International Journal of Decision Support System Technology
Volume 15 • Issue 2

A Go/No-Go Decision-Making Model Based on Risk and Multi-Criteria Techniques for Project Selection

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ABSTRACT

The realization of infrastructures and the deployment of processes can follow project formalism. Generally, a project goes through a design and a realization phase. Between these two phases, there is a crucial milestone: Launching the project. Making this decision is not easy at all, and constitutes a real problem-- the main reasons to this are the numerous numbers of criteria (for technical, economic, social, environmental dimensions) and risks in the sense of feared events. Criteria and risks are most of the time not considered due to lack of time (for formalization) and the difficulty to handle them. The objective of this paper is to propose a relevant approach to make the decision of launching the project or not. The proposal outlined is innovative in that it can consider indicators based on several appropriate criteria, the associated risks, and their ways of management. The fact of considering several criteria and risks increases the probability of making the good decision.

KEYWORDS

Criteria, Decision, Multicriteria, Project, Risk, Scenario

INTRODUCTION

Nowadays, the building of most infrastructures and the deployment of most processes take the form of a project. After the design phase, the main issue is to decide whether the project can be launched or not. During this phase, the decision is either to launch the project in its actual configuration, abandon it or redefine it. According to (STANDISH GROUP, 2013)) 90% of all major projects (of more than 1 million euro) fail due to bad decision-making. Making the good decision is thus the key element for the project's success (Balachandra, 1984), (Baccarini, 1999), (Asrilhant et al., 2004). To make

DOI: 10.4018/IJDSST.315641 *Corresponding Author

these decisions, stakeholders need a decision process, with metrics that indicate the likelihood of the project's success (Shenhar et al., 2001). Thus, a project is likely to succeed if its assessed metrics are pertinent to the context and if they suit the project objectives.

The aim of this paper is to help stakeholders at the project launch phase, by proposing an approach based on a decision process and metrics on which they can rely. So that, they can decide whether the project is qualified to be launched or not. There are few studies in the literature addressing this particular issue – which is also called the "go/ no go" question (Balachandra, 1984), (Han Seung H. & Diekmann James E., 2001), (Tang, 2019), (Vergara-Martínez et al., 2020). Most authors are more interested in the bid/no bid question (Gallagher et al., 1995), (Eldukair, 1990). (Balachandra, 1984) is interested in the decision to continue instead of that to launch. There is, however, a real need to consider this problem of go/ no go for the project launch. This decision is very often based on limited criteria – mainly the cost and the duration (Rose, 2005), (Collins & Baccarini, 2004), (Hughes et al., 2004), (Belout & Gauvreau, 2004). This method can no longer be recommended, because customers are becoming increasingly demanding. Otherwise, cost and duration alone are insufficient as criteria to characterize the project success likelihood. Other criteria that consider dimensions such as technical, environmental, social, and regulatory requirements must be integrated in the assessment. Generally speaking, ignoring these dimensions widens the gap between what was planned and what was achieved and leads to the project failure. Another reason for project failure is the occurrence of non-identified and unpredicted events (risks). Thus, to make correct decisions in the launch phase, there are two main difficulties: (a) the need to integrate several criteria (Costantino et al., 2015) and (b) the consideration of risk (Dutra et al., n.d.), (Wei et al., 2016). This position is also that of (Balachandra, 1984) that states that risk and uncertainty make decision making extremely complex. Authors such as (Zhang, 2016), (Cserháti & Szabó, 2014) and (Yim et al., 2015) have addressed some aspect of these problems, but not all of them. For instance, (Zhang, 2016) focused only on risk while (Cserháti & Szabó, 2014) focused on criteria and (Yim et al., 2015) analysed only the project indicators. (Mirza et al., 2013) and (P. Zhang et al., 2016) proposed a decision framework without investigating risks. (Tang, 2019) proposes a Bayesian Probability to assess the Probability of Success for Go/No-Go Decision Making. (Isihara et al., 2020) a methodology to rank of all possible Alternatives by using the PAPRIKA method.

The major drawbacks of these proposals are the lack of (1) a generic framework that can consider several types of criteria, and several risks, and (2) an aggregation model to characterize the project from the characteristics of its tasks. A multi-objective programming approach proposed by (P. Zhang et al., 2016) does not provide guarantees for the existence of the criteria, unlike our proposal which is based on aggregation functions. Finally, the evaluation of the project in a context of risk, investigated by (Fang & Marle, 2012), (Marle et al., 2013), (Mustafa & Al-Bahar, 1991) does not consider risks at the task level, as our proposal does. There is thus a real scientific need to find a framework that provides an indicator that includes several risks and criteria for the project launch issue. We make the hypothesis that the use of more and better-adapted criteria and risks may lead to an improved decision-making.

The innovation in this paper, in comparison to the shortcomings in the literature, lies in providing (a) a method for considering several criteria, risks and their treatment strategies, (b) an aggregation of these criteria from low level (on the task) to the level of the whole project, (c) indicators that include a wide range of appropriate criteria that are complementary to the cost and duration factors, (d) relevant indicators that make it possible to determine whether the project can be launched or not. Thus, it becomes possible for the stakeholders to make the right decision. This, in turn, leads to a reduction in the failure rate, saving time and money.

This paper begins with a literature review of project success analysis methodologies in risk situations. Next our proposal is presented. This consists of a description of the analytical process and a conceptual model. The latter describes the main concepts. Then the methodology to assess the risk impact on identified criteria is described, along with the aggregation procedures. Finally, some