. By means of quicker and more accurate reporting INAIL can now better manage injuries and their statistics.

For 10 respondents out of 13, the integration has also had a positive effect on general practitioners’ management of medical reports as well as relationships with the local university. In particular, the ERP allows the extraction of many figures and statistics concerning diagnosis associated to specific pathologies which supports academic clinical research.

Of the 13 respondents, 10 declared that, on the whole, it can be claimed that the integration due to the ERP implementation has improved the level of transparency towards different stakeholders, including the patient. In this way what in the literature is named as ‘clan’ or social control has been developed (Kirsch et al., 2010). In fact, the issue of increasing trust between an organisation and its stakeholders through the sharing
of data and information is well-known in the private sector. For instance, Lorenc and Szkoda (2015) discussed it specifically for the automotive sector, while other authors (Alawamleh and Popplewell, 2012; Khare et al., 2012) dealt in general with the issue.

5.4 Operations efficiency

According to 12 respondents the integration of the different processes has increased staff’s productivity. As some physicians and heads of department reported, one of the most important leverages for productivity has been interoperability. Indeed, considering ERP is a widespread and standardised technology, internal mobility of physicians and nurses is facilitated. Technology is no longer a barrier when moving from one ward or department to another, which this leads to an increase in staff’s productivity. Furthermore, as discussed in the previous two sections, ERP allows monitoring and controlling of operational times, which positively affects staff’s productivity once more.

In the same manner there has been an increase in medical machines’ productivity (10 out of 13), including operation theaters (11 out 13). For instance some interviewed managers pointed the improved scheduling of operation theaters and machines. Moreover the software has introduced the possibility of a more scheduled and at the same time quicker intervention in cases of maintenance.

Another important achieved benefit concerns the integration with suppliers’ management systems. According to 10 respondents out of 13 many suppliers can now easily manage processes which are part of the patients’ routing, such as sterilisation services within operating theaters as well as transport of patients or internal surveillance. Considering that many suppliers have implemented the same kind of ERP, now there is also an improved relationship in terms of administrative processes such as invoicing, shipping and incoming notes and many other electronic documents. As previously discussed, this has surely increased trust between FUH and its suppliers.

For 10 out of 13 respondents, the ERP has also brought about a better control and reduction of drug inventories and medical products such as prostheses within warehouses.

5.5 Strategic and performance management

From the performance management standpoint it is clear how promptness in gathering data is one of the most relevant benefits (Sinimole, 2012); this emerged from several discussions in particular with the ICT managers and the head of the department, but all interviewees (13 out of 13) agreed with it. If promptness and accuracy are the keystones of the hospital PMS this implies also general benefits in terms of measurability of the accounting system. First of all a more accurate and quicker control of economic and financial performances such as incomes, expenses and cash flow can be achieved. Second, according to 12 respondents, the budgeting process is deployed, controlled and reviewed in a quicker manner with a punctual measurement of the employed resources within processes. Therefore through the ERP implementation top and senior managers can monitor more frequently performances of the processes, services, departments and their efficiency (Seppänen et al., 2014).

Lastly, as previously pointed out, due to the integration of different databases and modules, the PMS is now more cross-functional and shared between the different organisational parts of the hospital. This finding is particularly true for 10 respondents out of 13.
5.6 Pitfalls and criticalities

FUH was one of the first ERP implementations in public healthcare consequently there were not enough experiences with which to compare the project. Therefore FUH has had to struggle with different pitfalls and criticalities. Table 3 summarises the criticalities experienced during the implementation grouped by theoretical categories.

Table 3  Criticalities experienced during the ERP implementation

<table>
<thead>
<tr>
<th>Theoretical category</th>
<th>Criticality</th>
<th>No. of references</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5  Complexity of the ERP project</td>
<td>5.1 Budgeting and strategic vision clarity</td>
<td>13/13</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>5.2 Project management and control</td>
<td>13/13</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>5.3 Top management commitment</td>
<td>13/13</td>
<td>100</td>
</tr>
<tr>
<td>6  Process reengineering</td>
<td>6.1 Integration level</td>
<td>12/13</td>
<td>92.3</td>
</tr>
<tr>
<td></td>
<td>6.2 Assessment and mapping of the processes</td>
<td>12/13</td>
<td>92.3</td>
</tr>
<tr>
<td></td>
<td>6.3 Non-standard patients’ routings</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td>7  Staff’s involvement</td>
<td>7.1 Raising awareness</td>
<td>12/13</td>
<td>92.3</td>
</tr>
<tr>
<td></td>
<td>7.2 Staff’s resistance</td>
<td>10/13</td>
<td>76.9</td>
</tr>
<tr>
<td></td>
<td>7.3 Technical training</td>
<td>8/13</td>
<td>61.5</td>
</tr>
<tr>
<td></td>
<td>7.4 Developing internal skills</td>
<td>8/13</td>
<td>61.5</td>
</tr>
</tbody>
</table>

The three theoretical categories of criticalities are discussed next.

5.7 Complexity of the ERP project

Usually an ERP implementation in whatever industry requires a relevant economic effort. According to the ICT managers, FUH has had to budget a huge amount of money in the last years. And when it comes to money bound to public funds it is not that easy to plan all the outcomes and incomes especially the last one. If there is a lack of funds due to an unstable economic and political period this could mean a slowdown or even a stop to the project. Indeed all the interviewed managers stated that budget has been a criticality, even if it was overcame in some ways.

Moreover, according to 13 respondents out of 13, because the project was complex, expensive and employed many resources it needed a clear strategic vision from the top management. In this sense, a change of mind or worse a change of top management could put the project at stake. Fortunately FUH experienced a strong and enduring commitment from the General Manager and the Health Director during the implementation.

Lastly, 13 managers out of 13 stated that the complexity of the project required well-defined project management and control. Time is a critical issue not just from a financial point of view. The ERP implementation had to meet precise technical and organisational milestones such as database integration, training, development of skills, and hardware and software match. All the interviewed managers agreed with each other that in this sense a strong vision and commitment from the top management helps to overcome the encountered pitfalls.
5.8 Process reengineering

If the integration level to be achieved takes into account almost entirely the hospital, according to 12 respondents this surely represents a criticality. Many departments and patients’ routings have to be assessed and mapped. According to the ICT managers, an initial process mapping is a time-consuming activity but the deeper you analyse at the beginning the more probable is the success of the implementation. Indeed, from the experiences in other sectors it can be understood how a wrong or superficial initial process mapping can lead to the failure of the entire project or to following expensive changes in the software (Bharathi et al., 2012). Of the 13 respondents, 12 underlined how an incorrect assessment and mapping could become a criticality.

For ten interviewed managers, the non-standard patients’ routing was another critical issue. In this case, because of the non-repeatability of the services it is difficult to map the patients’ routing as well as to reengineer it (Becker et al., 2013; Chiarini, 2013d). For instance, genetic disorders often need customised care and services. In terms of the ERP implementation the hospital has had to spend more time and money on non-standard patients’ routing.

5.9 Staff’s involvement

All complex projects need people’s involvement at all levels, departments and functions. An across-the-board ERP implementation in a large public hospital has to involve managers, physicians, nurses and technicians from accident and emergency department to surgery theaters, wards, laboratories and pharmacy. In this sense, according to 12 respondents out of 13, awareness is the key. Staff needs to know the potentialities of the new management system and have to be aware of what can happen to other departments or the patient if just one employee is not part of the system. Some physicians for instance said that if you do not enter the right data and information or if you do not use an ERP screen you can issue a wrong medical report or you can delay the patient’s flow. According to all the managers, staff cannot have any excuses such as education, job description, working night shift or distance from the hospital headquarters. Training and communication are fundamental processes for developing awareness and skills at the same time. As discussed in the previous sections, an initial communication plan helped in many ways and for eight respondents training is another important process for getting staff involved. Some heads of department reported that employees who do not receive any training can become hostile and resist the ERP system. The issue of training demand is a very complex one and can have unsuspected effects on organisational projects. According to Kyndt and Baert (2013) learning intention is most related to the attitude, subjective norms, self-efficacy, and career-related variables of the employee. And discussing the issue of resistance, 10 managers out of 13 pointed out that resistance to an ERP implementation can have many aspects. For instance there is a simple resistance due to laziness in learning something new, resistance due to fear of losing power and control as well as resistance due to fear of not being able to keep up with new technologies.

Lastly, technical training about the ERP software, for eight respondents, can be very useful for creating new skills that were previously lacking. As ERP modules are expensive to develop and manage, a large hospital has to have its own software developers and database maintainers.
6 Conclusions

This case study has been carried out at FUH by means of semi-structured interviews with 13 managers. Interesting theoretical findings emerged from the research; some from the literature review and others are new findings.

The benefits achieved by the hospital can be classified into four theoretical categories: patients’ satisfaction, stakeholders’ satisfaction, operation efficiency, and strategic and performance management. Benefits related to the latter category such as promptness in gathering data and information, cross-functional PMS and increased measurability, have been already investigated in the literature and our findings concurred with the literature. However, benefits related to patients’ satisfaction such as reduction of medical report mistakes and performance times or even patients’ privacy represent novelty. We also found as unique contributions the possibility of a better integration with external stakeholders such as NHS, INAIL, general practitioners and academics. This represents something never explored before in the academic literature. In this sense and for the first time, it can be claimed that ERP implementation has led to so-called ‘clan control’.

Also in terms of operations efficiency there are interesting and in some way new findings such as the increased productivity of staff and medical machines.

Our findings of the criticalities of the ERP implementation confirm that issues such as budgeting, project management, staff’s resistance and non-standard patients’ routing can impede the implementation. Once more new theoretical criticalities have emerged, in particular linked to staff’s involvement, raising awareness, internal communication and training are criticalities which can hasten the implementation of ERP.

All things considered, the benefits and criticalities emerged from this research represent also a practical guide for practitioners, ICT managers and clinical managers who want to implement an ERP in a public hospital. In particular, from a managerial point of view the results of this research offer the possibility of weighing the pros and cons of such a complex endeavor, advising managers of the potential pitfalls that could be encountered.

However, this research has some limitations that lead to an agenda for future research. Our research is a case study based in Italy. This means that academics and practitioners should investigate the same topic in different public hospitals in other contexts; the European context is probably similar to the Italian one but this might not be the case in the USA or other continents. Besides, in order to generalise or contest the results of this research, a broader inquiry, employing also quantitative methods, could be carried out within other public hospitals which are implementing ERPs.

References


Appendix

The interview guide and the questions

(Typical grand tour)
What are the general and typical benefits achieved by the hospital through the ERP implementation?

(Specific grand tour)
What are, in your opinion, the specific benefits achieved by the hospital or by your department(s)?

(Specific grand tour)
Can the benefits, in some ways, be grouped by specific categories?

(Typical grand tour)
How has the implementation project been managed?

(Specific grand tour)
How has the project been divided in terms of stages, responsibilities and times?

(Typical grand tour)
What have been the typical organisational and technological issues of the ERP implementation?

(Typical grand tour)
What are the typical pitfalls and criticalities that you have experienced during the implementation?

(Specific grand tour)
Can these criticalities, in some ways, be grouped by specific categories?

References


