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Project management information systems: An empirical study of their impact on project managers and project success

Louis Raymond [a,*], François Bergeron [b]

[a] *Université du Québec à Trois-Rivières, P.O. Box 500, Trois-Rivières QC, Canada G9A 5H7*
[b] *Université Laval, Québec, QC, Canada G1K 7P4*

Abstract

Project management information systems (PMIS) usually acquired by organizations as software packages are meant to provide managers with the decision-making support needed in planning, organizing, and controlling projects. However, the actual contribution of PMIS to project success or performance is still unknown. The purpose of this study is to empirically assess the quality of the PMIS presently used in organizations and to examine their impact on project managers and project performance, based on a PMIS success model. This model is composed of five constructs: the quality of the PMIS, the quality of the PMIS information output, the use of the PMIS, the individual impacts of the PMIS and the impacts of the PMIS on project success. Analysis of questionnaire data obtained from 39 project managers confirms the significant contribution of PMIS to successful project management. Improvements in effectiveness and efficiency in managerial tasks were observed here in terms of better project planning, scheduling, monitoring, and control. Improvements were also observed in terms of timelier decision-making. Advantages obtained from PMIS use are not limited to individual performance but also include project performance. These systems were found to have direct impacts on project success, as they contribute to improving budget control and meeting project deadlines as well as fulfilling technical specifications.

1. Introduction

Globalization and the internationalization of markets have increased competitive pressures on business enterprises. This has led companies to engage in projects that are critical to their performance, if not their survival. These projects, common in industries such as engineering services, information technology, construction, and pharmaceutical have one thing in common: they need to be managed, that is, they need to be planned, staffed, organized, monitored, controlled, and evaluated [1]. In order to succeed, companies must deliver projects on time and within budget, and meet specifications while managing pro-

ject risk. While large amounts of time and resources are dedicated to selecting and designing projects, it remains of paramount importance that projects be adequately managed in organizations if they are to achieve their performance objectives. In this regard, what are we to think of the management of the Athens Olympic Games, first estimated at a cost of 3 billion €, that finally ended costing 12 billion € [2]? Of the Canadian Arms Registry, an information system first estimated at "no more than 2 million dollars a year" in 1995, that finally cost close to one billion $ (CAN) 10 years later [3]? Or of the 275% cost overrun in Boston's Big Dig (Central Artery/Tunnel Project), totaling 11 billion $ (US) as of 2006 [4]? Thus, "project management remains a highly problematical endeavour" [5].

In the information technology (IT) industry, Gartner Research estimates that 75% of large IT projects managed with the support of a *project management information*

* Corresponding author.
  E-mail addresses: louis.raymond@uqtr.ca (L. Raymond), francois.bergeron@fsa.ulaval.ca (F. Bergeron).

system (PMIS) will succeed, while 75% of projects without such support will fail [6]. Using PMIS to manage projects, while not sufficient to insure project success, has thus become a necessity. Project management, which has long been considered an important characteristic of successful companies [7], is more than ever necessary to efficiently and effectively manage these projects and to support project managers in their decision-making. As powerful project management software has been developed and diffused in all types of organizations, be they large or small, private or public, they are meant to make a significant contribution to project management.

Similar to other information systems (IS), a successful PMIS should have individual impacts in terms of satisfied users and effective use. But a successful PMIS should also have organizational impacts, that is, impacts on project success in terms of respecting budget, schedule, and specifications. While PMIS are increasingly used by project managers in all types of industry, not much is known on the characteristics of these systems that contribute to project success. Thus the purpose of this study is first, to empirically assess the quality of the PMIS presently used in organizations and second, to examine their impact on project managers and project performance.

2. Research background and model

In the project management literature, IT-based information systems were deemed early on to be essential to project managers in support of their planning, organizing, control, reporting, and decision-making tasks. As defined by Cleland and King [8], the basic function of a PMIS was to provide managers with "essential information on the cost-time performance parameters of a project and on the interrelationship of these parameters". The nature and role of a PMIS within a project management system, as presented in Fig. 1, have been characterized as fundamentally "sub-servient to the attainment of project goals and the implementation of project strategies" [9].

Notwithstanding the theoretical and practical importance of PMIS to the project management field, there have been as of yet few studies on the actual use and impacts of these systems, thus highlighting the need to extend project management theory in relation to the developing practice in this regard [10]. Empirical studies of PMIS have been mostly limited to describing the demographics of project management software usage [1] and to evaluating specific applications of these systems or software modules to support project management tasks such as planning [11], communicating and reporting [12], managing risks [13], scheduling [14], estimating costs [15], and managing documents [16]. Project management software usage has also been found to have many drawbacks and limitations, both in theory when compared to an ideal PMIS by researchers [17] and in practice as perceived by project managers [5].

An IS-based conceptualisation and definition of project management software facilitates the import of knowledge from the IS field or discipline, knowledge that can provide a deeper understanding of the PMIS usage phenomenon and help in answering questions on the factors that explain the use and non use of PMIS, and on the actual impacts of these systems on project managers and project performance. This study will thus be founded on the recurrent constructs of antecedents and consequences of IS use developed in DeLone and McLean's [18] IS success model (ISSM), later updated [19], and in Davis et al.'s [20] technology acceptance model (TAM). These models stand out by the continuance of their constructs, after a review of theories and models of IS use that focused on their chronological examination and their cross-influences and convergences. The ISSM incorporates information quality and system quality as antecedents of IS use, leading to individual IS impacts, that is, on users and their work (e.g., in regard to their effectiveness), and in turn to organizational impacts (e.g., in regard to business strategy and performance). While the TAM explains IS use in a similar manner by the system's perceived usefulness and perceived ease of use. Both the ISSM and the TAM offer widely accepted and validated representations and explanations of the IS use phenomenon [21–23].

Our objective is thus to improve our understanding of the impacts of PMIS on project managers and on project performance. More specifically, one intends to ascertain the success of these systems, i.e., their level of use by project managers, as determined by the quality of PMIS and of the information they provide. One will also ascertain to what extent PMIS contribute to the successful completion of projects through their individual and organizational impacts. Indeed, one aims to verify if the use of a PMIS is related to efficiency, productivity and effectiveness of a project manager, and to the performance of the project itself. Thus, the following research questions: What are the main determinants of the success of the PMIS currently used? Does the use of PMIS increase the efficiency, productivity
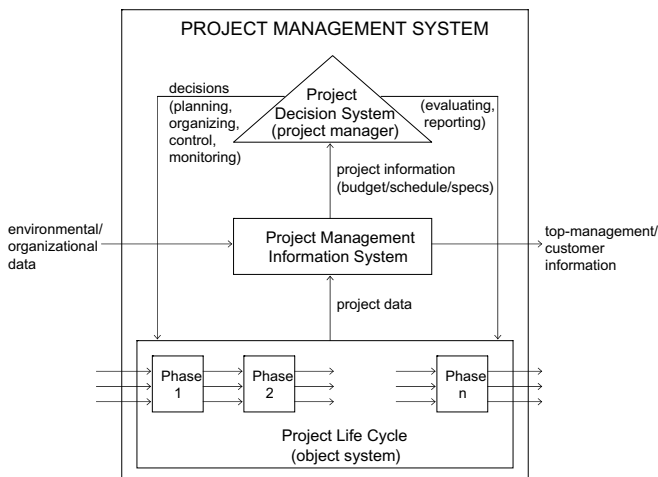

Fig. 1. The PMIS within the project management system (adapted from Raymond [9]).