Building a Framework for ICT Project Implementation and Evaluation

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Abstract

In this technological era with a wide range of Information and Communication Technologies (ICT) resources, organizations are dealing with massive amounts of data, highly equipped infrastructure, and a sustainable business environment and are attempting to obtain competitive advantages while securing their capital in an aggressive market environment. The use of technology offers a chance for firms to produce better quality products and services, in addition to creating a productive work environment and encouraging all types of stakeholders to take more interest in organizational business activities. The evaluation of this massive investment with the proper framework is a real challenge for almost every organization. This paper discusses the different approaches used for evaluating ICT projects, such as pre- and post- implementation evaluations through the measurement of financial and non-financial returns. This study proposes a framework to overcome the main issues related to ICT project implementation and evaluation. The details about possible phases and steps further enhance the reader?s understanding of the use and implementation of the framework in any industry. The study has implications both for researchers working in this field and for ICT decision makers from any industry to improve their decision-making processes for new projects using pre- and post-implementation evaluations with the help of the proposed framework.

1 Introduction

urrently, ICT projects are serious motivators for organizations to perform well in the competitive environment and contribute to society in ways that make their customers and employees satisfied with the provided services. Keeping this in mind, companies are investing substantial amounts to create competitive advantages and improve firm performance. According to the statistics presented in the Gartner report, organizations' spending on ICT resources is expected to reach $3.5 trillion globally during the year 2017 (Gartner 2016). In addition, this report has categorized the ICT investment into five major categories, in increasing order of amount spent: (i) data center systems, (ii) software, (iii) devices, (iv) IT services and (v) communication services. Data center systems ($173 billion) and communication services ($1.384 trillion) are the smallest and largest investments, respectively. This study focuses on the issues that organizations are facing in the prediction and measurement of the impact of this massive amount of investment. The measurement approach may require the organization to determine whether an ICT project has successfully achieved its objectives or failed and to justify this determination. ICT projects are not always successful; there are several reports that discuss the failure rates of ICT projects due to many reasons. As(Al-Shehab, Hughes, and Winstanley 2005)explained, 51% of project failures are due to time constraints and non fulfillment of the desired functionality that was predicted before the project implementation. One of the major reasons for ICT project failure is the organization not having or following a proper evaluation

process (Nawi, Rahman, and Ibrahim 2011; **??**arrukh Saleem et al. 2013). Inability to identify the potential impact on the organization, planning errors, underutilization of resources and projects that do not provide the functionality for the purpose that they have been implemented are some of the common reasons for ICT project failure. The aim of this study is to overcome the issues in identifying the potential impact of ICT projects on an organization based on the investment objectives. Moreover, this study attempts to build a comprehensive framework that can help ICT decision makers predict and measure the possible returns from ICT investment.

2 II.

3 Related Work

There are many kinds of ICT projects, such as integration of multiple applications into one portal (AL-Ghamdi and Saleem 2014), implementation of automated decision-support systems (F. Saleem and AL-Malaise AL-Ghamdi 2012), development of business architecture (Al-ghamdi and Saleem 2016), making the system scalable to improve efficiency **??**Altalhi et (Dadayan 2006). Dadayan further explained that the complexities involved in evaluating ICT projects are mainly due to (i) the number of processes involved in achieving business objectives and (ii) the current business situation (Dadayan 2006). In addition, improper methodologies for measuring ICT projects and inadequate identification of project objectives are some other reasons that make this process more complex **??**Farrukh Saleem et al. 2013). This highlights the research gap and requirements of a framework that can guide an organization in keeping track of ICT investments and making full use of the resources to prevent underutilization.

The evaluation approaches help the organization understand stakeholder participation and motivation to improve the ICT decision-making process using different methods. The findings of this section have implications for the characterization of the measurement factors that can be used in the framework for measuring ICT projects. Moreover, the major factors involved in the evaluation process and the findings of some common evaluation approachesare briefly discussedin a literature review and in the context of the proposed framework.

This section elaborates the list of categories based on the different characteristics mentioned above, as shown in Figure 1. At the top level, the techniques categorized as pre-and post-implementation evaluation, which highlights the time period for measuring the investment(Cress well, Burke, and Pardo 2006). The purpose of pre-evaluation methods is to analyze the potential future impact of ICT investment within a specific period of time based on cost and other related features(AGIMO 2004). The pre-evaluation methods further help to analyze the investment before implementation. Another way of measuring ICT investment is known as post-evaluation, which helps to evaluate the list of attained objectives and output for the investment (Olsen et al. 2005). Based on the previous discussion in section 1, it is evident that each organization has different kinds of objectives for ICT investment. This study has further organized the literature to associate each objective with a possible list of output value returns. For measuring an ICT project's value returns, this section covers different previously proposed methodologies based on multiple factors, from objective to subjective(Wilson and Howcroft 2005), such as cost-benefit analysis (Dadayan 2006)and the measurement of other strategic and informational benefits achieved by ICT projects (Shang and Seddon 2002). To narrow the focus while proposing the framework for measuring ICT projects, the subsequent section discusses how to recognize the different kinds of evaluations, their objectives, and the procedure for predicting and measuring the results of ICT projects.

4 Discussion Of Framework

The flowchart of the proposed framework, shown in Figure **??**, illustrates the measurement ofan ICT project from multiple perspectives. Organizations are keen to update IT infrastructure and software capabilities to support the business process and other activities. This study describes how an organization can keep track of and analyze ICT projects before and after implementation. The framework represents an integrated approach that combines possible techniques extracted from the literature review. ICT project portfoliomanagement techniques, pre- and post-implementation financial analyses, and post-implementation financial and non-financial measurement techniques are some common methods that are incorporated in the proposed framework. The framework is useful for ICT decision makers and business organizations, as it can provide the performance measurements and assess the ICT project comprehensively. The framework is divided into three phases, as discussed below.

5 a) Phase 1 -Pre-Assessment

Pre-assessment is normally performed during the planning phase. Every ICT project requires proper planning based on the requirements and objectives of the project. The basic purpose of pre-assessment is to finalize the list of functionalities for which the ICT project is implemented. Using preliminary analysis and a list of outcomes outlined for the ICT project (AGIMO 2004) is one of the methods designed by the Information Management Office of the Australian government. VMM, which was proposed by (VMM 2002),is another method that provides prospective analysis based on cost, value and risk analyses in defining the IT project. Another set of approaches that an organization can use, which are known as IT portfolio-management techniques, provide comprehensive analysis before project implementation. Total Economic Impact (Gliedman 2003) and Information Economics (Parker and Benson 1989) are the most famous IT portfolio methods used for building cases for ICT projects. Risk

analysis, the possible outcomes, and the list of expected benefits are some of criteria on which the pre-analysis is based. On the other hand, researchers have proposed different methods based purely on financial analysis. Net present value (NPV 2016)and Cost-Benefit Analysis (CBA 2016) are the methods used in pre-analysis to predict possible financial return from an ICT project. Based on the findings of the literature review, the following processes has been identified and can be used for pre-assessment in phase1:

6   b) Phase 2 -ICT Project Implementation

In this phase, the organization needs to finalize the different aspects, such as project implementation and use factors. At this stage, ICT decision makers discuss the current nature of the problem to justify the purpose and implementation of the ICT project. The ICT project's objectives need to be identified properly in this phase. The list of objectives defined at this stage will further help to measure the impact of the ICT project on the organization according to the directions given in Phase 3of the framework. The implementation process is critical; implementation of ICT resources in a justified place, proper utilization of ICT resources, ICT adoption and use are the main issues that must be investigated in this phase. The ICT project manager and his team are key players during the implementation phase. They strive to understand the user's requirements, to face the praise or criticism from stakeholders and, finally, to address every challenge adequately. Moreover, change management is a classical problem that the project manager must address smartly. The following are the some of the major factors that need to be considered during implementation phase, as discussed in different ICT project-implementation methodologies:

Determine the project objectives and the output variable to compute after implementation(Parker and Benson 1989);

7   Beneficiary and stakeholder analysis(IDA-VOI 2003): Benefits structuring (IDA-VOI 2003):

Strategy? Value ? Architecture ? Delivery questions(VAL-IT 2009) c) Phase 3 -Post-Assessment

The final phase of the proposed framework is the ICT project's post-implementation assessment based on multiple perspectives. Several organizations have developed methodologies for measuring the postimplementation impact of ICT projects. Researchers have categorized the post-assessment approaches into two categories: financial and non-financial. Traditionally, financial return, which is also known as Return on Investment (ROI) (ROI 2016), is the most common approach that an ICT decision maker uses for measuring the financial return from any investment. Robert Enterprise enhanced the idea of ROI with Social ROI (SROI) (SROI 2001). The SROI approach was designed to measure the environmental, social and public economic impacts of a project on the organization, in addition to the financial returns. The idea of measuring Value on Investment (VOI) presented by Gartner (Harris, Grey, and Roz well 2001) was a step to change the measurement criteria from financial to nonfinancial. VOI is the approach used for assessing the non-financial impact of any investment on the organization. Furthermore, different factors have been proposed for measuring the non-financial impact of an ICT project on the organizational business values. "Strategic," "Informational" and "IT Infrastructure" are the factors that were used in the context of a Brazilian firm to build a framework for the measurement of an ICT project's impact on business values (Maçada and Beltrame 2012). Shang and Seddon (Shang and Seddon 2002) presented the framework that can help to measure the benefits created by enterprise systems in Australian firms using "Operational." "Organizational," "Managerial" and "Transactional" factors. In addition, "Transformational" factors were proposed by (Gregor et al. 2006) to assess the values achieved by an organization after the implementation of an ICT project.

Several other researchers have proposed postimplementation assessment frameworks and discussed the issue of ICT projects (Gregor et al. 2006 The above discussion of the proposed framework highlights the importance of using different methodologies for the implementation and measurement of an ICT project. The research gap highlighted in this study is that the pre-and postimplementation evaluations of ICT investment are still subject to ongoing debate. Some frameworks cannot handle important intangible factors, while some only measure financial returns. The integrated approach used in this framework can help the organization measure the ICT project from financial and non-financial perspectives using pre-and post-implementation assessment phases.

The aim of this study was to investigate several points related to ICT project implementation and assessment. Determining an ICT project's influence on organizational performance is important, as this will help firms better evaluate their ICT projects and large investments. This paper incorporates previous research to create the basic framework and highlight the implications of the findings and deliverables of this study. Using this framework, a researcher can determine whether an organization is making ICT investments to achieve their business objectives in effective ways. ICT resources can help the organization to achieve their business objectives. Consequently, the results of any ICT investment/project can be predicted during preassessment and actual returns can be evaluated during the post-implementation phase based on the project's objectives. Therefore, the analysis conducted based on previous work helped to determine the specific processes and methods to use during the preassessment, project-implementation and postassessment phases, as discussed in the proposed framework. This proposed work will allow the organization to easily measure the results of an implemented ICT project if its objectives have been
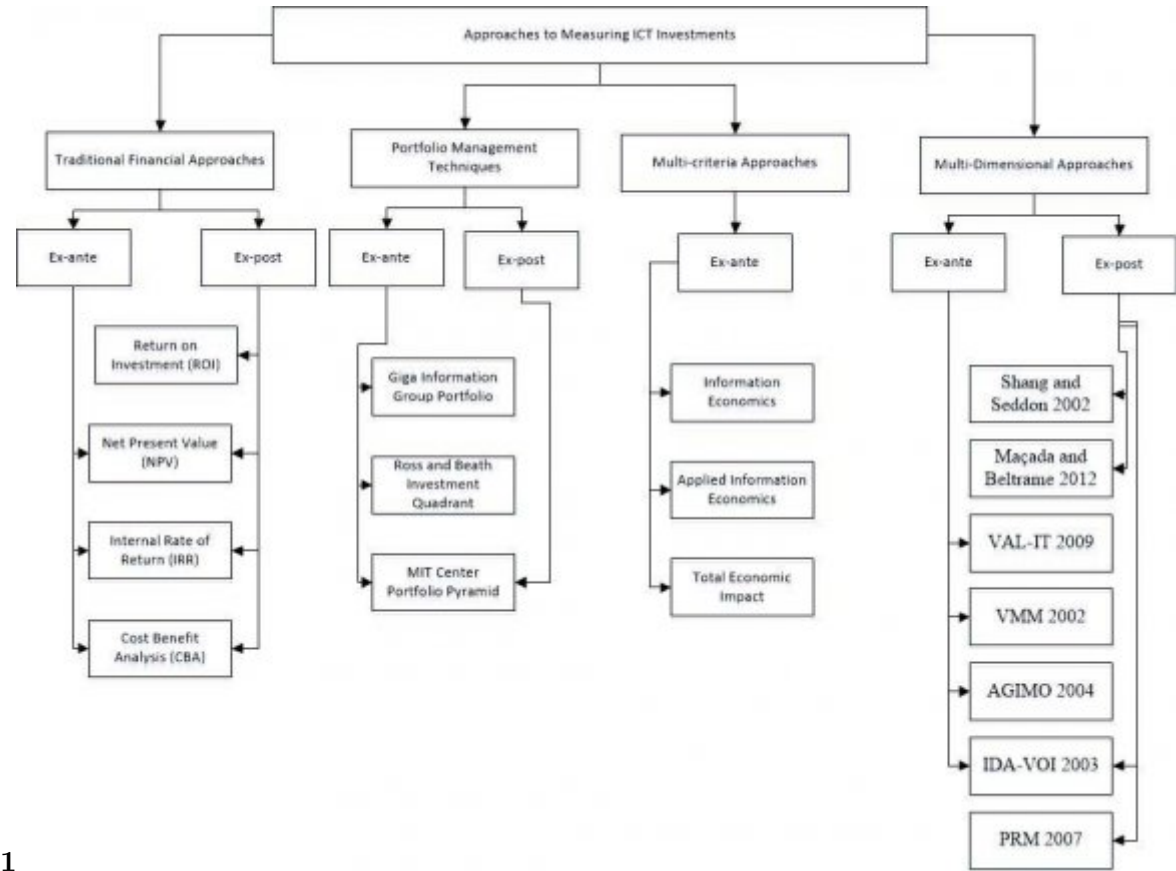
7 BENEFICIARY AND STAKEHOLDER ANALYSIS(IDA-VOI 2003): BENEFITS STRUCTURING (IDA-VOI 2003):

160   identified correctly during the pre-assessment period. The implementation of the framework in an organization is proposed as future work to demonstrate the applicability of the method discussed in this study. [1] [2]

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Figure 1: Figure 1 :

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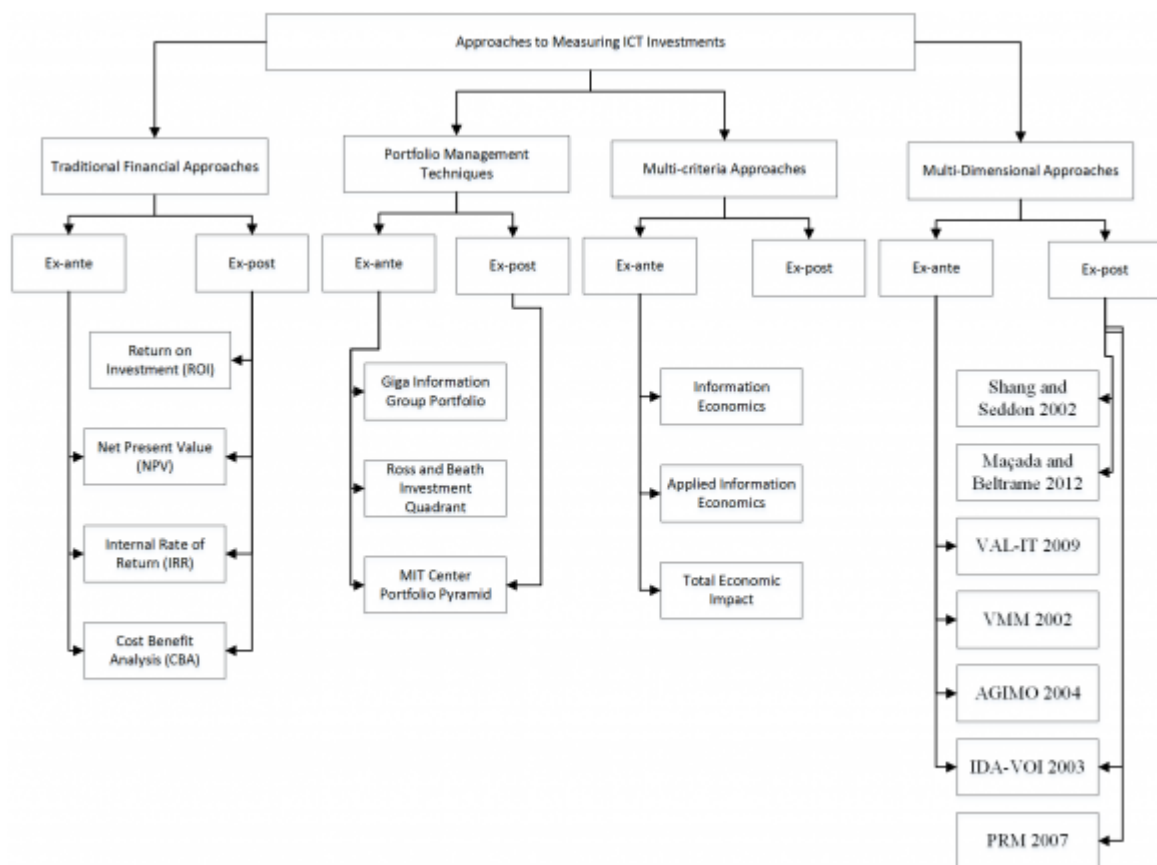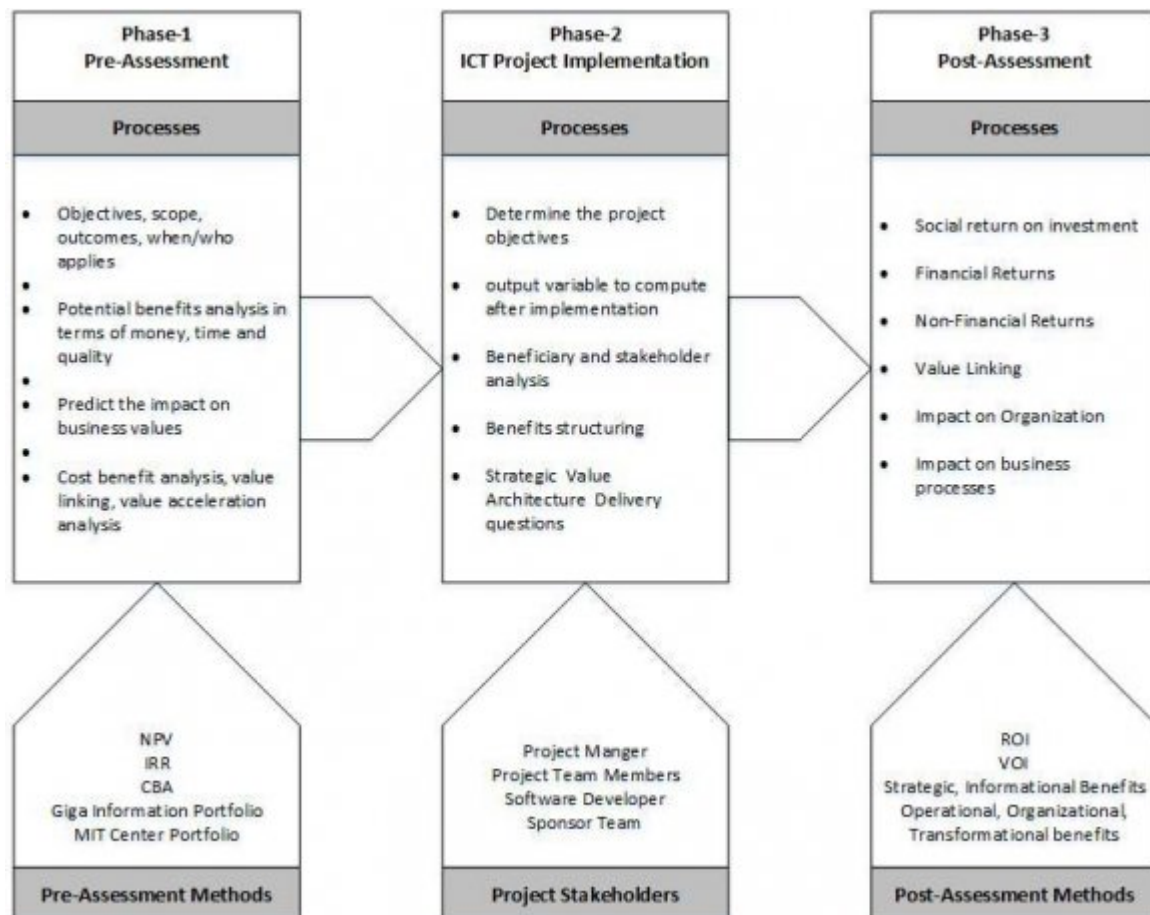
Figure 2:

Figure 3:

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