Critical Factors for Successful Project Implementation of Graphical Drug Histories System in a United Kingdom Hospital

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ABSTRACT

This paper presents an in-depth case study on the determinants considered by a hospital in the UK in implementing one of their Information Systems (IS) projects, the Graphical Drug Histories System (GDHS). Regardless of the non-adherence to formal IS implementation methods, this case study illustrates that individual's eagerness has been the prime-contributing factor to the success of the project. The lack of formal practices did not hinder the implementation eventual accomplishment; it merely added to the many hurdles the journey it took. The system was delivered with positive review and recognition by staff within the hospital.

Keywords

IS project implementation; IS implementation success: Critical success factors; Case study research

1.0 INTRODUCTION

It has become nearly unbearable for an organisation within the health sector to operate with no use of Information Systems (IS). Since their inception, IS have been held up by many as the cure-all for a variety of short and long-term ill decisions, and in many cases viewed as a remedy to deprived organisational performance – efficiency through the wonder of digitisation.

Faltering or mis-stepping at any of the implementation phases may actually increase inefficiency, ineffectiveness, and promote any number of uncertainties. IS, in and of themselves, cannot solve all organisational problems (or otherwise), nor will they magically remove the variety of managerial ills. While IS are not the instant cure-all that many view them to be, they are certainly an asset and can provide a number of and effective solutions if properly adopted. The successful implementation of IS projects depends upon a multitude of important and interrelated factors.

For close to 25 years the public sector in the UK, in particular the health sector has spent a great deal of time researching the question of how best to strategise and implement IS projects in their organisations. However, even with reams of background research and limitless outcomes from institutional studies, they still face a combination of problems for which there are no effortless solutions.

In short, the introduction of an effective IS can help replace conservative organisational practices and develop its day-to-day and strategic performances. The intricacy can demonstrate many barriers that the organisation must be aware of.

2.0 PRESENT STATE AND SIGNIFICANCE OF IS PROJECT IMPLEMENTATION RESEARCH

There has been a great amount of research assessing IS project implementation (e.g., Kuruppuarachchi, Mandal, and Smith, 2002; Nah and Lau, 2001). To implement a project is conceivably the major obstacle to the increased take up of IS. A considerable amount of studies has investigated the intricacy of project implementation with a view;

- To providing guidelines for success (e.g., Kuruppuarachchi, *et al,* 2002);
- To characterise implementation and inherent problems (e.g., Tait and Vessey, 1988); and
- To refine the factors that influence success (Yoon, *et al,* 1995).

Many of the approaches described above have nonetheless dealt with various factors associated with different measures of project implementation success. Yoon, *et al,* (1995) further noted that

much more research is needed to synthesise previous findings, formulate and empirically test hypotheses regarding the likely determinants and build a theoretical foundation in this significant area. The ability to develop a technically elegant and sophisticated IS far surpasses the ability to provide useful and workable IS projects. The present understanding of IS project implementation has not progressed exceedingly far in moving from general prescriptions to situation-specific recommendations, i.e., guidelines for facilitating the project implementation of particular types of IS within particular organisational contexts. However, most research efforts are not found in NHS but in other more developed areas, e.g., manufacturing.

The basis why studies dealing specifically with IS project implementation are significant is due to the increasing significance of IS in NHS. Most research efforts are not found in NHS but in other more developed areas, e.g., manufacturing.

3.0 PROPOSED RESEARCH FRAMEWORK

In the attempt to identify the activities that occur throughout implementation, both the Lewin/Schein change process model and the System Development Life Cycle (SDLC) were merged to form the proposed research framework (see Figure 1).

Figure 1 is about here

The cycle was chosen as it provided an open framework that could set boundaries for factors to tackle, out of the vast array of issues that impinge upon the implementation (McLeod, 1990; Lucas, 1992). The traditional SDLC arose out of a need in the 1960s to provide structure to the development and implementation of software systems. Campbell (1992) argued that a successful IS project proceeds through two distinct stages of implementation;

- Adoption of the thought that IS can help the organisation
- Implementation of the system in line with users needs.

She further indicated that issues change during the IS project implementation process, initially centring on technical problems such as data and application compatibility and then progressing to other data-related issues. As progress continues, the issues became more organisational in nature, revolving around difficulties concerning the control of the system.

In short, a review at the present studies into the factors influencing successful IS project implementation may help to draw parallels that will assist in understanding the significant issues in IS project implementation which will be dealt with in the case study. It thus serves as a guideline in probing the issues related to implementation during the data collection stage.

Lewin/Schein change process model (Keen and Scott-Morton, 1978) offers a basis for project implementation strategies. This model involves three stages; *unfreezing, change and refreezing;*

- *Unfreezing* (Before implementation) stage involves establishing the necessary conditions for change. Many of the factors, such as senior management support is evaluated and manipulated, if necessary, during this stage.
- *The change* (Prior to implementation) stage engages those tasks normally associated with the customary strategy.
- Finally, this model explicitly confronts the problems of *refreezing* (Post implementation or institutionalising) a system.

Analyses of IS project implementation using this model have examined the relative significance of good performance to overall project success at each stage[1]. Instead, each stage is composed of a number of issues requiring resolution, and good resolution of one of the issues does not necessarily imply good resolution of the others.

3.1 Definition of Key Factors

3.1.1 System champion

A recurring theme in the literature is the significance of the system champion or executive sponsorship. Glover, *et al,* (1992), found a lack of sponsorship to be the most frequent cause of a IS project failure. The sponsor has to be influential so that important decisions about the project can be taken and they can become a lively promoter of the system amongst their peers. They also have a central part to play in helping to derive user needs analyses.

3.1.2 Senior management awareness and support

[1] They argued that project implementation is more likely to succeed if they follow a normative framework of change such as Lewin/Schein model.

Securing senior management awareness and support are central to IS project implementation. Senior management awareness and support play a significant role in IS project implementation and can substantially influence its outcomes (Markus, 1983; Pinto, 1993). In addition, winning the support of the decision-makers is often mentioned as one of the significant prerequisites for initiating IS project implementation (Aronoff, 1989).

3.1.3 Resistance to change

The most common reaction to technological innovation and implementation in organisations is resistance to change. To stakeholders at work new technology can spell all kinds of trouble (Eason, 1993). It can mean loss of jobs, disruption to known procedures, the need to be trained in new skills or the further dehumanisation of the work itself. New system means change, and change can be disadvantageous.

3.1.4 User responses and feedback

If resistance to change is to be avoided it is necessary to involve all potential users in the process, not merely a selected few. In project implementation, it is difficult to involve everybody in the strategic decisions but there are many "local" decisions in which everybody can participate. It is significant to note that involvement of this kind gives people considerable influence over the decisions that affect them personally and it is this kind of example that most successfully encounter feelings of external threat.

3.1.5 User training

User training, in the context of IS project implementation, refers to the provision of hardware and software talents adequate to enable interaction with the system under consideration (Ventura, 1995).

4.0 RESEARCH METHODOLOGY

A review of IS project implementation studies was conducted in areas well-developed in this field such as manufacturing (e.g., authors). Based upon this review, it was noted that there is an enormous array of project implementation factors described in the literature. Given the array of these factors, case study research was structured and used as a methodology to allow the encapsulation of the project implementation. A pharmacy department was approached for the purpose of primary data collection. The foundation used in choosing the respondents for this study was based upon Glaser and Strauss's concept of theoretical sampling (Glaser and Strauss, 1967; Crook and Kumar, 1998). The unit of analysis of this study was a series of organisational activities taking place over time that covered the entire project implementation.

The data was analysed across the respondents to detect similarities and differences. Within the informant, the iterative approach to collecting, analysing and coding of data was more open-ended and generative, in which the focus was on the development of core and sub-categories. The data was then categorised through content analysis into concepts and sub-concepts. When all of the data were analysed, the core and sub-categories were organised by recurring themes. These themes then became essential candidates for a set of common and stable categories that linked with a number of related concepts.

The iterative re-analysis yielded a set of broad core and sub-categories and related concepts that described the salient conditions, consequences, events and experiences associated with the project implementation. These preliminary sets of categories and sub-categories guided the interviews with other respondents, allowing the process of collecting, analysing and coding the data to be more targeted. The ensuing framework is empirically valid because it can account for the distinctive data of each site and can generalise patterns across the respondents (Eisenhardt, 1989). Emerging concepts were checked for representativeness by examining them across participants.

4.1 Verification of the Case Data

Verification of the case data was accomplished by crosschecking the data collected from the respondents. The data collected was cross-checked by re-interviewing other respondents using the information that had been gathered from interviews conducted earlier in the same organisation. In this case, essential contents of previous interviews were reviewed. This strategy is in line with the strategy proposed by K. Y. Yin (1994, p. 35) in increasing case studies validity (construct).

5.0 CASE DESCRIPTION: GRAPHICAL DRUG HISTORIES SYSTEM (GDHS) IMPLEMENTATION AT XYZ HOSPITAL

5. 1 Brief Organisational Background

XYZ Hospital is situated in Nottinghamshire, England. The hospital provides highly secured National Health Services (NHS) to several regions of the country, for both male and female patients with mental illness and personality disorders[2]. It is also the national centre for secured learning disability services for England and Wales. There was approximately 1400 staff of which 710 were ward-based nurses. Highly secured care was provided through multi-disciplinary teams comprising of a selection of consulting psychiatrists, psychologists, nurses, occupational therapists and social workers.

5.2 Role of the Pharmacy Department and the Pressures Influencing GDHS Project Implementation

The Pharmacy Department consisted of five pharmacists. Their day-to-day tasks include supervising and analysing patient's drug treatments. Like other hospitals, the department was facing an increased demand for computerisation. This was due to regularity changes, and changes in the marketplace.

Long-established procedures have resulted in tremendous continuous disappointment in assessing patient's suitable treatment, i.e., to establish whether they were benefiting from the drugs. As noted by one of the pharmacists,

> *"A lot of the time we were asked whether these complex psychiatric drugs were working or not. It was always difficult to measure progress, especially in psychiatry, because so many of the outcomes were soft as opposed to treating something like an infection*".

Manually processed drug formulation, manual data retrieval, and hand-drawn graph were too time consuming for the pharmacists (prone to mistakes), as it was too difficult to see what treatments were being prescribed.

Additional major difficulties encountered were in assessing the effectiveness of psychiatric treatment offered to the patients, for instance:

- Problems in detecting trends in treatment strategy
- Schizophrenia chronic disease, treated with imperfect drugs, rarely result in dramatic changes and
- Treatment changes were often made based upon short term data (*"knee jerk"* reaction)

Because of these pressures, the head of department has decided to implement is the project, known as the Graphical Drug Histories System (GDHS).

5.2.1. Graphical Drug Histories System (GDHS) project implementation process

The proposed system was developed to assist the team in assessing patient' prescribed treatment and its progresses. Itwas believed to modernise long-established assessment of patient's drug treatment. The system was also seen as an extension of the clinical role that pharmacists were being asked to perform. To the hospitals' advantage, the system was seen as an excellent facility to demonstrate clinical governance being applied to medicine, prescribed by NHS.

A business case was presented to senior management but the proposal was rejected mainly due to their lack of interest. In the end, a large amount of funding was secured by a local government official whose avid interest swayed the views of the hospital management. Through an extensive iterative project implementation process, a bespoke program was developed to accommodate the application. The process took place quickly as staff members within the department were introduced to the application (whilst the prototype was still being tested). The Information Technology (IT) Department and the Head of the Pharmacy Department, who acted as champions, maintained the system jointly.

The initial stage of the implementation began with detailed meetings with the software developer to discuss the requirements of the system. The meetings were productive due to inputs provided by the department's head extensive knowledge on the problems of the treatments, familiarity of database and the pharmacists' technological skills.

[2] Patients can be detained under the UK Mental Health Act following doctor's certification that they need such a treatment under secure conditions on account of *"dangerous, violent or criminal tendencies"*. The average length of stay was between six and seven years.

Through continuous responses, adjustments were made until the resulting system was created. It was then refined to record and display "events". This meant that a timeline could be produced showing whether a patient was getting better (or not) and what combinations of the drug treatment were successful. The adjustments made provided meaningful data both to the pharmacists and patients.

The immediate benefits began to take place, once the system was operational. This had a positive influence on the role of the pharmacist in psychiatry. They have also become much more acknowledged than other professions in the hospital. Nonetheless, there were some slight problems such as the amount of time it took to input all the data required, as this was the first computerised system the department had encountered.

5.2.2 System champion

A system champion is someone who is completely committed to the thought of implementing a system within the organisation. She tirelessly pursues the objective of implementation by selling the thought to senior management, co-workers and anyone who is willing to pay attention. In the case of XYZ Hospital, the Head of Pharmacy Department initiated the embracing of the system. The idea has come up from requests made to pharmacists about the helpfulness of the medicines prescribed to patients.

5.2.3 Senior management awareness and support

The department has of a flat organisational structure dissimilar to other NHSs that were sophisticatedly tall, mechanistic organisational structure. The number of layers within this type of organisation has provided significant blockades to communication and the funding for the proposed system.

There was limited support for the department. Initially, the project was rejected due to the red tape blocking its way. It was not until a government official took an interest and persuaded senior management that they should go ahead with the funding. As far as the senior management was concerned, what they saw was an improved pharmacy service that enhanced its reputation[3].

The lack of senior management support also became apparent when upgrading the system. The difficulty arose in obtaining senior management commitment to recognise the importance in the upgrade. Their attentions were focused upon other more critical systems. Due to the complexity of the system and lack of resources, the GDHS was not operational for about a year and a half although the department continued to record data into the database. When the senior management did eventually grant the funds, the system was upgraded with improved application, and procedures were formalised.

With the new technologies, the department had the opportunity to smarten-up the system with features such as a new user-friendly GUI that improved navigability. These amendments were carried out to effect improvement but fundamentally, the system remained the same. During the this development stage, the following issues were brought to light:

- The lack of interest from senior management has led to a lack of resources, which hindered the commercial aspect and progression of the system.
- The system was not directed towards meeting the user needs, as they were not involved in the planning process. This could have been risky, as the users were the stakeholders.

5.2.4 Resistance to change

The implementation caused change in the practice for the staff involved and a staggeringly affect the future treatment of patients. The user resistance to the new system came from the staff having very little or no experience with computers. The resistance was overcame by the convenience of the new system in replacing traditional tasks that would change the practice for the better. The head of the department described the motivation as,

> "*Basically the motivation was, if you put in this effort, what you will get out of it, is nice, smart*

[3] As the system became more established within the profession, the lack of resources meant the pharmacy department became victims of their own success.

drugs charts that gives you an awful lot more influence in multi disciplinary meetings. You can then go to the doctors or clinical team and give a better presentation".

5.2.5 User responses and training

There was no official feedback meeting to assess how well the staff was adapting to the new system. Any responses were taken informally. This was due to the size of the department and the small amount of people using the system. An advantage of this informal communication (i.e., between the users) meant that if there were any faults or issues with the system then it could be solved rapidly.

At the department, little emphasis was placed on the training. As the department did not have the resources for training (neither did the organisation), there was no proper training offered to the department. Some training sessions did take place on an informal basis. It was a setback and consequently, staff missed the critical computing skills.

In general, untrained staffs were not as productive, or as well motivated, as those who had been trained. They would be unable to deal with change because their existing skills were specific to the current situation. In addition, employees were less likely to know, and work towards, achieving the organisation's aim and objectives. Users who had missed training sessions for whatever reason were found to be uncomfortable with the system. The head of department was made aware of these dissatisfactions. Consequently, a lot of emphasis was placed on the benefits of the innovative idea and how it could influence the workforce.

6.0 CASE DISCUSSION

The phrase resistance to change is a common theme in IS literature. By looking in detail at the GDHS implementation, the findings emphasise the fact that resistance to change may not be pathological but a sensible response. In line with Prerau's (1990) work on attempts to minimise resistance, senior managers should establish courses for users to elucidate the potential of GDHS, e.g., in its ability. Explanations can also be done through developing application prototypes, which can aid users to realising their needs better. Senior managers can also hire an independent party, such as their key vendors, to assess users' needs.

User involvement is fundamental to ensure the chance of project implementation success. Once a GDHS is acquired by an organisation, its pattern toward the organisational unit and individual is exclusive for that organisation. Involvement with a GDHS is not uniform across all users. Building the system in stages, with users comments continuously provided, contributes greatly to user acceptance of the system. Users are supposed to be holding the primary responsibility in developing and implementing the applications and in controlling the superiority of the data. This does not happen within one distinct stage, familiarisation of GDHS is an on-going evolutionary process.

The setback in developing the system by solely relying upon a champion is apparent. This isolation and lack of co-worker involvement also led to mistrust towards the champion as other people's ideas were excluded. As the champion noted,

"*They might think that they don't know what I'm doing and so just leave me to it and they might disconnect, and not be enthusiastic".*

It was perceived as exceedingly difficult, as members with good ideas were press to work on their own rather than in teams. Some of the members did not wish to be hindered by others were somewhat disappointed.

Implementation tasks can be more manageable with the aid of an applications and system development methodology. This iterative process should carry on as the applications and system was enriched, adding more knowledge of the underlying processes. A high degree of senior manager, system developer and user participation are needed and the design should be presented to both for feedback.

7.0 CONCLUSION AND DIRECTIONS OF FUTURE RESEARCH

The field of IS project implementation is extremely problematic and complex. IS project implementation is a process that involves all the

individuals who make up the organisation. From senior level administrators to clerical staff. In addition, it requires a significant portion of the resources available within the organisation, from human to fiscal. Any approach to implementation and deployment (which hopes to successful) must take into account both the technical and social factors that make-up the organisation.

XYZ Hospital has successfully created a GDHS that had revolutionised the day-to-day and strategic operations of their pharmaceutical department. The implementation has supported the department's need in monitoring clinical effectiveness of drugs and non-drug treatments for the patients. Thorough communications between the champion and system analyst was one of the essential factors influencing successful implementation of the project. Both of them have continuously exchanged their knowledge to develop the application. Nonetheless, these factors are subjected to where and how the system has been implemented and it varies according to what organisation (e.g., size of the project and size or the organisation). Lastly, it should be noted that the progress offered by the system has increased the pharmacists' role, their motivation and overall reputation.

In general, the introduction of a new IS, i.e., GDHS is assumed to bring improvements in organisational performance. GDHS is expected to advance pharmacists' activities. Even so, pharmacists that have already adopted the technology, experience varying degrees of success in implementing the system. The "installment" of GDHS does not necessarily result in its adoption, i.e., internalisation into organisational functions and processes. Careful management of GDHS implementation process is thus necessary, to assure desired outcomes of the system.

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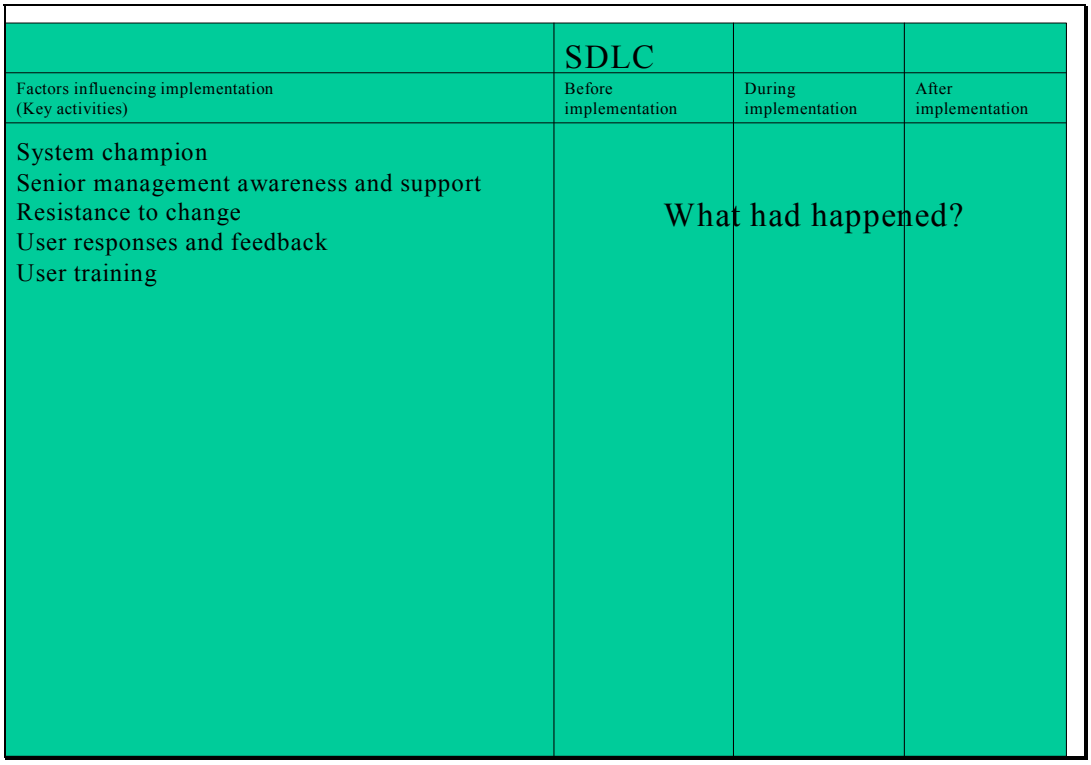

Figure 1: The Proposed Research Framework