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Management Information System Implementation Challenges, Success Key Issues, Effects and Consequences

: A Case Study of Fenix System

Master's Thesis within Military Logistics

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Artit Kornkaew

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Abstract

During the growth of a competitive global enviroment, there is considerable pressure on most organisations to make their operational, tactical, and strategic process more efficient and effective. An information system (IS) is a group of components which can increase the competitiveness and gain better information for decision making. Consequently, many organisations decide to implement IS in order to improve the effectiveness and efficiency of their organisations. However, a lack of awareness of numerous and varied challenging issues surrounding the implemenation process could be problematic for the whole process. Furthermore, the problem of a lack of key success issues seems to be a serious obstacle for the management information system (MIS) implementation process. Additionally, MIS implementation has effects on an organisation and these effects are related to the consequences of the business processes. Consequently, this issue is critical and crucial for an organisation to consider when they implement a new MIS.

The main purpose of this thesis is to present the MIS implementation challenges or problems together with identifying the key issues to successfully achieve implementation. Such challenges and success factors are conducted based on a research framework. In addition, this research accesses descriptions of implementation effects and consequences which impact the organisation and its processes.

This thesis has been conducted by studying the theory divided into three parts including: general background literature of information systems, implementation aspects, and organisational impacts literature. The methods that were used to successfullly accomplish this study were a case study of Fenix System, collecting data by personal interviews with respondents who were involved in Fenix along with internal documents.

The analysis of the research framework and empirical findings has contributed to a description of the main challenges and key success issues regarding MIS implementation, together with an identification of important effects and consequences when implementing MIS. This thesis's main results show that MIS implementation is surrounded with challenges which mainly concern management, adminsitration, and people issues involved in MIS implementation process. Additionally, it was concluded that the key issues which the MIS implementation project should be presented with primarily focused on the project team and their team work. The last main finding is concentrated on effects and consequences and it found out that MIS implementation mainly affects business process which lead to change, for instance jobs, routines, and so forth.

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1. Introduction

1.1 Background

During the growth of a competitive global enviroment, there is considerable pressure on most organisations to make their operational, tactical, and strategic processes more efficient and effective. An information system (IS) is a group of components which can increase competitiveness and gain better information for decision making. Therefore various organisations have chosen to apply this group of components to their associations (Spalding, 1998). Consequently, the organisations decide to implement IS in order to improve the effectiveness and efficiency of the organisations. Information systems have become a major function area of business administration. The systems, nowadays, plays a vital role in the e-business and e-commerce operations, enterprise collaboration and management, and strategic success of the business (Hevner et al., 2004).

According to Ein-Dor and Segev (1978), an IS becomes a management information system (MIS) when it is applied to improve management by directors of the organisation. This system can increase the performance of the management. MIS is a collection of manpowers, tools, procedures and software to perform various business tasks at various levels in the organisation (Tripathi, 2011). This system has three basic levels: operational, middle management and top management where the information is passed from bottom to top (Tripathi, 2011). Moreover, MIS is one of the important functions of management which plays an important role in providing information that is required for crucial decision making which directly affects the performance of the organisation (Murthy, 2006).

Due to a fundamentally changing external environment, several organisations have decided to change their IS strategies by adopting application software packages rather than in-house development (Hong & Kim, 2002). According to Davenport (1998), the most significant development in the corporate use of IS is the establishment of enterprise resource planning (ERP) systems. ERP systems are an information technology (IT) infrastructure that facilitate the flow of information between all supply chain processes in an organisation (Al-Mashari & Zairi, 2000). ERP systems, moreover, provide the means for management to respond to increased business needs in more effective and efficient ways (Spathis & Constantinides, 2003). Nonetheless, a concern regarding ERP systems regards their flexibility and ability to meet specific organisation and industry requirements. As a result, some organisations still integrate their systems using conventional best of breed (BoB) or stand alone system components of standard package and/or custom software without ERP systems (Davenport, 2000). In addition, some organisations have developed their own customised suites of enterprise applications, known as a best of breed (BoB) IT strategy, which offers greater flexibility and closer alignment of software with the business process of the organisation (Light, Holland & Wills, 2001). Therefore adoption and utilisation of ERP and BoB systems should be considered as an important factor which should be suitable for the organisations and the current business processes.

In private organisations, IS are important factors in assuring the competitive advantage and eventual profitability of the firm. On the other hand, in governmental organisations IS are just as crucial, but from another perspective, in terms of responsivesness,

efficiency, and productivity (Beaumaster, 1999). In defense organisations they also share the same objectives as many private-sector corporations: for instance they are striving to decrease costs by redesigning and integrating processes. Hence defense organisations require IS with the integrated system and technology platform both within and across the organisation in order to achieve greater visibility and affordable operational readiness. For example, the Swedish Armed Forces (SAF) formalised an ERP project due to many old and bespoke systems, lack of integration, and high complexity of current IT systems. Moreover, efficiency and effectiveness can be increased in IS for maintenance of aircraft; SAF has implemented an aviation "best of breed" solutions information system called the Fenix System. In addition, this system has been implemented in the Royal Thai Air Force (RTAF) since 2010. This research will focus on the implementation of MIS and provides a case study of the Fenix System which is a management information system for the maintenance of aircrafts.

1.2 Problem

Many companies have been implementing IS in their respective organisations and re-organising their business processes (Rajagopal, 2002). Computer-based IS mainly depend on IT; consequently, successful IS can be measured by the effectiveness of IT to support an organisation's strategies (O'Brien, 2004). The demand for efficient and effective use of IT is also gradually increasing at the present time (Beaumaster, 2002). An organisation that adopted an IT system to provide special attention to planning, acquisition, and implementation of these technologies. Those associates must be aware of the various number of issues which are a part of the ability of the organisation to achieve effective IT implementation (Beaumaster, 2002).

It is important to note that more than 70 per cent of standard package (i.e. ERP system) implementation projects fail (Milis & Mercken, 2002). Therefore, IS implementation is surrounded with various problems regarding the implementation process and it is not easy to succeed. There are several problems which occur during the implementation of IS. These problems can be observed in a series corresponding to each stage of the overall process. It appears that every layer is comprised of multiple issues that create or worsen the challenges (Beaumaster, 2002). MIS or IS have to provide an approach to deal with the ever-changing problems and be situated surrounding all aspects of the management of information (Theiruf, 1994). Moreover, the success of IS implementation in the organisation also depends on a multitude of important and interrelated factors (Beaumaster, 2002). Hence it is a of great significance to take into account this and observe the obstacles when implementing an new information system. In order to ensure success of MIS implementation, therefore, the key success factors should be determined and indicated on which issues will allow a project to be successful (Gargeya & Bardy, 2005).

As mentioned earlier, adopting IS is one factor which increases the effectiveness and efficiency in an organisation. However, implementing IS affects the organisation to a great degree and can be seen as a major change for an organisations' processes; for instance, it requires employees to change (Chan, 2000; Davies, 2009). Many companies have found that implementing such changes is the most difficult part of IS implementation (Kroenke, 2007). In addition, IS can effect individuals, groups, and a whole organisation when IS was introduced into that organisation. This system can create both a positive and negative impact on these levels (Davies, 2009). The negative effect of IS occurs when the system fails. This failure can be analysed on the technical,

project, organisational and environmental level. Thus a good strategy is significantly concerned with avoiding the failure of the system and achieving a successful system (Davies, 2009).

Problem statement

Considering the aforementioned context, it is important to notice that a lack of awareness of numerous and varied challenging issues surrounding the implemenation process could cause problems for the whole process of MIS development and deployment. Furthermore, the problem of a lack of key success issues seems to be a serious obstacle for the MIS implementation process. It is essential to define the success factors amd manage them in order to carry out a successful the implementation. Additionally, MIS implementation effects an organisation and these effects are related to the consequences of the business processes. Consequently, this issue is critical and crucial for an organisation to consider when implementing a new MIS in the organisation. The problem addressed in this study focus the challenges and key success issues regarding IS implementation. Additionally, the problem addressed in this study refers to effects and consequences on an organisation and its business process.

1.3 Research Questions

In order to achieve the purpose of the study, the following research questions were identified:

- ***What*** problems/challenges have been faced in MIS implementation processes?
- ***What*** are the key issues that need to be identified in order to achieve a successful MIS implementation?
- ***What*** are the effects and consequences for an organisation and its processes when implementing MIS?

1.4 Purpose

The purpose of this thesis is to present and describe MIS implementation challenges or problems as well as identifying the key issues to achieve successful implementation. Moreover, this research seeks to explain the implementation effects and consequences which impact the organisation and its processes.

1.5 Delimitations

This report will not consider modification of already-existing MIS, only new MIS implementation. Information system implementation in this study concentrates on purchasing standard package software, not developing in-house software. In addition, in the case study of the Fenix System, the research will not take into account the full version of the Fenix System, but will mainly focus on the system which was implemented by the Royal Thai Air Force (RTAF), called Fenix Export version or Fenix (E). The limitation of the Fenix (E) is an information system which is used for operation monitoring only for aircraft maintenance in the RTAF, and is not be used and integrated with other actors in the supply chain. Consequently, the supply chain perspective will not be considered in this research.

1.6 Definition

This research uses some technical terms and concepts which could be hard to understand. Therefore a list of definitions is created in order enable the reader to have an understanding of these issues. In this section the main definitions that are significant for the purpose of this thesis will be explained. The rest of them will be clarified and explained in Appendix 1.

Management Information System (MIS): MIS refers to an information system that makes timely and effective decisions for planning, directing and controlling the activities for which they are resposible and also helps businesses achieve their goals and objectives. In this study, MIS will be used as a similar definition to Information System (IS).

MIS Implementation: That is a part of the information system development process devoted to delivering the information system into its context of use. In this study, it is titled "IS implementation process" and is also mentioned as one of the steps of implementation process. In order to clarify this confusion, therefore, the process sometimes will be labelled as "IS Development and Deployment Process".

Effects and Consequences: A consequence is based on an effect and affects the way of working. In this study I would like to see what consequences have been generated due to the effects of implementation of MIS and how these impacts have affected the business processes and organisation.

Key Issues for MIS implementation Success: The key success issues in this study can be called "success factors" which refer to factors that have to be achieved in order to carry out a successful implementation of MIS. These are key areas where successful performance will assure the success of the organisation and the attainment of its goals that top management should take into account.

1.7 Disposition of the Thesis

In order to provide the reader with an overview of the thesis, the research structure and details below are summarised and presented in the following way:

Chapter 1 – Introduction:

The background to the thesis is present in this chapter. This provides the reader with a basic understanding of the subject and issues. In addition, the research problems are defined in the field of management information system implementation. Also, the purpose of the thesis is described together with delimitations. Since this thesis uses some technical terms, some of primary definitions are defined in order to allow the reader to understand the purpose of the thesis.

Chapter 2 – The Frame of Reference:

The frame of reference presents some understanding of the relevant implementing of MIS. In this chapter, management information systems (MIS) will be described as well as information systems (IS) and information technology (IT). One of the most important information systems for enterprise in the last two decades, such as enterprise resource planning (ERP) and the best of breed (BoB) solution, are described in order to gain more

understanding in technolgy related to information systems. In addition, the framework of MIS implementation with problematic issues together with key succes factors are explained. Additionally, organisational impacts by MIS implementation focused on effects and consequences on an organisation and its processes will be presented.

Chapter 3 – Method:

This chapter will use methodology combining a theoretical and empirical approach. This research uses a qualitative method and uses a case study as research in order to achieve the research's purpose.

Chapter 4 – Empirical Findings:

The chapter will present findings of the empirical research including the case study of the Fenix System. In-depth interviews in diffferent perspectives from the respondents involved in implementation process of Fenix (E) in Wing 7, RTAF will be carried out.

Chapter 5 – Analysis:

The intention in this chapter is to the give the readers my explanation of the findings related to my research questions. Moreover, theory and empirical data are combined to interpret and analyse the findings.

Chapter 6 – Conclusions:

This chapter will provide the readers with the main findings in problems and effects and consequences of implementing MIS together with identifying key success issues. In addition, the major effects and consequences of implementing MIS will be described.

Chapter 7 – Discussion:

The final chapter includes some discussion on some general aspects regarding the findings or lesson learned obtained from this study. Additionally, the trendency of the Fenix System will be discussed in this chapter.

2. Frame of Reference

In this chapter the reader will be more able to understand the subject and identify the suitable theoretical areas for creating an understanding which are connected to the purpose of the thesis. This review will ground the study of management information system (MIS) implementation issues in the field of information systems (IS). In essence, the review relates to MIS implementation and consists of three main sections which are focused in the research and writing that provide the main idea of this study.

This review begins with a presentation of a general background of literature which aims to give the reader an understanding of the subject. This part relates to MIS which focuses on management of information systems. Moreover, the discussion of ERP and "best of breed" solutions, two existing approaches to information systems for enterprise software systems will be described. In addition, this section includes a discussion of information systems (IS) related to information technology (IT). The second part of this chapter provides literature associated with MIS implementaion processes and its surrounding challenges along with its success factors. The third part of this section discusses organisational impacts on business/organisation processes including effects and consequences when MIS has been implemented. Finally, the summary of the research framework is illustratated as the model which will be used as a guide for analysis (see Figure 2.1)

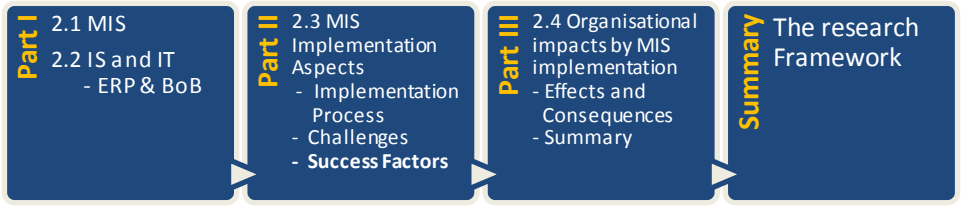

Figure 2.1 Frame of Reference Description (source: constructed by the author, 2012)

Part I General Background Literature

2.1 Management Information Systems (MIS)

The literature about management information systems (MIS) has been developed since the 1960s. An evolution of MIS can be divided into three periods: data processing, management information systems, and strategic information systems (Somogyi & Galliers, 1987). The first era, "data processing", is mainly focused on improving the efficiency of business through automation of basic information processes with not too much control over planning or resources. the second era, "management information systems", was concerned about the enhancement of managerial effectiveness by satisfying widespread information requirements. Managers of each organisation came to realise the capability of information technology resources and started to acquire their own systems to meet the requirements. The third era, "strategic information systems", focused on improving organisational competitiveness advantages by affecting the overall organisational business strategies. This period is an approach to use strategic management in MIS such as various and diverse information technologies, widespread

user involvement, and significant planning and implementation strategies (Beaumaster, 1999).

A variety of the definitions of MIS have been indicated, for example Ives, Hamilton and Davis (1980: p. 910) defined MIS as a "computer-based organisational information system which provides information support for management activities and functions" which is similar to Ein-Dor and Segev (1978: p. 1065) who described it thus: "MIS is a system for collecting, sorting, retrieving and processing information which is used, or desired, by one of more manager, in the performance of their duties". Furthermore, Davies (2009) claimed that MIS is one types of information system that supports the tactical decision-making of managers, and also monitors the current state of the organisation. Moreover, Kroenke (2007: p. 5) mentioned that MIS has three key elements including: development and use, information systems, and business goals and objectives. MIS can be named as an organisational information system, a computer-based information system, or an information system (IS; Ives et al.,1980).

Various characteristics of MIS are considered as important factors for the efficiency of MIS which is to report with fixed and standard information; to have reports developed and implemented using information system personnel, including systems analysts and computer programmers; to require formal requests from user; and to produce scheduled and demanded reports. In addition, external data are used by the MIS while it is not captured by the organisation (Asemi, Safari & Zavareh, 2011). Furthermore, Das (2012) discussed the same area and claimed that an efficient MIS should contain the following characteristics which include: system capability, modularity, simple, transparent, instinctive, online capability; integration; and support from well established and committed suppliers. On the other hand, the roles of MIS have been described as a useful tool for making business decisions by gathering data and information from MIS systems (Asemi et al., 2011). This concept is relatively stated by Das (2012) that MIS is mainly concerned with processing data into information for appropriate decision-making.

The MIS literature, based primarily on private sector organisations, prescribes performance evaluation on the basis of the economic efficiency of hardware and software (Hamilton & Chervany, 1981). Public organisations also have strong incentives to consider economic costs in decision making, but most face other, equally important competing criteria, such as procedural equity (cited in Bretschneider, 1990).

In addition, Beaumaster (2002) claimed that MIS concentrate on the automation of many business activities that aim to provide better methods of planning, reporting, and operation control. Therefore MIS, which is often referred as "information system (IS)", has attempted to provide methods to manage problems and situations around all perspectives of the management of information (Theiruf, 1994). Moreover, MIS is a facilitator for an organisation and also supports management activities. MIS implementation, however, is high priced with costly assets, thus this implementation project requires detailed planning of its design, implementation and operation processes.

2.2 Information System (IS) and Information Technology (IT)

Information systems (IS) and information technologies (IT) are a vital component of successful businesses and organisations (O'Brien, 2004). The definition of both IS and IT are closely related to each other; however, they are different in their functions. IT relates to the products, methods, inventions, and standards that are used for the purpose of producing information. It can also be defined as "the preparation, collection, transport, retrieval, storage, access, presentation, and transformation of information in all its forms (voice, graphic, text, video, and image). Information movement can take place between humans, humans and machines, and/or between machines. Information management ensures the proper selection, deployment, administration, operation, maintenance, and evolution of the IT assets consistent with organizational goals and objectives" (Boar, 1993, p.3). IT refers to the products, methods, inventions, and standards that are used for the purpose of producing information (Kroenke, 2007). IS "consists of the information technology infrastructure, application systems, and personnel who employ information technology to deliver information and communications services for transaction processing/operations and administration/management of an organisation" (Baskerville, Stage, & DeGross, 2000). Therefore IS is a set of components which interact to produce information, which include hardware, software, data, procedures, and people, whereas these components can be found in every information system (Kroenke, 2007). According to Figure 2.2, the main elements of IS consist of hardware, software, data, procedures, and people. Hardware refers to computers, storage disks, keybords, and communication devices while software is relevant to word-processing programs. Data or information is included texts, words, sentences, and paragraphs in reports. Furthermore, procedures refer to the methods for using the program and involved activities. The last element is people. The important role of the five components is that IS is not only computers, programs, and communication devices, but it also focuses on the assembly of hardware, software, data, procedures, and people; in other words, information system means a system of communication between people (Kroenke, 2007; Davies, 2009). Moreover, Gurbaxani and Whang (1991) claimed that there are many roles of information systems in an organisation, for example to increase an operation's efficiency, to process business transactions, to provide decision support, to monitor and evaluate employees' performance, and to maintain documentation and communication channels.

Information technology (IT; i.e. hardware and sofware) is one significant component in an information system (IS). Nowadays, IT is an important factor to evolve in strategic planning of an organisation. In addition, IT is the asset or capability base on which an enterprise constructs its business information system (Boar, 1993). On the other hand, the main roles of IT have been analysed and presented by Chan (2000). He claimed that the key roles of IT include an initiator, a facilitator, and an enabler. The importance of an initiator in IT is to initiate a new operation, or initiate the change of IT. In addition, a facilitator of IT is a tool which helps to manage work which is easier to work. Finally, an enabler of IT offers the ability or the necessary support to achieve a goal.

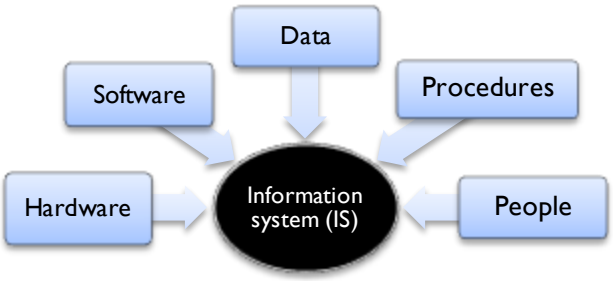

Figure 2.2 Five Components of an Information System (IS) (source: Kroenke, 2007: p. 5)

Organisations have radically changed their IT strategies and one of the strategies that they choose is to purchase standard package software instead of developing IT systems in-house (Holland & Light, 1999). The existing application software has been categorised by Kroenke (2007) as the following:

- *Horizontal-market application software* refers to a software that serves capabilities common across all organisations and is used in a wide variety of businesses such as Microsoft Office, Adobe Acrobat;
- *Vertical-market application software* provides for the specific industry requirement, for instance the programs that are used by parts of warehouses to track inventory, purchase and sales;
- *One-of-a-kind application software* is developed in order to support a unique need and fit only the organisation.

In addtion, Kroenke (2007) also explained how an organisation acquires application software or sources of them. The first approach is to purchase the suit software, called *off-the-shelf-software* which provides the customer an exact cost. However, some applications in the suit do not fit the organisational requirements. The second software sources can be obtained by buying off-the-shelf with alterations software. This software is more expensive than the previous software; in spite of that, an altered suit will be more fit than pure off-the-shelf-software. The last software is called *tailor-made application software* or custom-developed software. This software is obtained by hiring a vendor to make a custom suit in order to get the applications that exactly fits with their requirements. The existing types and sources of application software were summarised in Figure 2.3 by Kroenke (2007).

Software Source

Software Type		Off-the-shelf	Off-the-shelf and then customised	Custom-developed
	Horizontal applications	■		
	Vertical applications	■	■	
	One-of-a-kind applications			■

Figure 2.3 Software Sources and Types (source: Kroenke, 2007: p. 122)

Two ultimate approaches currently exist for enterprise software (ES) systems including ERP systems and "best of breed" (BoB) solutions (Mabert, Soni & Venkataramanan, 2003). Therefore, an organisation should carefully make the decision to implement IT solutions and evaluate to ensure that it meets the requirements (Loh & Koh, 2004). For instance, ERP systems are the most preferable method whereas the businesses replace the legacy system (Holland & Light, 1999). However, ERP system implementation is one of the most challenging projects and is not easy to achieve (Gargeya & Brady, 2005). On the other hand, BoB is flexible and organisations are able to choose from a collection of software applications which are appropriated with the organisation's requirements (Light et al., 2001). Nevertheless, Sledgianowski, Tafti, and Kierstead, (2008) claimed that BoB is required to develop an infrastructure (i.e. hardware, software, expertise, etc.) which would be very expensive. These discussion of ES system approaches as well as implementation processes of IT solutions will be discussed in following sections.

ERP and BoB Solutions

Many companies started to replace their legacy system with ERP packages in order to solve integration problems during the 1990s (Hyvönen, 2003). These systems are comprehensive packaged software solutions which aim for total integration of all business processes and functions. Gargeya and Brady (2005) stated that ERP systems had emerged as the core of successful information management and the enterprise backbone of the organisation. The main benefit of these systems is to provide a common integrated software platform for businesss processes (Parr & Shanks, 2000). An ERP system might be used as a basic platform in many companies, but they also still use some stand alone components, or ERP modules from diffferent vendors (Themistocleous et al., 2001). On the other hand, some companies without an ERP system still integrate their systems using conventional best of breed (BoB) or stand alone system components of standard package and/or custom software in order to reach flexibility and ability to meet specification organisation and industry requirements (Hyvönen, 2003). In contrast, the increasing needs to integrate intra-organisational information systems is established. Sunsequently, many organisations are now seeking to integrate inter-organisational information systems and ERP systems provide internal integration. As a result, they are seeking to use ERP systems to establish integration with other supply chain stakeholders (MacKinnon, Grant & Cray, 2008).

Taking into account the definition of ERP systems and BoB solutions, ERP systems are single vendor software packages which provide best-practice business process functionality centred around a single database. Many companies attempt to modify ERP systems to match their existing processes. However, they have often caused a great deal of trouble, for instance delaying implementation, increasing staff requirements and hampering the upgradeability of the system. On the other hand, best of breed (BoB) solutions are combinations of different software packages which provide more limited and focused functionality, such as one system for finance, one for operations, one for human resource management, and so forth. Therefore many organisations try to mix and match what they consider to be the best collection of software packages to match their organisational needs. These packages are then integrated using some type of middleware. Various advantages of BoB implementation are considered to be less disruptive to an organisation, require less process reengineering, and allow for greater flexibility. However, due to the fact that the packages come from different venders, there are extensive compatibility and integration issues (MacKinnon et al., 2008). In short, the

strengths of the BoB approach can be seen as being centred on the ability of organisations to benefit from the most appropriate and the best in class software function available (Light et al., 2001)

Unfortunately, many organisations have faced a challenge with the systems integration which is not only an obstacle of the system, but also the supply chain partners consist of independent systems so that, in some cases, they cannot communicate with each other. In addition, there is a complexity of existing information systems, which in many cases have fixed and rigid structures for messages, interfaces and databases (Themistocleous, Irani, & Love, 2002). Therefore ERP systems have become the resource to support the business processes and increase efficiency and effectiveness of collabolative relationships with actors in the supply chain. However, ERP systems are not appropriate for every organisation. Many organisations which haven't chosen ERP systems still have some problems with isolated systems. In order to solve these problems, enterprise application integration (EAI) is conducted. EAI or application integration (AI) is adopted to refer to the integration area and is defined as the "unrestricted sharing of information between two or more enterprise applications. A set of technologies that allow the movement and exchange of informatiom between different applications and business processes within and between organisations" (Linthicum, 1999, p. 354).

To conclude, both approaches are beneficial for an organisation which implement an information system. However, there are many factors that the strategic level or top management should take into account in order to choose the proper information system for implementation within their organisation. These MIS implementation aspects including implementation process, implementation challenges, and key issues for success implementation will be described in the following part.

Part II MIS Implementation Literature

2.3 MIS Implementation Aspects

In this part, I will describe the implementation process together with challenges and success key issues. The following section seeks to introduce and describe the MIS implementation process which can be seen as a vital stage in the deployment of information technology to support the business information systems that are developed by the organisation for employees, customers, and other business stakeholders (O'Brien, 2004).

2.3.1 MIS Implementation Process

This part will discuss the implementation process which in this study is also referred to as the "information system development process". The implementation of new information systems is a significant investment for organisations. Since information systems are sociotechnical systems, development involves the joint design of activity systems and ICT systems (Davies, 2009). It is important to define the key stages of the information system implementation process. Consequently, Davies (2009) presented information system implementation stages which are concerned with a number of key activities in the process. In addition, this information system implementation process concept is similar to O'Brien (2004) who explained a five-step process called the information systems

development cycle which includes the steps of: (1) investigation; (2) analysis; (3) design; (4) implementation; and (5) maintenance (see Figure 2.4). The first phase of information system development process is *systems investigation* or system conception which is aimed to determine how, based on informatics planning and management, to develop a project management plan and obtain management approval. *Systems analysis* is focused on identifying the information needs and developing the functional requirements of a system. *Systems sesign* is the process of planning a technical artefact and developing specifications for hardware, software, data, people, and network. In addition, this phase invloves building the information system to its specifications. *System implementation* invloves delivery of systems, testing the system, training people to use the system, and converting to the new business system. Finally, *system maintenance* is the process of making necessary changes to the functionality of an information system (O'Brien, 2004; Davies, 2009).

Nontehless, Zmud and Cox (1979) defined, traditionally, the MIS implementation stage which invloves different related activities including: initiation, strategic design, technical design, development, conversion, and evalution. Each implementation stage can be described as follows: initiation includes project definition and justification; strategic design refers to establishing the scope and requirement of a project (i.e. design attribute visible to the users); technical design involves translating the strategic design into hardware, software, and process specifications (i.e. design attributes not visible to the users); development concerns the acquisition of hardware, the acquisition and construction of software, and the testing of both hardware and software; conversion relates to the insertion of the new information system into the organisation; finally, evaluation assesses the effectiveness and efficiency of the MIS.

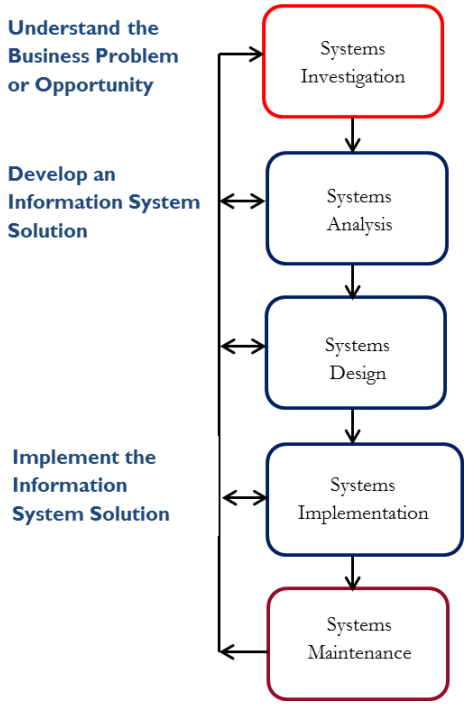

Figure 2.4 Information System Development Cycles (source: O'Brien, 2004: p. 345)

One of the most important processes of IT implementation is the initial part of the project or strategic planning of IT. Nowadays, many companies focus on their startegic planning with aims to develop long-term plans, change their organisation, and improve their competitiveness (Gunasekaran & Ngai, 2004). Planning is a major issue for the IT implementation process, and IT planning can be defined as "organisational activities directed toward (1) recognising organisational opportunities for using information technology; (2) determining the resource requirements to exploit these opportunities; and (3) developing strategies and action plans for relising these opportunities and meeting the resource needs" (Boynton & Zmud, 1987: p. 59).

However, before implementation, it is important to view the business model, and then identify suitable IT systems requirements (Gunasekaran & Ngai, 2004). In order to increase the effective IT planning process, therefore, Boynton and Zmud (1987) suggested nine planning agenda. This IT planning agenda points out various issues that managers or organisations require giving attention to, including: (1) intra-organisational political analysis; (2) intra-organisational market analysis; (3) business strategy analysis; (4) business market analysis; (5) technology analysis; (6) organisational learning analysis; (7) organisational culture; (8) IT infrastructure analysis; and (9) IT risk-taking analysis. In IT projects management, IT planning is a significant process and Bailey (1998) also mentioned three approaches for planning in project management which are: linear planning, exploratory planning, and personal planning. Furthermore, implementation of IT systems requires a project management approach administrated by the right team for the planning and implementation of the IT project. This process should be supported by top management in order to achieve the successful IT project (Gunasekaran & Ngai, 2004).

On the IT procurement process, Beaumaster (2002) claimed that IT procurement involves all aspects of IT acquisition not only the software and hardware, but also various services, support personnel, intellectual properties, and items related to information technologies. Furthermore, Beaumaster (2002) provided the nesessary functions in this process including: investment analysis, risk assessment analysis, life cycle planning, and systems acquisition.

Various factors required, according to Beaumaster (2002) regarding IT implementation, concern putting the system into practice, managing change, developing skills, training and evaluation. In order to achieve implementation goals and objectives, Gunasekaran and Ngai (2004) claimed that successful implementation of IT needs a strong project team which can include key and IT knowledge managers from all functional areas. Moreover, they suggested that education and training are the most important factors of any change process in an organisation and the users need to be motivated to work in a transparent and open communication environment. One of the important factors in IT implementation is that top management support and are involved in order to successfully implement the IT solution (Gunasekaran & Ngai, 2004).

According to O'Brien (2004), the information systems implementation activities involve hardware and software acquisition, software development, testing of programs and procedures, development of documentation, and a variety of conversation alternatives. Also, education and training of end-users and specialists who will operate a new informtion system are involved. The first step, acquisition of hardware, software, and services, concerns how the organisations evaluate and select the hardware, software, and IT services; thus all hardware and software requirements are set up. Most large

organisations both in private and public sectors formalise these requirements by listing them in a document called an RFP (request for proposal) or RFQ (request for quotation). Then these requirement documents are sent to the suitable vendors and the agreement is signed. The next step is concerned with development or modification of software application in order to meet the organisation's requirements. The third stage is a vital implementation activity which involves the education of and training of the IS personnel such as end-users and user consultants. They have to learn how the new technology impacts the organisation's business processes and management. The fourth step concerns developing documentation for the system's users. Finally, the last step is the conversion process which concerns changing the approaches from the old systems to new systems. Conversions can be achieved on a parallel basis, phases basis, pilot conversion, and plunging in to a new system. (O'Brien, 2004).

Another perspective of implementation process was stated by Kuruppuarachchi, Mandal and Smoth (2002), who presented the phases and main functions of IT projects that are similar as the literature mentioned previously. These phases consist of project initiation, requirement definition, acquisition/development, implementation, and termination. In addition, they claimed that every IT project should carry out quality control, risk management, and change management over the entire life cycle of the project. In order to achieve IT project implementation, Kuruppuarachchi et al. (2002) also explained that the manager should meet these three basic requirements that include: (1) a clear business objective; (2) understand the nature of the change; and (3) understanding the project risk, in order to achieve IT project implementation. This section has presented various views and perspectives of MIS implementation or "IS development and deployment" processes which provide general knowledge in order to perceive this study. In the following section, MIS implementation challenges are described.

2.3.2 MIS Implementation Challenges

From previous research, Beaumaster (1999) identified and categorised problematics issues regarding the IT implementation. These issues create or worsen the implementation problems (summarised in Table 2.1). The more specific categorisations of the issues can be viewed as: management process issues, organisational environment issues, leadership issues, technical systems issues, and personnel issues.

- *Management process issues* speak to the functional operation of an organisation such as budgeting, personnel, and general management.
- *Organisational environment issues* are identified as factors which are less tangible such as organisational culture, change, and behaviour.
- *Leadership issues* relate to the areas which involve the interaction and direction of the organisation executive.
- *Technical systems issues* are mainly those referring to the hardware and software considerations of information technologies.
- *Personnel issues* are those issues surrounding each individual in the organisation.

These issues impact the planning, procurement, and deployment of information systems in their organisations. In this study, these categorisations of information system issues will be the frame of study in terms of challenges or problems that an organisation faces when a new information system is implemented.

In addition, Kwon and Zmud (1987) claimed that MIS implementation processes are not easy to achieve. They also identified some issues which many organisations have faced and these factors also impact organisational processes and products associated with each implementation stage. These factors include characteristics of the organisation (specialisation, centralisation, formalisation), characteristics of the technology being adopted (complexity), characteristics of the task to which the technology is being applied (task uncertainty, autonomy and responsibility of person performing the task, task variety), and characteristics of the organisational environment (uncertainty, interorganisational dependence). Another perspective of MIS implementation challenges is also presented by Lucey (2005) that the problems relate to MIS implementation include the following: lack of management in the design phase of the MIS, inappropriate emphasis of the computer system, undue focus on low-level data processing applicatons particularly in the accounting area, lack of management knowledge of computers, poor appreciation by information specialists of management's true information requirements and of organisational problems, and lack of top management support.

In this study, as a result, the categorisation of implementation challenge issues in Table 2.1 presented by Beaumaster (1990), will be used as a framework. This framework will be based using analysis in part in order to fulfil the purpose of this research. However, in order to achieve MIS implementation, the key issues to success of the implementation process should be presented in the following section.

Table 2.1 Categorisation of Information System (IS) Implementation Challenge Issues (source: Beaumaster, 1999: p. 10)

Leadership Issue	Management Process Issues	Organisation Environment Issues	Technical Systems Issues	Personnel Issues
Inter-departmental Coordination	Stategic Planning	Organisational Culture	Existing Systems	Organisational Expertise
Individual Support	Budgeting	Internal and External Politics	Standardisation	Individual Expertise
Organisational Support	Organisational Directives	Contracts	Compatibility	Internal Leadership
Timeframes and Scheduling	Written Guidelines	Changing Technologies		Staffing
		External Consultants		Resistance to Change
				Training

2.3.3 Key Issues for MIS Implementation Success

In this study, the key issues to successfully achieve MIS implementation can be defined in the same meaning as success factors. Most concepts of success factors in the IS literature are described as critical success factors (CSFs). CSFs in the information system (IS) literature is well established for numerous contexts such as requirement analysis, IS planning, and project management (Somers & Nelson, 2001). Most of the literature in CSFs have been identified for ERP systems implementation whch are favourites and worldwide information systems in many companies. These CSFs are investigated by many researchers such as Nah, Lau and Kuang (2001) who presented 11 factors that were critical to ERP implementation success. Moreover, Motwani, Subramanian, and Gopalakrishna (2005) investigated the factors facilitating and inhibiting the success of ERP projects and identified CSFs during ERP implementation stages. The CSFs can be viewed as situated exemplars that help extend the boundaries of process improvement, and whose effect is much richer if viewed within the context of their importance in each stage of the implemenatation process (Somers & Nelson, 2001). Boynton and Zmud (1984) claim that the CSFs method can be applied as a means of supporting both MIS planninng and requirements analysis. In addition, they described the concept of CSFs as those few things that must go well to ensure success for a manager or an organisation. According to Gargeya and Brady (2005), they identified six factors both for success and failure of ERP implementation and they also claimed that the managers should concentrate on these factors which contribute to avoid the failure and guarantee the success of ERP implementation. Referring to Lucey (2005), CSFs may also help to clarify and refine the organisation's information requirements. When the CSFs are identified the information system should be tailored to provide specific, detailed information that enables management to monitor progress towards meeting those objectives.

There are many investigatations of IT project implementation success factors. One study from Slevin and Pinto (1986) presented a list of success factors which are the same as the Project Management Institute's *Project Management Handbook* (Pinto, 1998). Also, Tan (1996) presented a set of success factors including technical characteristics, user involvement, communications, management support, project team characteristics, difference between technology provider and receiver, incentives, infrastructure support and obstacles, to identify their effects on external technology transfer project. Moreover, a list of success factors are also drawn up by Milis and Mercken (2002), who found a large number of possible success factors and also provided an overview of the possible success factors regarding IT project implementation. However, in conclusion, they can group the success factors into four categories as follows. The first category integrates factors which influence goal congruency. The second category contains the components that relate to project team in order to improve the motivation and cooperation of the team. The third category concentrates on the acceptance of the project and the result. Finally, the fourth category is concerned with the implementation process which deals with implementation politics and planning.

In order to enable the reader easily perceive this, the list of key issues regarding successful MIS implementation is drawn up and categorised and presented in Table 2.2. The list of success factors is presented based on the literature, and categorised along with its key factors. As mentioned before, this summary of success key factors in this study is not only obtained from ERP systems implementation literatue, but also from information system (IS) and information technology (IT) project implementation. In addition, the theory will be used to discuss in the analysis part.

Table 2.2 Summary of Key Issues for Implementation Success (source: constructed by the author, 2012)

Category	Key Factors	Sources
Project Definition/Mission	- Clarify goals and general direction of the project - Proper project definition - Relate to business needs and clearly stated - Goals and benefits should be identified and tracked	Pinto (1998); Somers & Nelson (2001); Milis & Mercken (2002); Nah et al. (2001); Motwani et al. (2005)
Project Schedule/Plan	- Proper level of detail specification of individual action steps	Pinto (1998); Milis & Mercken (2002)
Project Team	- Competent & experienced Project Manager -Project team members with complementary skills and consist of the best people in the organisation -Responsibilities/authority/reward defined - Mix of consultant and internal staff -The team should be familiar with business functions -The team should be co-located together to facilitate working together and support each other and work toward common goals	Milis & Mercken (2002); Somers & Nelson (2001); Nah et al. (2001); Motwani et al. (2005); Gargeya & Brady (2005)
Management Involvement & Support	- Top management support - Align with strategic business goals - Identify the project as a top priority - Communicate with employees about vision, role of new system, its importance, etc. in advance - Documentation and advertising implementation success	Tan (1996); Pinto (1998); Somers & Nelson (2001); Nah et al. (2001); Motwani et al. (2005); Gargeya & Brady (2005)
Project management	-People should be given responsibilities to drive in project management -Should be disciplined with coordinated training and active human resource department involved - Excellent project management	Nah et al. (2001); Motwani et al. (2005)
Client consultation	-Use consultant to facilitate the implemenattion	Pinto (1998); Somers & Nelson (2001); Gargeya & Brady (2005)

Category	Key Factors	Sources
Technical tasks	-Start software development, testing and troubleshooting at the beginning in the project - Troubleshooting errors is critical, so work well with vendors to resolve software problems	Tan (1996); Pinto (1998); Nah et al. (2001)
Monitoring and feedback	-Comprehensive control information at each stage in the implementation process -The progress of the project should be monitored through set milestones and targets - Benchmarking - Adequate testing	Pinto (1998); Nah et al. (2001); Motwani et al. (2005); Gargeya & Brady (2005)
Vendor/Customer partnerships	- Manage and improve relationship with external parties	Somers & Nelson, (2001); Milis & Mercken (2002)
Change Management	- Enterprise culture and structure change should be managed - Users should be involved in design and implementation of the project - User training should be emphasised - Commitment from the top management - The changes should be communicated - Managers and employees must be trained and understand the systems	Nah et al. (2001); Somers & Nelson (2001); Milis & Mercken (2002); Motwani et al. (2005); Gargeya & Brady (2005)

Part III Organisational Impacts Literature

2.4 Organisational Impacts of an Implementation

2.4.1 Impacts of Information System

In order to understand effects and consequences by implementing IS which affect an organisation and its processes, it is essential to describe various perspectives of impacts originated by adopting IS. Once an information system (IS) is introduced, IS has affected their context of use in activity system in an organisation. Activity system is defined as a community system which a combination between a logical collection of activities and processes or tasks that performed by a group of people in pursuit of a goal (Davies, 2009: p. 13). According to Figure 2.5, it illustrates various dimensions of impact including intended effects, unintended effects, positive effects, negative effects, and impacts on individuals, groups, and organisations. The effects can be positive or negative depending on how well the system is aligned with its context. In other words, both intended and unintended positive effects are created when the IS is closely aligned with their activity system, whereas, if it is misaligned with an activity system, as a result, it can generate negative effects (Davies, 2009).

In today's business environment, many companies expect that a positive impact is established when they decide to implement an information system. However, a manager should consider some factors in order to perceive the impact, for instance Gurbaxani and Whang (1991) described that it is important to categorise the role of the information system in an organisation as mentioned previously (see section 2.2 IS and IT), and to determine with other organisational and environmental factors in order to analyse the impact of the information system on an organisation. Furthermore, Rikhardsson and Kræmmergaard (2006) explored the impact of enterprise system implementation and use in six large companies in Denmark. It is essential to realise that managers should understand the possible impacts of the implementation project together with its effects on the organisation (Rikhardsson & Kræmmergaard, 2006). In addition, Lucey (2005) explained that properly designed ICT-based information systems can affect the way organisations operate, how they are managed and how they are structured. The following section presents effects and consequences on an organisation and its businesss processes which occurred after the implementation of MIS.

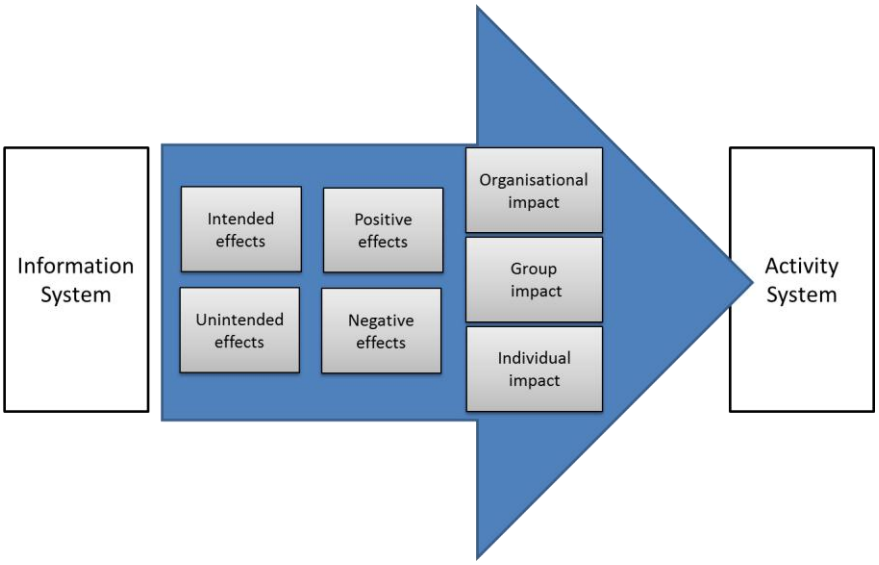

Figure 2.5 Dimensions of Impact (source: Davies, 2009: p. 269)

2.4.2 Implementation Effects and Consequences

Information system (IS) implementation creates both positive and negative effects for an organisation that use it. Most of the literature has underpinned the design and use of a modern MIS which is mainly based on technology (or IT; Lucey, 2005; Davies, 2009). The technology, which influences organisations in many ways (Lucey, 2005), begins to have effects on an organisation in which IS is introduced and implemented. Therefore the effects for the organisation are critical to consider by applying MIS. The designed IT-based information systems can affect the business processes of an organisation (Lucey, 2005). Consequently, managers of the organisation have to understand these effects in order to design and run systems that provide only benefits for the organisation, and to avoid the risks that occur from IS tools (Davies, 2009).

On the other hand, it is not only IS that can impact an organisation, but IT also causes an effect on the companies that use this tool. This is because IT is represented as a facilitator, an initiator, or an enabler for the business. This is based on the situation and how the technology will be applied (Chan, 2000). According to Lucey (2005), technology alters the skills requirements for individuals, jobs, and working protocols.

IT systems have significant potential as vehicles for learning in organisations. Various benefits are provided from introducing IT systems into an organisaiton. The IT system typically causes amendments in forms of collabolation and coordination between groups in an organisation. An electronic mail (e-mail) can be an example of using IT in an organisation. It is nowadays extensively used as a means of scheduling meetings which reduces time for face-to-face contact. The IT system can also change the patterns of power and influence in and between groups (Davies, 2009).

Moreover, this system can increase levels of work monitoring which makes work become more visible. The system allows a greater control of work by the managerial group. IT systems, moreover, increase the potential for workers to establish more clearly what is happening in their organisation, identify problems with work processes and suggest alternative ways of doing things. Large amounts of transactional information are enabled to be captured about the day-to-day activities of the workforce by this system. IT systems, moreover, can improve the quality of work and provide greater degrees of worker empowerment. This system helps to remove many burdensome administrative activities, freeing up workers to devote more time to issues such as customer service. In addition, IT involves the improvement of a customer service section by letting front-line personnel make instantaneous decisions (Davies, 2009).

IS can increase or decrease both of the levels of skill required of workers and the size of a task relative to the overall purpose of the organisation. Moreover, IS is designed to increase the autonomy of workers in the sense that they are given responsibility for planning and controlling their own work. This tool can also encourage or diminish levels of social interaction between workers (Davies, 2009).

IS and IT, which were embedded in them, do not only affect internal actors, but also external stakeholders (Davies, 2009). For instance, IS can change relationships between individuals and departments within the organisation and also affect some relationships outside the organisation (e.g. with customer, suppliers and clients; Lucey, 2005). Lucey (2005) had claimed that technologies have a significant effect on the structure of the organisation. They allowed people to change their place of work, improve workng practices, reduce marketing and transaction costs, coordinate the flows of organisational information, have closer contact with customers, suppliers and clients and have an impact even on the organisation's structure and culture (Lucey, 2005).

In order to simplify the literature which has been discussed earlier, the list of effects and consequences of implementing MIS are summarised in the following.

Table 2.3 Summary of Implementation Effects and Consequences on an Organisation and its Processes (source: constructed by the author, 2012)

Effects and Consequences Description	Sources
-Technology modifies the skills requirements for individuals and, as a result, it changes jobs and the way they operate as routine. The companies have to adapt their business processes rather than change the system	Lucey (2005); Chan (2000); Rikhardsson & Kræmmergaard (2006); Davies (2009)
-Information system implementation adjusts relationships between individuals and divisions within the organisation and also affects the relationship with other organisations in a supply chain such as suppliers and customers. Also, it can mean a closer relationship with suppiers, customer, clients and the general public	Lucey (2005); Davies (2009)
-Technology can be seen as the major change on the structure of the organisation. On other words, it may also lead to organisation transformation.	Lucey (2005); Chan (2000)
-IT has a big impact on the organisation and can work as an initiator, facilitator, an enabler for the business, or can be a tool of the new management	Chan (2000); Rikhardsson & Kræmmergaard (2006)
-Modern IT can reduce communication costs and internal coordination costs	Gurbaxani & Whang (1991)
-Enhance the quality and speed of information processing and management's decision making, planning and control - Increase data quality and flexibility	Gurbaxani & Whang (1991); Lucey (2005); Rikhardsson & Kræmmergaard (2006)
-Better administration, communications and coordination -Better management of the organisation's knowledge	Lucey (2005)
-Frustration among employees due to errors in system set-up as well as unfamiliarity with the new system	Rikhardsson & Kræmmergaard (2006)
-Integration of business processes, for instance sales, purchasing, production, etc., were integrated through a common system. -Better support business processes	Rikhardsson & Kræmmergaard (2006)
- Increase levels of work monitoring and permit greater control of work by managerial group	Davies (2009)
-Enable large amounts of transactional information to be captured about the day-to-day activities of the workforce	Davies (2009)
- Decrease levels of social interaction between workers.	Davies (2009)

2.5 Summary of the Research Framework

Based on the earlier literature review, Figure 2.6 illustates a frame of study in this research that is the MIS implementation process and its challenging key issues. In addition, success factors will be investigated in MIS implemenation. Finally, the impact on an organisation and its processes which concentrate on effects and consequences are investigated.

According to the model, it illustrates the MIS implementation process, in this study called, "Development & Deployment Process", and its surrounding challenging issues according to Beaumaster (1999). The implementation challenges can be broken down by issue type and they can be categorised into five issues including: leadership issues, organisation environment issues, management process issues, personal issues, and technical systems issues. In this context, the model also introduces the key issues for MIS implementation success which influence the MIS implementation process. These success factors can be viewed as tools which increase degrees of implementation process improvement and support in each stages of the implementation process. In addition, a significant role of these success factors is the contribution to the success of MIS implementation. The last element in the model is organisational impacts focusing on effects and consequences which are manipulated by implementing MIS within the organisation.

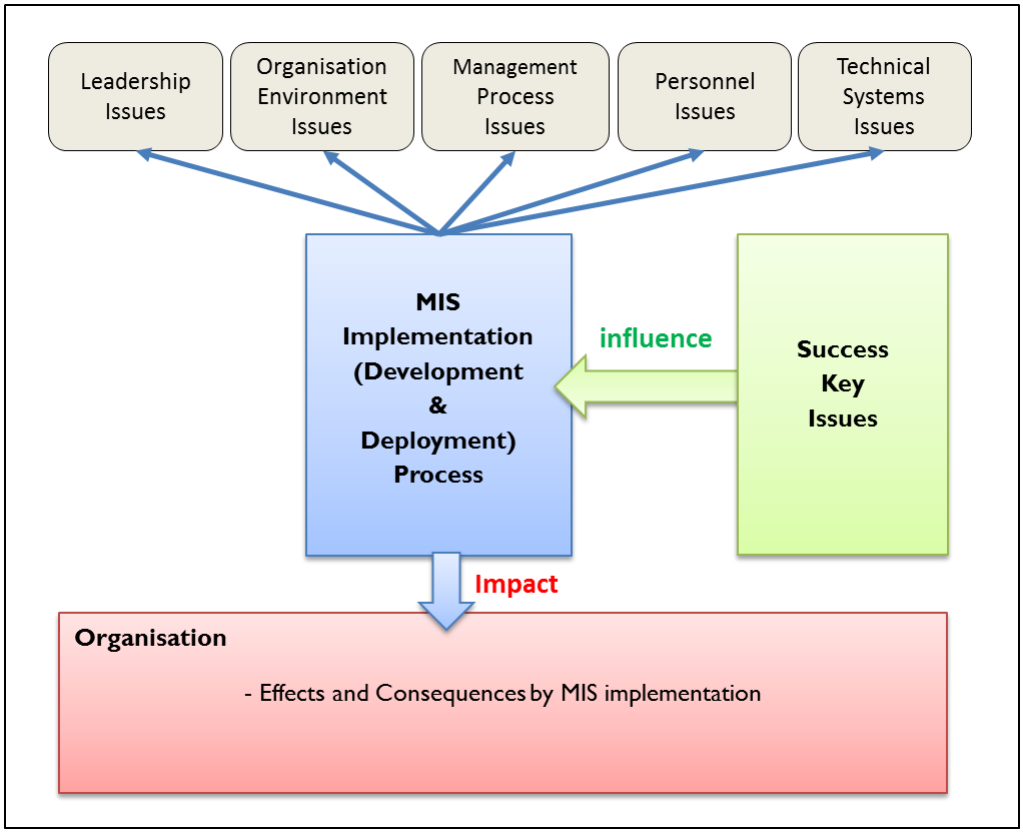

Figure 2.6 The Research Framework (source: constructed by the author, 2012)

3. Methodology

This chapter focuses on the choice of the research method which is the underlying foundation for how to conduct the whole research. Moreover, the chapter will discuss research approaches and choice of method. Afterward, the techniques for collecting data will be presented. Finally, the trustworthiness of the research regarding validity and reliability is discussed in this chapter as well.

3.1 Research Approach and Design

There are many definitions of reseach design and some examples can be defined that "The research design constitutes the blueprint for the collection, measurement, and analysis of data" and "research design is the plan and structure of investigation so conceived as to obtain answers to research questions" (Blumberg, Cooper & Schindler, 2005). Phillips and Burbules (2000: p. 31) defined research as the process of making knowledge claims and then refining or abandoning some of them for claims that are more strongly warranted. Another definition found explains that research is the process of answering unanswered questions or creating that which does not exist (Goddard & Melville, 2004: p .1).

After formulating the research questions, the next step of the research is to design the research strategy. However, before going any further, the question below should be considered. Is the purpose of the research to describe or to explain? Two of research approaches, which are deduction and induction, can be defined as following: "[The]deduction is a research approach which involves the testing of a theoretical proposition by using a research strategy designed to perform this test. On the other hand, the induction is a reseach approach which involves the development of theory as a result of analysing data already collected" (Saunders & Lewis, 2012, p. 108-109).

According to Avgerou (2000), IS research is issue-oriented rather than theory driven which is in correspondence with an inductive approach. This thesis is more issue-oriented and focuses on the single case study for achieving the purpose of the thesis rather than hypothesis testing based on existing theories. In this study, the researcher did not formulate any theory from the beginning, but instead had some questions in mind and then used the data collected to form the theory. In this case, mainly the inductive approach is applied.

3.2 Choice of Method

This chapter focuses on the method that will be applied in this research. Before discussing the research strategy and the data collection process, quantitative and quanlitative research should be described. Myers (1997) mentioned that the choice of research methods manipulates the way in which the researcher collects data. Kumar (2005) claimed that choice of method of the research is decided by the type of information which is investigated. Also, the choice of method is based on three criteria including: the purpose of the study, how the variables are measured, and how the information is analysed (Kumar, 2005). Based on these criteria, differences between the quantitative and qualitative approach will be discussed in the following sections.

Muijs (2004) defines that quantitative research explains phenomena by collecting numerical data that are analysed using mathematically based methods, particularly statistics. Another explaination by Antonius (2003) describes that quantitative methods are procedures and techniques used to analyse data numerically and quantitative data are measurable data. On the other hand, qualitative research deals with non-numerical data. Qualitative research methods were developed in the social sciences in order to study social and culture phenomena and some examples of qualitative methods are action research, case study research, and ethnography (Myers, 1997). In addition, Cooper and Schindler (2008) state that qualitative research includes an array of interpretative techniques which seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency of certain more or less naturally occurring phenomena in the social world. They explain that qualitative research aims to achieve an in-depth understanding of a situation by using focus group, individual interviews, case studies, ethnography, grounded theory, action research and observation. This approach is more holistic and more suitable for research where the purpose is to gain more insight and understanding of an area (Silverman, 2006). One definition by Blumberg et al. (2005: p. 192) to differentiate between qualitative and quantitative is "qualitative refers to the meaning, the definition or analogy or model or metaphor characterising something, while quantitative assumes the meaning and refers to a measure of it". Moreover, Table 3.1 below will show us how Padgett (1998) distinguishes both quantitative and qualitative methods. There is no general guideline to indicate which research is more suitable. Therefore the researcher needs to take into account some questions, for example what is the research problem? What kind of information do you want to get? (Blumberg et al., 2005).

It is important to emphasise that the qualitative method is conducted when translating and observing reality in order to develop a theory. In addtion, this approach aims to explain what the researcher experienced and perceived (Newman & Benz, 1998). Denzin and Lincoln (2005, p. 3) concluded the qualitative research with "qualitative researchers study things in their natural settings, attemping to make sense of, or interpret, phenomena in terms of the meanings people bring to them". Therefore, qualitative researchers concentrate on understanding how people interpret their experiences, what meaning they attribute to their experiences, and how they construct their worlds (Merriam, 2009). In short, this research is more qualitative in its nature, since qualitative research methods are more likely designed to help the researcher understand people and the social and cultural contexts (Myers, 1997).

Table 3.1 Distinctions between Quantitative and Qualitative Research (source: Padgett, 1998: p. 3)

Qualitative Research	**Quantitative Research**
Inductive	Deductive
Naturalistic, in vivo	Scientific method, decontextualising
Uncontrolled conditions	Controlled conditions
Open systems	Closed systems
Holistic, thick description	Particularistic
Dynamic reality	Stable reality
Researchers as instrument of data collection	Standardised data collection instrument
Categories result from data analysis	Categories precede data analysis

3.3 Case Study

In the research of information systems, case studies are becoming more widespread and the most common qualitative method used (Myers, 1997). Researchers use the case study approach in order to analyse a phenomenon in its natural environment, and collecting data through, for instance, direct observations, interviews, document analysis, and so forth. The case study can be defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used." (Yin, 1989: p. 23). A case study research highlights the embeddedness of a phenomenon in its real-life context (Blumberg et al., 2005).

Some of the advantages of using case studies are: an entity can be investigated in depth; more attention is given to details; the data is strong in reality due to being based on people's experiences; generalisations are allowed; and data can be achieved for further research work (Blumberg et al., 2005: p. 190; Blaxter, Hughes & Tight, 2006: p. 74).

Yin (2003) described the reasons why the researcher should consider using a case study approach. You should use case study approach when: (1) the researcher wants to answer "what", "how", and "why" research questions; (2) the researcher cannot manipulate the behaviour of those involved in the study; (3) the researcher would like to cover contextual conditions that are relevant to the phenomenon under their study; or (4) the boundaries are not clear between the phenomenon and context. Case study research is suitable for explanatory, descriptive and exploratory research. However, the researcher has to consider what type of case study will be conducted and appropriate for the research question (Baxter & Jack, 2008). The different types of case study described by Baxter and Jack (2008) consist of: explanatory, exploratory, descriptive, multiple-case studies, intrinsic, instrumental, collective. This research uses the descriptive type of case study which be used to describe an intervention or phenomenon and the real-life context in which it occurred (Yin, 2003). As a result, the case study research method is especially fit to information system (IS) research, since interest has shifted to organisational rather than technical issues (Benbasat, Goldstein & Mead, 1987).

The case which was selected for the purpose of this research concerns implementation of management information system (MIS) for aircraft maintenance which was implemented in the Swedish Armed Forces (SAF), the Czech Republic Air Force, the Hungary Air Force, and the Royal Thai Air Force (RTAF). However, this research mainly focuses on the Fenix System implemented in the RTAF which is named Finex E (export version). The Fenix System is intended to monitor the maintenance activities of the various kinds of aircrafts and safety equipment. The Fenix System was established by the Swedish Armed Forces (SAF). In order to achieve the goals, I have selected to use a single case study approach, collecting data by interviewing people who were involved in the implementation process of Fenix (E) in the RTAF, Thailand. The reason why I have used this case study is because the implementation of the Fenix System is interesting itself, since Fenix (E) is the new information system in the RTAF and it changed RTAF's business processes. Additionally, this implementation of Fenix (E) system was successful and satisfied from the operational level to the top management level of the RTAF.

To conclude, this thesis is more concerned with contextual understanding related to the MIS implementation and also effects and consequences of its implementation, along with the challenges and key success issues. Therefore a mainly inductive approach together with a qualitative research method is taken into account to be the most appropriate to

fulfil the purpose of this thesis. Furthermore, the case study approach of Fenix System implementation, as a management information system (MIS) for maintenance of aircraft, will be carried out. The result of the case study will accomplish the research questions as well.

3.4 Data Collection Process

In this study both literature studies and interviews were done to gather information. In this research, a qualitative technique was conducted in order to collect information. Polkinghorne (2005) described that the most broadly used technique in the production of qualitative data is interviews with participants. In terms of sources of data, these data can be gathered either from primary or secondary sources. Generally, primary sources can be data which has been gathered from the people or organisation directly, and also unpublished data. On the other hand, secondary sources relates to any materials, such as books and articles, which have been published previously (Myers, 1997). This research used primary data which was collected through interviews with the respondents and the data obtained from interviews were also complemented with secondary data from internal documents and presentation documents of the Fenix System provided by the Fenix Program Manager and key people in the project. In addition, some parts of the user manual of the Fenix System are used to perceive the overview of the system.

Interviews

The general method to get qualitative data is interviews with participants or respondents and the main reason to interview is to gain full and detailed information of the experience under study (Polkinghorne, 2005). Interviews are the most broadly used source as a method of collecting data for evidence (Blumberg et al., 2005). There is a definition of interviewing as: "interviewing is a technique of gathering data from humans by asking them questions and getting them to react verbally" (Potter, 1996). Another definition mentioned by Kumar (2005) is: "Any person-to-person interaction between two or more individuals with a specific purpose in mind". Also, Kvale (1996) described the aim of interviews thus: "[the] purpose is to obtain descriptions of the life-world of the interviewee with respect to interpreting the meaning of the described phenomena". Björklund and Paulsson (2003) categorised interviews as questioning which takes place through personnel direct contact, via telephone, e-mail or text messaging.

In order to collect information, the interviews are used to gain information. Interview guidlines with basic questions in the interviews was prepared (see Appendix 3). In this research, semi-structured interviews were used. Semi-structured interviews are another type of interview which is often used in case study research and usually start with rather specific questions but allow the interviewees to follow their own thoughts later on (Blumberg et al., 2005). Thus when a semi-structured interview is conducted, the researcher can generate the questions that will be discussed with the responsdents. In consequence, the respondents can answer the questions with freedom and further questions may be added during the interview.

This research uses a qualitative view of science in order to find answers to individuals' perception of their reality, their beliefs and experiences. The reason why this research used the qualitative approach is that there is no need to receive numerical answers to quantify. The purpose of the interviews is to get the picture of the implementation

process. These qualitative interviews need full and sufficient information. These interviews were based on the specific problems that are mentioned.

By conducting face-to-face, phone, and e-mail interviews, a better understanding of problems and the current situation of the case are gained. The interview time was approximately an hour, the time varying from 40 minutes to 90 minutes. In addition, audio recording was conducted by a recorder device in order to support arranging the information further when I wrote in the research paper and, also, to avoid misunderstanding in the future. The disadvantages with selecting qualitative research is that the collected data might be prejudiced. However, in order to reduce the risk and ensure the quality of the research, the trustworthiness of the research will be discussed in section 3.6.

Choices of Respondents

It is important to interview people who have the right and rich knowledge about the studied phenomenon, otherwise there is a risk that the interviews will not fulfil the purpose of the thesis. The choice of responsdents for this thesis were selected from the people who were involved in the adoption and implementation of the Fenix System. Being part of the implementation process, the researcher believed that they would be able to give details of the information which would be relevant for this study. The selection of the respondents in this research was made based on their roles, expertise, and experience involved in the Fenix System implementation process in order to achieve the purpose of the thesis.

In this study, the reseacher planned for interviews both in Thailand and Sweden from March 2012. The first part, the respondents from Wing 7, RTAF, were interviewed in Thai in order to make the questions clear and understandable for the interviewees. The aim of the first interview with the respondents from Wing 7, RTAF was to obtain the effects and consequences on the organisations affected by Fenix System implementation as a maintanance management information system for Jas 39 Gripen aircrafts, focusing on Fenix System export version (Fenix E). The second part was conducted in Sweden, using English for the interviews. The main purpose of the second part of the interviews was to gain the general information about Fenix System implementation from an overview perspective and also IS implementation aspects were discussed. From the interviews, the program manager of the Fenix project also provided additional presentation which gave the background information about Fenix System implementation in the whole system from the beginning until now.

In the interview process, some of respondents cannot be face-to-face interviewed due to constraints and difficulties. Consequently, these respondents were interviewed through e-mail interview questionnaires and phone interview. Futher, interviews could be performed if certain information was unclear. In addition, some of respondents were followed-up by e-mail in order to seek clarification or further information. The interviewees together with their roles, organisation, and general information about the interviews are presented in Table 3.2.

Finally, the researcher also visited Wing 7, RTAF between 12 March 2012 and 13 March 2012, and from this visit the researcher was provided with additional background information about the working process of the Fenix System, along with challenges or

problems which have been faced during the process. This data proved to be essential during the analysis part of the study.

Table 3.2 Details of the Interviews (source: constructed by the author, 2012)

Name	Roles	Organisation	Date	Approach
Wg.Cdr. Chakree Rungsindhu	Chief of Aeronautical Engineering, Wing 7	Wing 7, RTAF	05/05/2012	Phone/ E-mail
Sqn.Ldr. Jirapan Intongkaew	Fenix (E) system user	Wing 7, RTAF	12/03/2012	Person-to-person
Sqn.Ldr. Pichead Buanlee	Maintenance Leader SQN 701, Wing 7 & Fenix (E) system user	Wing 7, RTAF	12/03/2012	Person-to-person
Sqn.Ldr. Peerapol Cherdchaiphoom	Fenix (E) system user	Wing 7, RTAF	12/03/2012	Person-to-person
Captain Martin Lennartsson	Planning Engineering A/C 39 Gripen & Fenix Support	Swedish Air Force (SwAF)	03/04/2012	E-mail
Jan Lundborg	Program Management Fenix	Swedish Defence Materiel Administration (FMV)	19/03/2012 and 11/04/2012	Person-to-person/E-mail
Sven-Åke Sibbesson	Project Manager for Fenix Export version Thailand	Swedish Defence Materiel Administration (FMV)	04/05/2012	Phone/E-mail
Pär Kask	Assistant Logistics Manager Gripen for Thailand	Swedish Defence Materiel Administration (FMV)	19/03/2012	Person-to-person/E-mail
Steen Dam Jensen	IT consulting in ERP system for Swedish Armed Forces (SAF)	Ebicon AB	23/03/2012	Person-to-person/E-mail
Hans Ekeroot	Project Manager for the maintenance enterprise for Fenix System	Logica, Sweden	29/03/2012	E-mail

3.5 Data Analysis

The analysis of data is the process where one is trying to gather and present the data in such way so it has a good structure and becomes easy to understand (Repstad, 1999). In addition, data analysis is a process of bringing order, structure and meaning to the mass of collected data (Ghauri, 2005). The goal with the analysis is to be able to come up with trustworthy conclusions which are based on the empirical data. The empirical findings and the theoretical framework will be compared by analysing data which has been collected in relation to existing theories. Data was analysed after all data was gathered together. My analysis will be based on theories in MIS implemetation and the research framework which was presented in the research framework in chapter 2.

As was mentioned, the research framework model guided the analysis part. To analyse information, this model was derived from the theorectical framework in chapter 2. Each element (challenges, success factors, organisational impacts) in the model were elected by different sources from literature such as journals and books related to studied phenomena. The reason why the researcher creates the research framework model is to make the interpretion more reliable and to generate categories and identify patterns and themes in the empirical findings and data analysis part of this research.

The process of handling the data in this research is to write down the interviews after conducting them and then read and analyse that information through interpretation. It is important to note that some of interviews had to be translated into English since some of these interviews were conducted in the Thai language.

3.6 The Trustworthiness of the Study

Validity and reliability are two major components to measure the quality or trustworthiness of the study. Consequently, the following describes the validity and reliability of this study.

3.6.1 Validity

Validity is concerned with the question of whether the researcher is studying the phenomenon he/she purports to be studying (McKinnon, 1988). There are two kinds of validity, namely internal and external. In terms of internal validity, it evaluates how well there is a match between the empirical findings and theory. In contrast, external validity measures the extent to which results from the measurements are coherent with the reality and whether generalisations can be drawn from the result (Ghauri & Gronhaug, 2005).

In order to maintain external validity in this research, the interview guide (in Appendix 2) was created together with some questions which were asked during the interview. The summarised note in the case of the Fenix System was sent back to the respondents for corrections and adding more information which was missing.

In terms of internal validity in this research, focusing on an open approach was conducted in order to maintain a high internal validity. The open approach doesn't manipulate the outcome and also keeps an open mind by being quiet and listening to the respondents for the most of the time during the interviews. There is a weakness in the internal validity in the research that a few of the respondents had not dealt directly with the Fenix System implementation. As a result, this might have caused more general

answers, not specific to the Fenix System in the RTAF but from a general perspective since this research applies a business theory on a governmental organisation. Nontheless, qualitative research usually has a high internal validity, rather than external validity due to the fact that external validity can be difficult to accomplish (Merriam, 1994).

3.6.2 Reliability

Reliability is concerned with the question of whether the researcher is obtaining data on which she/he can rely (McKinnon, 1988). Reliability is concerned with the findings of the research; if they can be repeated, they are considrred to be reliable. In other words, reliability measures the extent to which conclusions can be drawn and repeated if the research is done again (Ghauri et al., 2007)

The reliability in this research is achieved by having the structured research method. In addition, in order to construct reliability, the respondents recieved the questionnaire in Appendix 2. The interviews were recorded by electronic device; therefore the conversation which was expressed throughout the interviews was noted exactly. In addition, realiability of this research is open for questioning until it is repeated in a similar manner by other researchers.

4. Empirical Findings

This chapter will present the empirical data collcted to answer the purpose of the thesis. The structure of this chapter is based on the in-depth interviews of the respondents. The empirical data is based on a case study of the Fenix System which creates different perspectives in; system user, system administrators/project team, software suppliers, and IT experts. In addition, the presentation of the Fenix System is presented in this chapter. In order to give an insight into what challenges were faced and organisational impacts of Fenix System implementation, it is essential to perceive and understand the background of the Fenix System and its implementation process which is focused on Fenix (E) implementation. Subsequently, Fenix (E) implementation challenges and organisational impacts will be interpreted based on the interviews (see Figure 4.1).

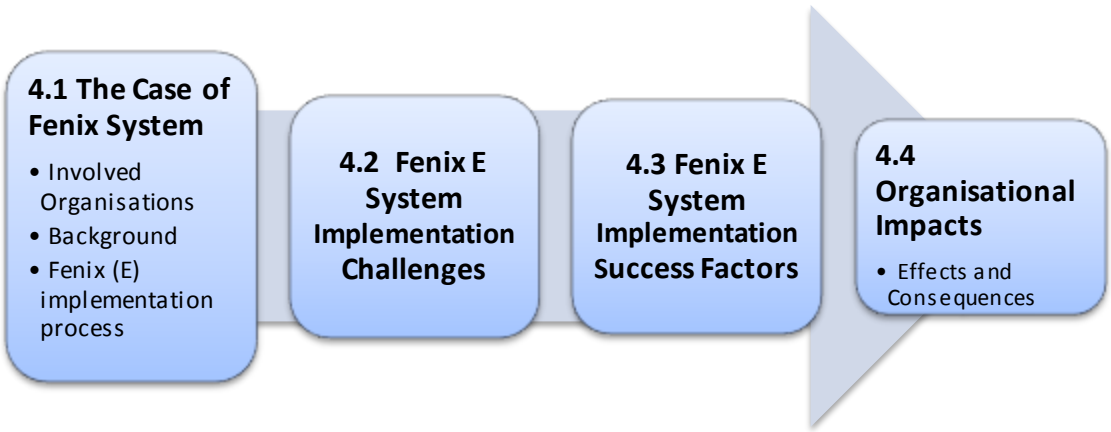

Figure 4.1 Empirical Finding Structure (source: constructed by the author, 2012)

4.1 The Case of the Fenix System

4.1.1 Involved Organisations of the Fenix System

In order to understand the relationship between the organisations in this research, this part will describe the organisations involved in the Fenix project. The organisations which are involved in the Fenix project in this thesis can be divided into four main parts including: the Swedish Armed Forces (SAF); the Swedish Defence Material Administration (FMV); the Swedish Air Force (SwAF); and the Royal Thai Air Force (RTAF). In the beginning the SAF headquaters defined the overall system requirements and provided the money for the project. The Fenix project was established by FMV in 2003 and started to detail the requirements in order to purchase a new system. Moreover, FMV is one of the main actors that is responsible for: design, system development, application administration support, data migration, equipment/system baseline, and integration, of the Fenix System. However, in the implementation process, the responsibilities of SAF are in the fields of business change management, representing the users, data cleansing, business process documentation, and training. At the operational level, SwAF is responsible for services and business processes and defining new requirements of the systems. Since 2010, the RTAF has purchased the Gripen 39 C/D fighter aircrafts and SAAB 340 AEW (see Figure 4.1) and RTAF signed the agreement

with FMV, and in this agreement the Fenix System Export version, or called Fenix (E) system, was implemented in Wing 7, Suratthani, Thailand.

Figure 4.2 Gripen 39 C/D Fighter Aircraft and SAAB 340 AEW (source: constructed by the author, 2012)

4.1.2 Fenix System Background

First of all, the Fenix project was discussed and analysed more than 20 years ago in order to replace the old information system that was used within the SAF. The first and second attempts to implement a new information system were not successful. However, the lastest analysis occurred in 2000, called DUFM 2000, when requirements from the people in organisations within SAF were accumulated. Then analysis and studies of the new management information system (MIS) implementation started. Referring to this analysis and study, SAF made an effort to integrate the systems to be one common system for three military services (i.e. army, navy, and air force). Nonetheless, due to different requirements and strategies, the Swedish Air Force has decided to separate its own information systems from other services in 2003, whereas the army and navy decided to select another system, called LIFT system, which was developed in-house by themselves.

In late 2003 the Swedish Defence Material Administration (FMV) released a request for quotation (RFQ) for a management information system for the operation and maintenance of aeronautical assets within the Swedish Armed Forces (SAF). Therefore the Fenix project had been formalised as a big change of the management information system for aircrafts and safety equipment within the Swedish Air Force (SwAF).

In 2005 FMV signed the contract with the prime contrator in order to implement the Fenix System. The business project started in 2006 and the purpose of this approach is to design the system and processes. An applications architecture model was developed based on the organisation requirements (from the DUFM 2000 analysis). Finally, each Fenix System had been deployed or what is called “go-live”. There are different kinds of systems depending on the type of aircraft (see Figure 4.3), and the first system went live in 2008.

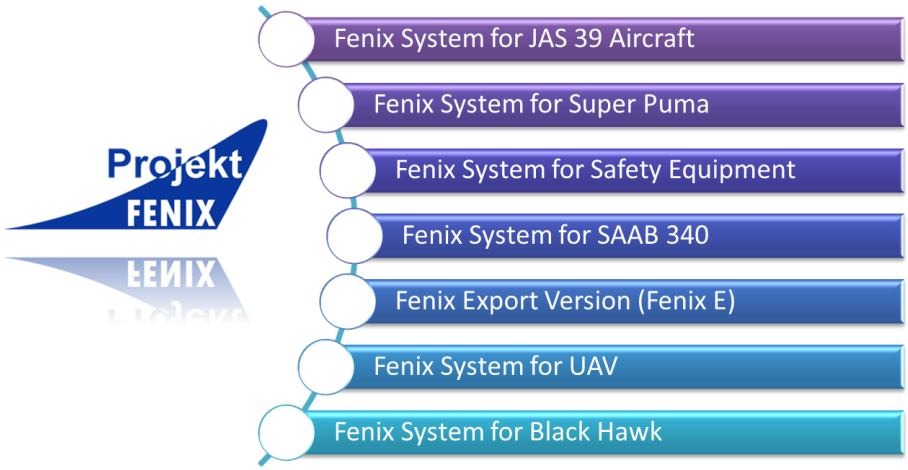

Figure 4.3 Overview of Fenix System (source: constructed by the author, 2012)

"Fenix" is the name of a large project within SAF, called "Fenix Project" which is similar to the name of the information system for aviation maintenance, named "Fenix System". The Fenix System is a new maintenance, repair and overhaul (MRO) system for SwAF which can be called "Fenix (S)", and the system has been implemented in order to replace the old legacy systems which were developed in the 1970s, as mentioned previously. The challenges of this project are to replace a nearly 30-year-old information system and to change business processes. As the Fenix Program manager stated: "Introducing a new system means a new business process" (Jan, personal communication, 19 March 2012).

In detail, the Fenix System is a commercial off-the-shelf (COTS) application based on Maintenix (name of software) which was developed by Mxi Technologies Ltd. This package software is high standard software as proved by successful implementation not only in the military aviation maintenance domain such as the United States Navy, Canadian Air Force, Kuwait Air Force F/A-18 programs, and the Lockheed Martin F-35 Joint Strike Fighter (JSF) program, but also the commercial airlines and manufacturers such as Air Canada, Qantas Airline, Rolls-Royce, Boeing, etc. In terms of military aspects, Maintenix software helps military forces to bring maintenance operation into the next generation of maintenance, repair, and overhaul (MRO) management in order to support the operational capability and competitiveness through high availability of aircraft. The web-based, modular solution provides an integrated maintenance system across the entire organisation, and feeds ready information to operations and parts demanding data into the supply chain (Mxi Technologies Ltd, 2009). In addition, Maintenix use the web and advanced IT architecture to support integration with other corporate information systems. As a best of breed solution for aviation maintenance, Maintenix has been designed to integrate with existing ERP systems and other corporate information systems (e.g. legacy systems) in order to provide a complete solution for all customers and business requirements. The Fenix System contains five different primary function areas, with each supporting operations in the organisational units in different ways such as maintenance engineering, aircraft maintenance, material management, business support, and Fenix administration.

In 2010, FMV signed an agreement with the RTAF; consequently the Fenix System export version or Fenix (E) has been deployed in the Wing 7, RTAF, with adjustments introduced to cope with the special requirements export operations impose on the system. In addition, the Fenix System has been implemented as a maintenance and support information system in order to increase availibility of the aircrafts, improve maintenance, and support efficiency, since the Gripen 39 C/D aircrafts and Saab AEW have been commissioned in Wing 7 of the RTAF.

This study mainly concentrates on Fenix (E) implementation aspects in the RTAF and the following section will present the implementation process of Fenix (E) in Wing 7, RTAF.

4.1.3 Fenix (E) System Implementation Process

Background

Since the RTAF signed an agreement with FMV, Jas 39 Gripen and SAAB 340 AEW aircrafts have been commissioned in Wing 7, RTAF Thailand. Consequently, an information system supports for MRO (maintenance, repair, and overhual) business, called Project Fenix Export (Fenix E) has been deployed in Wing 7 as well. The project has been mainly based at FMV in Stockholm, Sweden and working together with the Swedish "Gripen for Thailand" project. In addition, the Swedish Armed Forces (SAF) is represented in the project.

The Fenix (E) implementation project team consists of a management team from FMV, SwAF and some specialists from the external outsourcing company. Within the Fenix (E) project team are specialist internal managers and staff who have vital knowledge and experience, approximately 10–12 people. These specialists are expert in the fields of technical systems and management such as baseline, database, migration, business process analysis, interface and configuration, Fenix operation and support, and system knowledge. In conjunction with the project team, they also have coordinated and cooperated with RTAF staff in order to achieve the project's goals and objectives.

Recently, the RTAF has deployed Fenix (E) in RTAF headquarters such as directorate of logistics, directorate of aeronautical engineering, directorate of armament, and directorate of communications and electronics in order to view the information from Fenix (E). This information can be used for decision making support in RTAF.

Figure 4.4 illustrates the overview of Fenix (E) system applications based on Maintenix software including: maintenance engineering, aircraft and component maintenance, material management (LRU/spare part), and analysis and reporting module (ARM) .

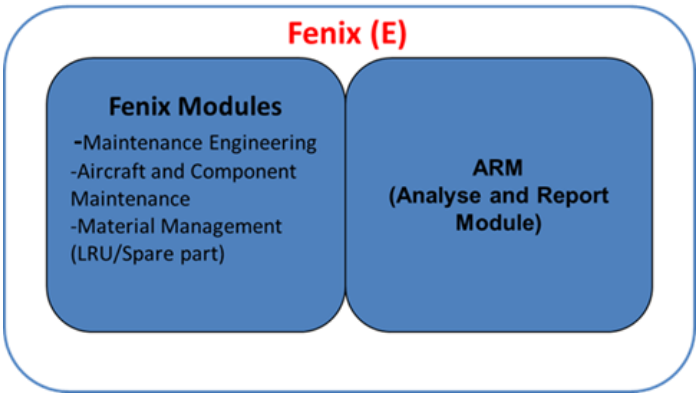

Figure 4.4 Fenix (E) Applications Architecture Overview (source: constructed by the author, 2012)

Defined Implementation Activities

Analysis and Studies

In late 2009, Fenix (E) was analysed and discussed in order to be deployed in Wing 7, RTAF since Fenix (S), which had been used within SAF, didn't fit RTAF's business and requirements in some areas. Consequently, this analysis and study aimed to set the scope of RTAF's business which will be supported by the system. The analysis process was done to discuss how Fenix (E) will be deployed by the RTAF. This process was accomplished by a number of questions and discussion areas regarding the facilities, the chain of command, organisation structure, MRO (maintenance, repair, and overhual) processes, and so forth. The business process analysis was divided into two processes. The first process was focused on aircraft maintenance and the second one was concerned about ground support element (GSE) maintenance.

Business Process Analysis and System Design

In 2010, the design phase was established which aimed to support the system. Also, the new routines together with new report system (called analyse and report module) were created in order to support the business. In terms of routine, in this system tools which describe how the user should work with systems are referred to. Activities or methods carried out during this phase of the Fenix project included:

- *Configuration Maintenance Plan* – This process was set up and checked how to maintain the aircrafts.
- *Business Analysis* – This analysis was coorporated with the users and perceived the maintenance process both from aircraft and ground support equipment (GSE) maintenance. The business analysis approach was done by interviewing and collecting data from the users in order to study how they work.
- *Organisation Processes* – The reason why these activities were discussed was because this system is a COTS applications that means the most part of operations have to adapt to the product. Therefore the structure of the organisation must be changed; consequently, the organisation processes were analysed.

- *Configuration Baseline of Fenix System* – In the Fenix System, Baseline refers to basic data which is essential for the system. This baseline was created based on the maintenance plan.
- *System Baseline of Fenix System* – This baseline was built in order to define the roles needed on the system. In Fenix (E), "roles" are used to state access to the system.

Validation and Trial and System Deployment (Go-Live)

After the summer of 2010, there were many validation and trial processes for the Fenix (E) system in order to ensure the right system matched with the right business process. The project team set up the workshop in order to see how the business process was working when they conducted the system validation and trial process was conducted. In the Fenix System, "Validation" can be defined from the Fenix Program manager as:

> Validation is an acceptance of test of systems. When the software suppliers are ready for the system, so we went to acceptance test and saw some kinds of failure report and then send it back to the suppliers in order to correct it and deliver again. We did all validation and trials to accept the system from the system integrator company. We have about 34 to 40 people in total from FMV and SAF to test the system delivered from our system integrator company. (Jan, personal communication, 11 April 2012)

The first trial was the system pilot test done by the personnel of SwAF. In addition, the system was tested several times during the autumn of 2010 by the project team. After the project team was satisfied with the system, they called the personnel who worked as operators from SwAF to perform the test again in the same way. During the test, the project team also set up the strategy for education along with creating documentation.

In Octerber 2010, the Fenix (E) system education and training process for the RTAF staff took place for a week in Halmstad, Sweden. Subsequently, the project team had proved the preparedness before "go-live" in areas such as documentation, communication test, and other technical testing issues for five to six weeks in order to guarantee that the RTAF would have the proper software installed. In addition, the project team had to test the "go-live" strategy, or a general exercise which was the same step before the system go-live. These activities seemed like a simulatation of the go-live process. In other words this was a full-scale test before go-live occurred in Thailand.

As a result, the Fenix (E) system went-live successfully on 13 December 2010 before the Jas 39 Gripen aircrafts and Saab 340 AEW landed in Wing 7, RTAF. Figure 4.5 illustrates the time scale for test and trial together with the go-live process of Fenix (E) system for RTAF.

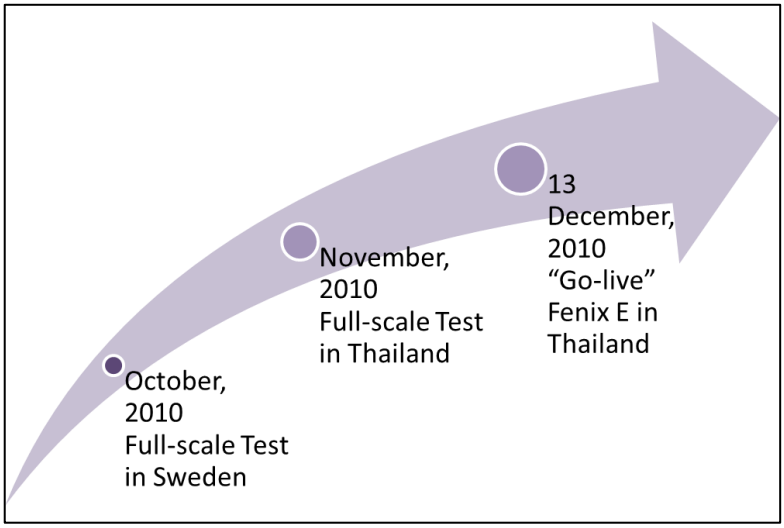

Figure 4.5 Test and Trials Period and "Go-Live" for Fenix (E) (source: constructed by the author, 2012)

4.2 Fenix (E) System Implementation Challenges

The main purpose of the questions asked the respondents to identify and describe challenges or problems experienced by the respondents involved in the Fenix (E) system implementation. Most of the interviewed respondents strongly agreed that the Fenix implementation process was not achieved easily, since the Fenix System had to change the business processes. Furthermore, it was a big challenge for RTAF since they had purchased Gripen Jas 39 and SAAB 340 AEW aircrafts, and Fenix (E) system has to be implemented in Wing 7, RTAF. The findings, in terms of Fenix implementation challenges, can be explained based on each stages of implementation process as follows.

One of the most challenging issues is the beginning of the Fenix implementation project, since implementing the Fenix (E) system had a short and tight schedule. Therefore one of the respondents stated that the project team had to plan and keep on the right track from the beginning (Sven, personal communication, 4 May 2012). However, this project was in the high priority task for SAF. As a result, top management supported and provided the project team the resources they needed. As mentoned earlier, due to the tight schedule, it was quite a challenge and they need to set up good strategic planning in order to achieve the goals effectively and efficiently.

Some of respondents mentioned that a great problem is that the education and training process is a big challenge for implementing Fenix System. One of the respondents stated:

> Let's say for training a thousand users need to be trained before you go live. How should you do that?, that's the challenge. (Jan, personal communication, 19 March 2012)

In addition, one of the interviewed respondents mentioned how important training the people for Fenix System is:

> I think that the training is very challenging. If a successful training is performed the system gives more value to the users and let the support

> organisation develop new features instead of discussing handling of the system on and on. (Eken, personal communication, 29 March 2012)

Another challenge is in education and training process area that the users of Fenix System have to participate in the trainning courses in order to get certificate for using this system. Moreover, one of respondents explained that each training course can hold only 15 people in order to maintain the quality and standard of education and training process (Wg.Cdr.Chakree, personal communication, 5 May 2012). In addition, only the staff who have a certificate can conduct knowledge transfer of Fenix System (Sqn.Ldr.Pichead, personal communication, 12 March 2012). Thus the training process is difficult to organise. In addition, computer skills and language of the users are also barriers in the training process, since Fenix (E) implemented in RTAF uses English as the main language. There are some statements, mentioned by interviewed respondents, about the challenges in the training process on implementing Fenix System in RTAF:

> On the training process, they use English to educated our trainees. So, it was difficult to understand for some people who are not so good in English. (Sqn.Ldr. Pichead, personal communication, 12 March 2012)

> English Language has also proven to be a barrier to implement the system. (Martin, personal communication, 3 April 2012)

> I have a problem with my computer skill. So, it's quite hard to learn the Fenix System in training process. (Sqn.Ldr. Peerapol, personal communication, 12 March 2012)

Assistant Logistics Manager Gripen for RTAF also mentioned about the challenge that the users of Fenix System should have the initial knowledge in order to be trained or educated in the training process efficiently. He stated:

> The users of Fenix System need better knowledge, for example knowledge about the maintenance plan in order to be able to work with the aircraft. (Pär, personal communication, 19 March 2012)

Another important factor that also affects the implementation process is that the there are no the guidelines, called RAMP, that describe how the user should work with the Fenix System related to the maintenance of the aircrafts. As one of respondents, who works as the support group staff in RTAF, stated:

> The biggest challenge we have faced was the lack of routines already in place. There were none at Wing 7 that we could attach to, so Fenix routines (RAMP) built up the logistics routines on the base. (Martin, personal communication, 3 April 2012)

As the main "go-live" of the new information system was planned, the most difficult part of the implementation process was in transferring data from the old system to the new system. In Fenix System, this transferring data is called "data migration" which aims to align database structure from the legacy system to the new system. In this case, the data from legacy system (i.e. DIDAS Flyg) must be transfered and also the cleansing of the data process before going to the trial process, as the Program Manager of Fenix said:

> Before you go to a trials period, you need to have a successful migration. The migration is always a problem. You need to clean data in those system. (Jan, personal communication, 19 March 2012)

As a result, this also one of the challenges in Fenix (E) system found some data in the system which was not complete and correct. One of respondent stated:

> Since we are the first country that use Fenix (E) system. Therefore some of the equipment name still be Swedish, not English and from this problem affects our working process and make the system is more complicated. (Sqn.Ldr. Pichead, personal communication, 12 March 2012)

4.3 Fenix (E) System Implementation Success Key Issues

Most of the respondents strongly agreed that a significant success factor in the Fenix project is good coordination and cooperation since the Fenix project team was divided into two sections. The first section is supervised by FMV and their main roles are development, baseline, migration, system baseline, and integration of the Fenix System. On the other hand, the second part of the project team is managed by the SAF Fenix team who were in the fields of control in business change management, data cleansing, business process documentation, and training (see Figure 4.6). The main critical success factors of Fenix System implementation was efficient and effective coordination and operation. One respondent stated:

> The success factors of the project is that the project team are divided into two parts. FMV and SAF, they work and operate together. (Pär, personal communication, 19 March)

Moreover, setting up the project team members with the right skills for the right job are critical success factors in the implementation project. One of the respondents stated:

> Project team with the right skills and their team work are the most important part to be successful in this project. (Sven, personal communication, 4 May 2012)

Furthermore, coordination and cooperation with external organisations (i.e. suppliers) is also important, as two of respondents said:

> Cooperation between different part of business, buying, developing organisations is one of the success factors for successful implementation. (Eken, personal communication, 29 March 2012)

> Good cooperation between the system provider and the end-user. (Jan, personal communication, 19 March 2012)

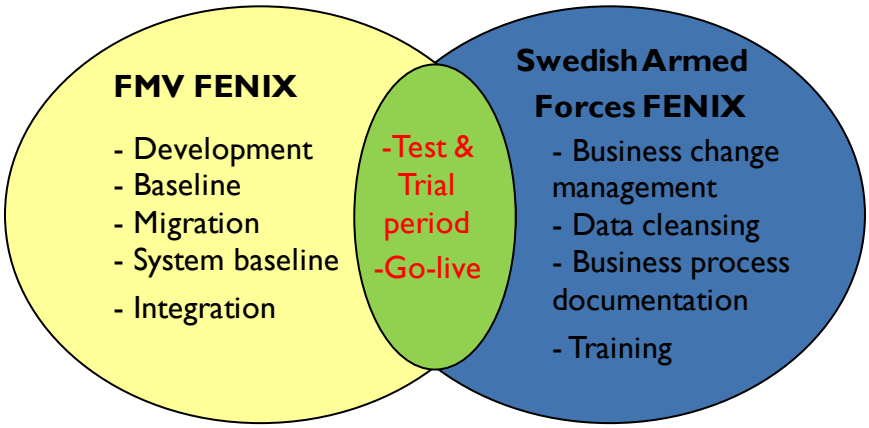

Figure 4.6 Fenix Project Organisation and Responsibilities
(source: constructed by the author, 2012)

In addition, the test and trials process is a very significant process and can be one of the critical success factors of Fenix implementation. In each system implementation, a test and trial period was conducted for three months in order to ensure that the system was working well. Also, in Fenix (E) the test and trials process had been conducted for three months before deployment or "go-live" in Wing 7, RTAF. As one respondent said:

> Trials are important because when you test the system in a live situation, you will find the problems and get positive thinking before you go live. (Jan, personal communication, 19 March 2012)

4.4 Organisational Impacts

4.4.1 Effects and Consequences of Fenix System Implementation

After the RTAF has put F-5 fighter aircrafts out of commission, Jas 39 Gripen and SAAB 340 AEW have commissioned instead in Wing 7. Therefore, Fenix (E) System has been implemented as an aviation information system for these aircrafts. Subsequently, the organisation of Squadron 701 and 702 were adapted or changed in order to fit with new information system (i.e. Fenix System). Since Fenix System is a commercial off-the-shelf (COTS) product, RTAF therefore has to adapt the organisational structure to support the system. One respondent who was working in a support group in RTAF stated:

> The Fenix System affects the organisation structure in Wing 7, RTAF. They have to reorganise the squadron to fit the Gripen and Fenix System. Also SAAB 340 AEW squadron need to re-organise but not in the same amount. (Martin, personal communication, 3 April 2012)

Another effect and consequence is that people who are involved with this maintenance information system (Fenix System) have to change their organisational culture and working process in order to successfully achieve the implementation. In other words, the maintenance process of the aircraft in Wing 7 has to be changed due to the fact that,

historically, Wing 7, RTAF had followed standard pattern from the United State (US). Two respondents who have been working with Fenix System said:

> This changes organisational culture, we have our own routines in terms of maintenance processes. Conversely, when Fenix System was implemented in Wing 7, RTAF, we have to change our working process. (Sqn.Ldr. Jirapan, personal communication, 12 March 2012)

> This changes the way that I have worked before. (Sqn.Ldr. Peerapol, personal communication, 12 March 2012)

On the other hand, two respondents mentioned about the outcome of changing from the old system to the new information system (i.e. Fenix System), saying that:

> Some people are not happy when they have to change the organisation structure. (Pär, personal communication, 19 March 2012)

> I think I am satisified with the outcome of this systems. It makes my working easier. (Sqn.Ldr. Pichead, personal communication, 12 March 2012)

Another effect and consequence is that the Fenix (E) is a complex software with many functions because the maintenance of aircraft is complicated. As a result, it's difficult for the users to learn the system and it takes time to understand the complexity of the system (Sven, personal communication, 4 May 2012). Consequently, the following issue always occurs and is problematic regarding any discussion of information system implementation because technology is often completely new and complex, together with the fact that implementation of new information system generates fear, thus it creates significant resistance to change. In other words, when a new information system is implemented, some people who get use to the older system are always resistant to change and use the new system. However, in the case of the Fenix System, RTAF users were qualified to be participants of Fenix System; for this reason, the degree of resistance to change is decreased.

Some of the respondents mentioned that a great effect and consequence of implementing Fenix (E) is increasing tasks for some users. Since the Fenix System is a complex system, the users have to input a number of details data in the system (Wg.Cdr.Chakree, personal communication, 5 May 2012). However, one of the respondents stated that some areas of system reduce work tasks for them and make their tasks been much more easier (Jan, personal communication, 11 April 2012). A problem is also the phenomena that, in Wing 7, RTAF, there is a lack of personnel to operate the system. Two of respondents explained:

> One of problems of this system is lack of people who input the data into the system. Since they have to input the data after the last aircraft landed on the ground. Therefore, no reserved people do this task. Moreover, someone who can operate this system must have to be trained and get certificate. (Sqn.Ldr. Jirapan, personal communication, 12 March 2012)

> The personnel issue is also the phenomena that personnel operate in the Fenix system will be lacking in the future due to personnel transfer and retirement. Moreover, it's difficult to find personnel since these people

> require system knowledge and need to be educated before using this system. (Wg.Cdr.Chakree, personal communication, 5 May 2012)

Another consequence affected by lack of personnel is that some users who play a role as the main key personnel who administrates Fenix (E) are absent temporarily. Consequently, nobody can replace his/her task and the working process is obstructed (Wg.Cdr.Chakree, personal communication, 5 May 2012). Finally, The system also provides the visibility of the whole maintenance system of the aircrafts. As a result, they can work and run the business processes effectively (Sven, personal communication, 4 May 2012).

In addition, one respondent mentioned that an effect today is lack of integration between the legacy or existing systems (Wg.Cdr.Chakree, personal communication, 5 May 2012). There are many information systems in RTAF, for instance Logistics Management Information Systems (LMIS) which are the main information system for the whole logistics activities in RTAF. Since Fenix (E) system was implemented, integration of systems or exchanging data are also needed. Therefore the consequence is that they require personnel to input the data into another system in order to keep availability and visibility of information to support top management. The same respondent also stated that our RTAF IT experts rarely participated in this implementation due to the fact that RTAF has purchased the Fenix (E) system and also FMV has supervised the entire implementation process from the beginning. As a result, lacking of organisational system expertise led to be an obstacle to increase knowledge of developing the system in the future.

5. Analysis

5.1 Introduction

This chapter will present data analysis of the empirical findings of the study based on the theories mentioned in the research framework (see Figure 2.6). The analysis of data is emphasised on the information which is related to the research questions in this research. Therefore this part can be divided into three main sections. The first section aims to discuss and analyse the empirical findings associated with the first question in order to seek the IS implementation challenging areas tied to the five problematic issues including: leadership issues, organisational environment issues, management process issues, personal issues, and technical systems issues which are presented in the research framework. The second section attempts to discuss and present the key issues for successful implementation related to the second research question. The third section approaches the impacts that could be had on an organisation and its business processes which are focused on implementation effects and consequences.

5.2 MIS Implementation Challenges

One of the research questions of this study focuses on the determination of the problematic issues with regards to MIS implementation within the organisation. Based on the research model, the challenges of MIS implementation issues are grouped into five main categories as presented by Beaumaster (1999). By comparing empirical data and theoretical parts, the analysis will be broken down into five main issue as follows.

Leadership Issues

According to Beaumaster (1999), leadership issues reflect those areas which require the interaction, commitment and direction from the top management, such as inter-departmental coordination, organisational support, individual support, and timeframes and scheduling. The inter-departmental coordination relates to the ability of the organisation to coordinate its implementation process across departments. The findings from interviews indicate that there are some problems with the individual support within the organisation. For instance, from one of respondents stated that

> In the organisation we have different types of responsibilities, thus this is very difficult to set up the meeting with the right person and right responsibility. (Jan, personal communication, 11 April 2012).

This point of view shows that, in MIS implementation, processes requires organisation and individual support in order to achieve the goals and objectives. This is supported by both the respondents' perspective and from a theoretical point of view. Normally, these issues point to those individuals in top management. Nonetheless, MIS implementation impacts people at all levels within the organisation, hence the more people support it, the more effective the MIS implementation will be (Beaumaster, 1999). From the findings, top management support is an important factor to accomplish the project since Fenix (E) system had short scheduling, so top management in SAF addressed the Fenix (E) project as a high priority project and they supported the resources that the project team required.

One of the problematics issues that Beaumaster (1999) defined is timeframes and scheduling. It is important to note that timeframes and scheduling are very significant factors to MIS implementation in an organisation. According to the respondents, this implementation belongs to the defence organisation, so security was a major priority for the organisation. However, this issue also affects the scheduling of the implementation process; in other words, this concern about lagging of time of the implementation process. This issue can be supported by Kwon and Zmud (1987) that the characteristics of the organisation is one of the factors that affects implementation stages. One of the respondents stated:

> The defence organisation requires a number of documents, description of the system,and so on, so that it takes time to get approval. It's a very long process. (Jan, personal communication, 11 April 2012).

Organisational Environment Issues

Organisational environment issues are essential to define the challenges which affect or might be affected by enviromental factors, according to Beaumaster (1999). The findings indicate that Fenix System was implemented in the defence organisation, thus security and confidentiality are the main issues. According to to the findings, before the system "goes-live", a number of documents, descriptions of the system, and so forth, need to get approval from SAF in order to ensure the security issues. This topic relates to Beaumaster (1999) who described internal or external politics which top management and IT professionals have to recognise and address the political ramifications of IT implementation within their organisation and the external environment (Beaumaster, 1999).

A challenge that has been found from the interviews is concerned with external consultants who address IT issues within their organisation. Beaumaster (1999) claimed that external consultants are typically hired to play role as advisors on various issues as well as to provide the hardware and software for the organisation. Information from the interviews indicates that, because of the government organisation, it is difficult to get acquisition of external consultants suddenly.

However, the findings from respondents didn't mention about the challenges in terms of contracts or changing technologies aspects.

Management Process Issues

One challenge in the mangement process referred to by the respondents is strategic planning of the implementation project at the beginning. Kraemer and King (1977) argue that one of the problems regarding information technology implementation can be seen as lack of a strategic plan. The findings from interviews indicate that strategic planning is a huge topic and very important factors that make a good working process in the project. In addition, McLean and Soden (1977) also support the importance of strategic planning that the achievement of MIS implementation in an organisation bases on the degree of strategic analysis of organisation requirements and objectives. The project manager for Fenix (E) argued that they cannot go in the wrong direction due to short and tight scheduling. Therefore they need a good strategic plan in order to complete the goals and objective before the aircrafts were delivered to RTAF.

Several respondents mentioned about the routines which are the procedures that describe how the user should work. This issue refers to the written procedures specific for the system. Referring to the findings indicates that lack of routines affects the working process and this issue can be related to the written guidelines mentioned by Beaumaster (1999).

Personnel Issues

Personnel issues is one of the major problematic issue regarding the MIS implementation process. When it comes to personnel issues, Kroenke (2007) stated that, when the five components of an information system (i.e. hardware, software, data, prodedures, and people) are considered, the most important component is people. For instance, even if an organisation that has a perfect information system, if the staff do not know what to do with the information that it produces, it wastes time and money (Kroenke, 2007). According to Beaumaster (1999), personnel issues are concerned with each individual in the organisation, for instance organisational expertise, individual expertise, internal leadership, staffing, resistance to change, and training. These isues relate to the management process of human resources in the organisation.

Several respondents indicate that training and education processes are one of the main challenges in the MIS implementation process. It is significant to ensure that all the users have been trained adequately. Beaumaster (1999) argued that lack of training can play the role of an obstacle of effective MIS implementation and overall organisational achievement. Another issue that also relates to the training process is staffing. MIS implementaion training of individuals requires support staff within the organisation in order to make the implementation effective and feasible (Beaumaster, 1999). According to the findings, these interviews also revealed that there was a lack of staff and it was difficult to get trainers over the course of the time.

According to Beaumaster (1999), resistance to change can be seen as in every change of information system. Part of the resistance is performed as fear, such as fear of technologies, fear of being displaced by technology, and fear of the unfamiliar (Beaumaster, 1999). Consequently, individuals who have resistance to change can perform by putting off the extra work and effort needed in learning new information systems or technologies (Danziger & Kraemer, 1986). According to the interviews, most of respondents claim that this is always a challenge when the organisation replaces the old system with the new system. For instance, in the case of implementation of the Fenix System in Sweden to replace the old system, called DIDAS, that had been used for almost 30 years in SAF, some of the users didn't want to change the way they had worked before. In addition, one of the respondents in RTAF also support this phenomenon that when they recruit a new system users in order to be trained the system, these people always show their resistance to change. The reason behind this seems to be the complexity of the system as one of the respondents mentioned. As a result, the users can act in a way that is resistant to change.

Another challenge that I did not mention in theoretical part, but found from the interviews is a lack of adequete communication to the operational level in order to make the users understand what the system is designed to do, what the system look like, and so forth. (Eken, personal communication, 29 March 2012)

Technical System Issues

According to Beaumaster (1999), technical systems issues are primarily related to the impact inforamtion technology has on organisations and individuals. In addition these issues include hardware and software considerations as well as the compatibility and life cycles of various information technologies. The finding from interviews indicate that one respondent mentioned this issue:

> We also have technical issues, for example many failure reports that needed to be corrected in the system by the suppliers before we go-live with the system. (Jan, personal communication, 11 April 2012).

The issue is concerned with standardisation and compatibility. However, due to the fact that the prime contractor has a high quality and standard in the application software, there is not so much discussion about this issue. However, the challenge for RTAF, currently, is integration between the legacy system and the new system.

5.3 MIS Implementation Success Key Issues

It could be beneficial to identify succes key issues before MIS information system due to the fact that these success factors can play a role as the criterion to guide the successful implementation process. According to Somers and Nelson (2001), success factors help to improve the implementation process and to increase the visibility of effects in each process as well. Tan (1996) also presents a set of success factors such as technical characteristics, user involvement, communications, infrastructure support, and so forth. However, these success key issues in this context are not on the technical side, all of them come from the managerial perspective.

According to the findings, most of respondents can identify what the successs factors in the Fenix implementation project are; namely, the project team, their team work, together with coordination and cooperation in the project team. This phenomenon can also be related to the success factors mentioned by Mills and Mercken (2000), which relate to the skills of the project team members, particularly the Project Manager. Information from the Project Manager for Fenix (E) indicated that it is important to build up good members with the right skills in the project team. In the project team, there are many different areas and different tasks such as data migration, base line, and so on; for this reason, they find out the best people with good skill and experience in each area.

One critical success factor that some of respondents agreed with was the strategic planning of the Fenix implementation project. According to Pinto (1998), a project plan is needed for a successful project. The Project Manager of Fenix (E) (Sven, personal communication, 4 May 2012) also agrees with some respondents that strategy is a big issue that concerns the direction of planning and achievement of the project's goals.

The last success factors the program manager of Fenix argues for is the importance of having a test and trials before the deployment process. According to Gargeya and Brady (2005), test and trials of the system have proven to be the key components of success for some organisations. The findings from the interviews also indicate that the fenix system endured one month of rigorous testing procedures before the system went live. Moreover, this process also seems like an evaluation process before the system goes live (Jan, personal communication, 11 April 2012). This is also argued by Pinto (1998), who

claimed that implementation process require monitoring and feedback in order to control the quality of the system's outcome. However, the theory does not cover all the activities of test and trials process due to the fact that this process needs to test the system by the efficiency project team and sent back to the suppliers as well.

5.4 Organisational Impacts

5.4.1 Effects and Consequences on the Organisation and its Processes

According to the literature reviewed, various effects and consequences by implementing MIS or IS were reviewed. Both positive and negative side of effects on an organisation and its processes can be seen. It is very interesting when comparing the theories and the respondents. One of the effects that most respondents brought up is re-organisation. This is aligned with the literature which Lucey (2005) who mentioned that implementing information system and technology have effects on organisational structures; in other words, technology can be seen as the major change on the structure of the organisation. Most literature identified that technologies or IT is the significant component of IS that led to changes in an organisation. The information which was found from the case indicates that the RTAF has to change the organisation's structure in squadron 701 and 702 order to fit to the Fenix Systems and along with the new aircrafts. This is supported by Zmud & Cox (1979) that the organisational structure is utilised to facilitate MIS implementation. It is virtually impossible to implement an information system without altering the organisation, for instance job descriptions are newly created, power and authority relationships are changed, performance becomes more visible, and so on.

Furthermore, some literature which was reviewed from various authors (Chan, 2000; Lucey, 2005; Rikhardsson & Kræmmergaard, 2006; Davies, 2009) indicate that adopting IS requires individual skills. Therefore, the Fenix (E) system requires skills and knowledge, for instance maintenance and aircraft knowledge. Moreover, an organisation should alter its business processes rather than change the system; consequently, it led to change of the routine, jobs, and the way of operatation. This is why the RTAF has to change the new routines for maintenance and business processes in order to match with the Fenix (E) system.

According to Davies (2009), it is important to notice that IS can increase levels of work monitoring and permit greater control of work by the managerial group. It is also stated by Lucey (2005) that IS increases the degree of administration, communication, and coordination within an organisation and also external stakeholders. According to the findings, one of the modules of the Fenix (E) system, called ARM which is an application to generate the report from the system, produces information which is used to support top management of RTAF (RTAF Headquarter) decision making.

On the other hand, organisational impacts are not only in the positive perspective as mentioned earlier, but also in negative ways. IS can create frustration among employees due to the fact that some problems occur from errors in the system, together with the fact that users are unfamiliar with the new system (Rikhardsson & Kræmmergaard, 2006). As a consequence, this led the users to become resistant to change. However, this phenomenon is not a big deal for Fenix (E) System due to the fact that the project team has a good administarton and management along with high standards of this COTS software package.

A phenomenon can also be related to the the theory identified by Davies (2009), which stated that IS decreases levels of social interaction between operational levels but this did not get mentioned in this research since the Fenix (E) System has been used mostly in Wing 7, not the entire RTAF units; in other words, only a small group in RTAF has used the Fenix E system.

5.5 Summary

MIS implementation is a complicate issued and involves both technical and management aspects. In this study, the purpose was to describe and present challenges, key succes issues, and organisation impacts regarding MIS implementation. A summary in this chapter will provide the interesting points from analysis, not hightlight all aspects in the following.

Analysis of "MIS implementation challenges" indicates that the most problematics issues in the MIS implementation process is related to personnel issues since most of the findings were concerned with people rather than others factors. However, the smallest issues are associated with technical systems. The main reason why these issues are not important is due to high standard and quality of vendors. Consideration of the "MIS implementation success key issues" indicates that more concern is about the teamwork and capabilities of the project team. According to analysis of "Organisational impacts" indicates that the effects and consequences by MIS implementation is most concerned about the business process effects and its consequences.

Interestingly, the result of analysis in this study regarding the research framework model which the researcher found out is that when an organisation has started to implement MIS, there are effects on the organisation. It is essential to notice that each main five issues (leadership, organisation environment, management process, personnel, and technical issues) affects the MIS implementation process. For instance, technical system issues can support the MIS implementation process; however, from analysis some areas of this issues affect the process. Therefore the model can be modified as presented in Figure 5.1.

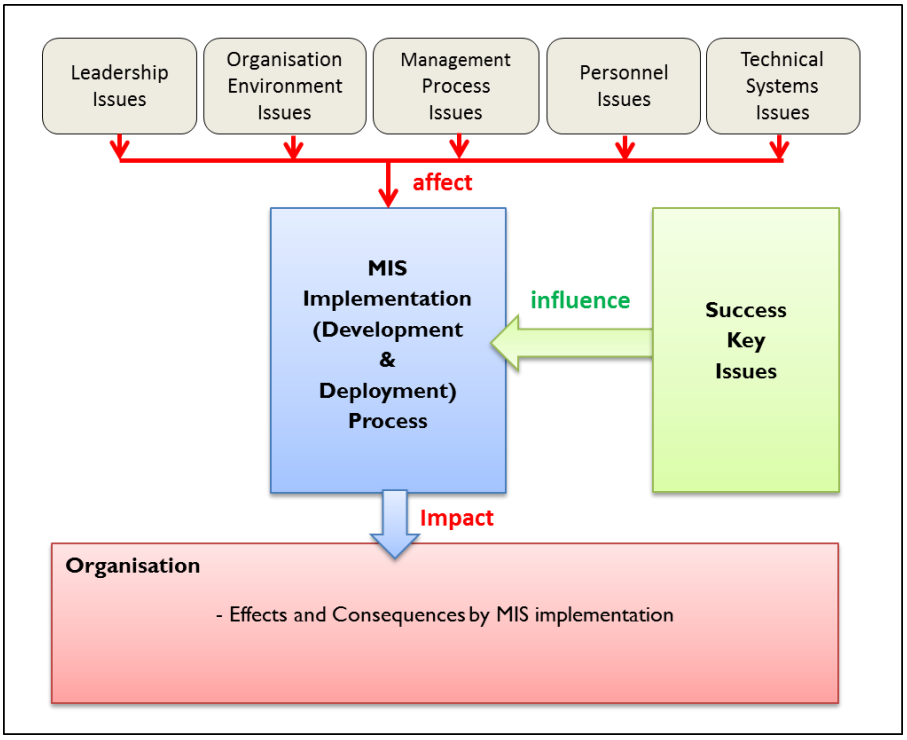

Figure 5.1 Modified Research Framework Model (source: constructed by the author, 2012)

6. Conclusions

The primary focus of this study was to determine surrounding problematic and success key issues regarding MIS implementation. Each implementation stage was presented in order to understand the MIS implementation process together with describing the activities in each stage. The most important learning from this research is that the description of problematic issues which was categorised into five main issues regarding implementation of new MIS within the organisation was presented. Moreover, key issues for successful MIS implemntation which refer to the success factors to ensure the achieve of MIS implementation were identified. In addition, effects and consequences of MIS implementation were described.

Regarding the first research question, the author found MIS implementation challenges regarding the implementation of MIS. In order to structure these problematic issues, the researcher created a framework based on a literature review which consists of five categories. The first category contains challenges that relate to leadership issues including: lack of individual support, lack of top management support, characteristics of the organisation. The second category combines topics which associate with management process issues such as: lack of strategic planning, lack of written procedure/guidelines. The third category is related to the organisational environment and includes: internal/external policies challenge (i.e. security and confidential issues), acquisition of external consultants. The fourth category focuses on the technical systems issues which consist of: lack of integration of systems. The fifth category concentrates on personnel issues including: training and education process management, inadequate staffing, people's resistance to change.

Based upon the second research question, the key issues which should be presented in succesful MIS implementation it can be concluded that there are various factors that need to be presented in IS implementation projects. One of the important factors is the degree of coordination and cooperation among the project teams. In addition, the project team members have good and correct skills with efficiency. Also, the projects should have good strategic planning. The last factors relate to the intensive test and trials period of the system or can be called the system evaluation which is the process to ensure the correction, availibility and readiness of the system.

Regarding the third question, the study led to the conclusion that MIS implementation influences an organisation and its business processes in a variety of ways. In this study, one obvious piece of evidence is the changing of organisational structure (re-organisation) and business process. This led to changes in jobs, routines or the way they operate. In addition, individual skills and knowledge are required in order to be able to use the information system. Therefore the end user has to be trained and educated, the reason is to ensure they can use the system efficiently and effectively. The impacts concerning the resistance to change of the people who use the system can be concluded that it depends on how well the system and change is managed.

7. Discussion

In the result of this study, various trends were identified and considered to discuss in this chapter. This research presented the challenges, key success factors, and organisational impacts surrounding MIS implementation. However, some additional aspects which the researcher has learned more during this study – lessons learned from Fenix System implementation – are discussed more in this chapter.

Regarding implementation challenges, COTS products as mentioned before are the software packages which provide the customer the exact cost but some application areas don't fit with an organisation's business process. Consequently, the project team should try to adapt the business process aligned to the software; in other words, they should stick with COTS, not enhance the applications, and therefore try to use the Maintenix business process rather than an organisational process. Since there are so variety of requirements from the users in the beginning, this led making the system more complicated. As a result, the project team should put effort into the business analysis. In the Fenix (E) System, this is a challenge for the project team due to the fact that there was a limit of time and the project team didn't recognise the RTAF business process thoroughly. Therefore the operational level (RTAF personnel) should be involved in the analasis part from the beginning of the system. Additionally, IT environment such as development and test, baseline development, application administration, and production site, has to be well-planned in order to ensure the project's goals and objectives are reached. Similarly, a test and trials period is also a very important process for the Fenix System implementation as mentioned previously; consequently, this stage should be carried out with limited personnel since many people means many requirements. In technical aspects, The system baseline as described in the previous chapter is the basic data in the Fenix System. Referring to observations from this study, there are many versions of baseline; as a result, this aspect made a challenge in terms of administration for the systems. In addition, it is essential that the project team should understand the baseline development, and not let the vendors deal with all the work.

In terms of success factors, the- project team is the most important part to success of the Fenix System implementation as dissussed in this study. However, it is important to notice that the personnel or members of the project team should be the same, otherwise it will take a long time for knowledge building for the newcomer in the project team. Furthermore, knowledge management is one a critical task for IS implementation and it takes quite long time; however, it is a great condition to reach success. One important issue in the implementation process is the education and training process. There are many issues involved in the training process such as documention, people, and planning. In order to ensure the efficiency and effectiveness of the system, the end user should test the system as much as possible.

The organisational impacts aspects discussed previously are very interesting for the organisation, in this case the RTAF. Implementation of the Fenix System could impact directly and indirectly on an organisation and its business process. As mentioned, delimitation in the research will not consider other actors in the supply chain, however, this study found that the RTAF can be in a closer relationship with the suppliers (i.e. FMV) generated by IS. From observation, it is pointed out that knowledge and expertise in-house is important, since RTAF internal expertise is a small part in this Fenix (E) Project. As a consequence, the incoming challenge in the near future can be found that when the agreement with the vendor is ended, some questions will come up and will be a

big challenge for the RTAF, for instance how the system will be developed and maintained? How will the system integrate to other existing systems in RTAF? How to upgrade the system due to the fact that each aircraft system needs some adaptations?.

In practical implications, since the RTAF has adopted different types of information systems, these systems need to be intergrated and exchange data in order to increase availability and readiness of information to support top management and the operational level. Consequently, it will be very helpful for the RTAF to adopt and implement the same aviatiom management information system (such as the Fenix System) with the same platform in all the units in the RTAF which involved in aircraft (i.e. Wing, Headquarters). Additionally, this will increase a degree of air-worthinesss and air safety issues, and also increase a greater visibility of managing aviation assets throughtout their operating lifecycle.

8. References

Al-Mashari, M. & Zairi, M. (2000) Supply-chain re-engineering using enterprise resource planning (ERP) systems: an analysis of a SAP R/3 implementation case. *International Journal of Physical Distribution & Logistics Management*, 30 (3/4), 296–313.

Antonius, R. (2003) *Interpreting quantitative data with SPSS* (Illustrated, reprinted ed.). London: SAGE.

Asemi, A., Safari, A. & Zavareh, A. A. (2011) The role of management information system (MIS) and Decision support system (DSS) for manager's decision making process. *International Journal of Business and Management*, 6 (7), 164–173.

Avgerou, C. (2000) Information systems: what sort of science is it?. *Omega*, 28 (5), 567–579.

Bailey, A. (1998) Uh-Oh. It's a computer systems project… *IEEE Engineering Management Review, Winter*, 21-25.

Baskerville, R., Stage, J. & DeGross, J.I. (2000) *Organizational and social perspectives on information technology* (1st ed.). Boston/Dordrecht/London, Kluwer.

Baxter, P. & Jack, S. (2008) Qualitative case study methodology: study design and implementation for novice researchers. *The Qualititive Report*, 13 (4), 544–559.

Beaumaster, S. (1999) *Information technology implementation issues: an analysis*. Unpublished manuscript, Faculty of the Virginia Polytechnic Institute and State University.

Beaumaster, S. (2002) *Local government IT implementation issues: a challenges for public administration.* Paper presented at the 35th Hawaii International Conference on System Sciences, Hawaii, USA.

Benbasat, I., Goldstein, D. K. & Mead, M. (1987) The case research strategy in studies of inforamtion systems. *MIS Quarterly*, 11 (3), 369–386.

Björklund, M. & Paulsson, U. (2003) *Seminarieboken: Att Skriva, Presentera och Opponera*. Lund. Studentlitteratur.

Blaxter, L., Hughes, C. & Tight, M. (2006) *How to reasearch* (3rd ed.). Maidenhead, Open University Press.

Blumberg, B., Cooper, D. R. & Schindler, P. S. (2005) *Business research methods* (2nd ed.). Berkshire: McGraw-Hill Education.

Boar, B. H. (1993) *The art of strategic planning for information technology*. New York, John Wiley & Sons, Inc.

Boynton, A. C. & Zmud, R.W. (1984) An assessment of critical success factors. *Sloan Management Review*, 25 (4), 17–27.

Boynton, A. C. & Zmud, R. W. (1987) Information technology planning in the 1990's: directions for practice and research. *MIS Quarterly*, 11 (1), 59–71.

Bretschneider, S. (1990) Management information systems in public and private organizations: an empirical test. *Public Administration Review*, 50 (5), 536–545.

Chan, S. L. (2000) Information technology in business processes. *Business Process Management Journal*, 6 (3), 224–237.

Cooper, D. R. & Schindler, P. S. (2008) *Business research methods* (International ed.). New York: McGraw-Hill Irwin

Danziger, J. N. & Kraemer, K. L. (1986) *People and computers: the impacts of computing on end users in organizations*. New York, Columbia University Press.

Davenport, T. H. (1998) Putting the enterprise into the enterprise system. *Harvard Business Review*, July-August, 121–131.

Davenport, T. H. (2000) *Mission critical: realizing the promise of enterprise systems*. Boston, MA, Harvard Business School Press.

Das, S. K. (2012) *Applications of management information system in an organization*. Paper presented at the National Seminar held on 24–25 Febuary 2012 at IACS, Jadavpur, Kolkata, India.

Davies, P. B. (2009) *Business information systems*. New York, Palgrave Macmillan.

Denzin, N.K. & Lincoln, Y.S. (2005) *The Sage handbook of qualitative research* (3rd ed.). Thousand Oaks, CA: Sage.

Ein-dor, P. & Segev, E. (1978) Organizational context and the success of management information systems. *Management Science*, 24 (10), 1064–1077.

Gargeya, V. B. & Brady, C. (2005) Success and failure factors of adopting SAP in ERP system implementation. *Business Process Management Journal*, 11 (5), 501–516.

Ghauri, P. & Gronhaug, K. (2005) *Research methods in business studies, a practical guide* (3rd ed.). New York: Financial Times Prentice Hall.

Goddard, W. & Melville, S. (2004) *Research methodology: an introduction* (2nd illustrated, revised ed.). Lansdowne: Juta and Company Limited.

Gunasekaran, A. & Ngai, E. W. T. (2004) Information systems in supply chain integration and management. *European Journal of Operational Research*, 159, 269–295.

Gurbaxani, V. & Whang, S. (1991) The impact of information systems on organizations and markets. *Communication of the ACM*, 34 (1), 59–73.

Hamilton, S. & Chervany, N. (1981) Evaluation information systm effectiveness-part i: comparing evaluation approaches. *MIS Quarterly*, 5 (September), 55–70.

Hevner, A. R., March, S. T., Park, J. & Ram, S. (2004) Design science in information system research. *MIS Quarterly*, 28 (1), 75–105.

Holland, C. P. & Light, B. (1999) A critical success factors model for ERP implementation. *IEEE Software, May-June*, 30–36.

Hong, K. K. & Kim, Y. G. (2002) The critical success factors for ERP implementation: an organizational fit perspective. *Information & Management*, 40, 25–40.

Hyvönen, T. (2003) Management accounting and information systems: ERP versus BoB. *European Accounting Review*, 12 (1), 155–173.

Ives, B., Hamilton, S. & Davis, G. B. (1980) Framework for research in computer-based management information systems. *Management Science*, 26 (9), 910–934.

Kraemer, K. L. & King, J. L. (1977) *Computers and local government: volumei, a manager's guide*. New York, Praeger Publishers.

Kroenke, D. M. (2007) *Using MIS* (2nd ed.). Upper Saddle River, New Jersey, Pearson Prentice Hall.

Kvale, S. (1996) *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, CA, SAGE.

Kumar, R. (2005) *Research methodology: a step-by-step guide for beginners* (2nd ed.). London, SAGE.

Kuruppuarachchi, P. R., Mandal, P. & Smoth, R. (2002) IT project implementation strategies for effective changes: a critical review. *Logistics Information Management*, 15 (2), 126–137.

Kwon, T. H. & Zmud, R. W. (1987) unifying the fragmented models of information system implementation. In: Boland and Hirschheim (eds.) *Critical issues in information systems research*. New York, John Wiley.

Light, B., Holland, C. P. & Wills, K. (2001) ERP and best of breed: a comparative analysis. *Business Process Management Journal*, 7 (3), 216–224.

Linthicum, D. (1999) *Enterprise application integration*. Reading, MA, Addison-Wesley.

Loh, T. C. & Koh, S. C. L. (2004) Critical elements for a successful enterprise resource planning implementation in small- and medium-sized enterprises. *International Journal of Production Research*, 42 (17), 3433–3455.

Lucey, T. (2005) *Management information system* (9th ed.). London, Thomson Learning.

Mabert, V. A., Soni, A. & Venkataramanan, M. A. (2003) Enterprise resource planning: managing the implementation process. *European Journal of Operational Research*, 146, 302–314.

MacKinnon, W., Grant, G. & Cray, D. (2008) *Enterprise information systems and strategic flexibility.* Paper presented at the 41st Hawaii International Conference on System Sciences, Hawaii, USA.

McKinnon, J. (1988) Reliability and validity in field research: some strategies and tactics. *Accounting, Auditing & Accountability Journal*, 1 (1), 34–54.

McLean, E. R. & Soden, J. V. (1977) *Strategic planning for MIS*. New York, John Wiley and Sons, Inc.

Merriam, S. B. (1994) *Fallstudien som forskningsmetod*. Lund: Studentlitteratur.

Merriam, S. B. (2009) *Qualitative Research: a guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Milis, K. & Mercken, R. (2002) Success factors regarding the implementation of ICT investment projects. *International Journal of Production Economics*, 80, 105–117.

Motwani, J., Subramanian, R. & Gopalakrishna, P. (2005) Critical factors for successful ERP implementation: exploratory findings from four case studies. *Computer in Industry*, 56, 529–544.

Muijs, D. (2004) *Doing quantitative research in education with SPSS* (illustrated ed.). London: SAGE.

Murthy, C. S. V. (2006) *Management information systems*. Mumbai, Himalaya Publishing House.

Mxi Technologies Ltd. (2009) *Mxi solutions for defense organization* (MC.1003.01) [Brochure]. Ottawa/Canada, Mxi Technologies Ltd.

Myers, M. D. (1997) Qualitative research in information systems. *MIS Quarterly*, 21 (2), 241–242.

Nah, F. F. H., Lau J. L. S. & Kuang, J. (2001) Critical factors for successful implementation of enterprise systems. *Business Process Management Journal*, 7 (3), 285–296.

Newman, I. & Benz, C. R. (1998) *Qualitative-quantitative research methodology: exploring the interactive continuum*. USA, Southern Illinois University.

O'Brien, J. A. (2004) *Management information systems: managing information technology in the business enterprise* (6th ed.). New York, McGraw-Hill/Irwin.

Padgett, D. 1998. *Qualitative methods in social work research: challenges and rewards* (illustrated ed.). California: SAGE.

Parr, A. N. & Shanks, G. (2000) *A taxonomy of ERP implementation approaches*. Paper presented at the 33rd Hawaii International Conference on System Sciences, Hawaii, USA.

Phillips, D. C. & Burbules, N. C. (2000) *Post positivism and educational research* (illustrated ed.). Maryland: Rowman & Littlefield Publishers.

Pinto, J. K. (1998) *Project management handbook*. San Francisco, CA, Jossey-Bass.

Polkinghorne, D. E. (2005) Language and meaning: data collection in qualitative research. *Journal of Counseling Psychology*, 52 (2), 137–145.

Potter, W. J. (1996) *An analysis of thinking and research about qualitative methods*. Mahwah, NJ, Erlbaum.

Rajagopal, P. (2002) An innovation-diffusion view of implementation of enterprise resource planning (ERP) systems and development of a research model. *Information & Management*, 40, 87–114.

Repstad, P. (1999) *Närhet och distans – Kvalitativa metoder i samhällsvetenskap* (3rd ed.). Lund, Studentlitteratur

Rikhardsson, P. & Kræmmergaard, P. (2006) Identifying the impacts of enterprise system implementation and use: examples from Denmark. *International Journal of Accounting Information Systems*, 7, 36–49.

Saunders, M. & Lewis, P. (2012) *Doing Research in Business and Management: An Essential Guild to planning Your Project*. Harlow, England: Pearson Education Limited.

Silverman, D. (2006) *Interpreting qualitative data* (3rd ed.). Padstow, TJ International Ltd.

Sledgianowski, D., Tafti, M. H. A. & Kierstead, J. (2008) SME ERP system sourcing strategies: a case study. *Industrial Management & Data Systems*, 108 (4), 421–437.

Slevin, D. P. & Pinto, J. K. (1986) The project implementation profile: new tool for project managers. *Project Management Journal*, September, 57–63.

Somers, T. M. & Nelson, K. (2001) *The impact of critical success factors across the stages of enterprise resource planning implementations*. Paper presented at the Proceedings of the 34th Hawaii International Conference on System Sciences, Hawaii, USA.

Somogyi, E. K. & Galliers, R. D. (1987) Applied information technology: from data processing to strategic information systems. *Journal of Information Technology*, 2 (1), 30–41.

Spalding, J. O. (1998) Transportation industry takes the right-of-way in the supply chain. *ILE Solutons*, 30 (7), 24–28.

Spathis, C. & Constantinides, S. (2003) The usefulness of ERP systems for effective management. *Industrial Management & Data systems*, 103 (9), 677–685.

Tan, R. R. (1996) Success criteria and success factors for external technology transfer projects. *Project Management Journal*, June, 45–55.

Theiruf, R. J. (1994) *Effective management and evaluation of informaion technology*. New York, Quorum Books.

Themistocleous, M. & Irani, Z. & Love, P. E. D. (2002) *Enterprise application integration: an emerging technology for integration erp and supply chains*. Paper presented at the ECIS held on 6–8 June 2002, Poland.

Themistocleous, M., Irani, Z. & O'Keefe, R. M. (2001) ERP and application integration: Exploratory surway. *Business Process Management Journal*, 7 (3), 195–204.

Tripathi, K. P. (2011) Role of management information system (MIS) in human resource. *International Journal of Computer Science and Technology*, 2 (1), 58–62.

Yin, R. K. (1989) *Case study research: design and methods*. Newbury Park, CA: Sage.

Yin, R. K. (2003) *Case study research: design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Zmud, R. W. & Cox, J. F. (1979) The implementation process: a change approach. *MIS Quarterly*, 3 (2), 35–43.

9. Appendices

9.1 Appendix I – Definitions

Application Software:

Programs that perform a business function. Some application programs are general purpose. Other application programs are specific to a business function (Kroenke, 2007).

Business Process Design:

The creation of new-departmental, business practices during information system development. Most designs of business process use technology to enable more efficient business processes that require people to work in new ways and to follow different procedures (Kroenke, 2007).

Data:

Recorded facts events, transactions, or figures (Lucey, 2005; Kroenke, 2007).

Hardware:

Electronic components and related gadgetry that input, process, output, store, and communicate data according to instructions encoded in computer programs or software (Kroenke, 2007).

Information:

Data interpreted in a meaningful context or knowledge derived from data (Kroenke, 2007; Davies, 2009)

Information Technology (IT):

The products, methods, inventions, and standards that are used for the purpose of producing information (Kroenke, 2007).

Organisational Culture:

All-pervasive influence on how it is structured, how work is done, what its aims are and how management and staff interact within the organisation (Lucey, 2005).

System Analysis and Design:

The process of creating and maintaining information system. Sometimes it is called systems development (Kroenke, 2007).

System Implementation:

The stage of systems development in which hardware and software acquired, developed, and installed; the system is tested and documented; people are trained to operate and use the system; and an organisation converts to the use of a newly developed system (O'Brien, 2004).

System Maintenance:

The monitoring, evaluating, and modifying of a system to make desirable or necessary improvements (O'Brien, 2004).

9.2 Appendix 2 – Interview Guide

The following questions have been used for in-depth interviews with the respondents

Opening

-Your current position, tasks, responsibilities, etc.?

-Before implementing Fenix System, did you have experience with other information systems? How long have you had experience working with this area?

MIS Implementation PROBLEMS/CHALLENGES

-Do you have some problems/challenges in implementation process? And what problems/challenges have you been faced with?

-Can you describe the management information system (MIS) or information system (IS) implementation stage/process? And from your perspective, which stage is the most important?

-What are the reasons for changing a new information system (IS) in your organisation?

-Did you have some problems when using the new information system (IS)?

-What do you think about "MIS implementation is used to facilitate organisation process; however, it makes change and conflicts within the organisational culture"?

-In the implementation process, which challenges do you think are the most problematic (for example training process, rapidly changing technology, resistance to change, etc.)

- When MIS is implemented, how about the project outcome? In addition, what do you expect from this new information system?

-Could you explain the IT strategy or MIS strategy in your organisation? (Long-/short-term)

Success Factors (SFs)/Success Key Issues

-What success factors do you see as necessary for a successful MIS implementation? , Why?

Effects and Consequences

-What effects and consequences have you faced by implementing a new information system, regarding business processes/organisation?

Conclusion

- What barriers do you think will affect improving the MIS implementation process?

- Do you have any desirable future improvements and functions in the system?

- Further comments and corrections

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