

# **Understanding project evaluation – a review and reconceptualization**

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# Understanding project evaluation – a review and reconceptualization

**Purpose** – this study aims to understand the underlying logics applied by different project evaluation approaches and to propose an alternative research agenda.

**Design/methodology/approach** – this paper explores the project evaluation literature via conducting a qualitative research applying systematic literature review and thematic analysis.

**Findings** – the project evaluation literature has mainly concentrated on the objective aspects of project evaluation and overlooked the subjective aspects that reflect the temporal, dynamic, complex and subjective nature of today's projects. We propose a meta-framework that helps project practitioners to select an appropriate project evaluation criterion for their projects by considering the strengths and limitations of their preferred project evaluation model as well as making project evaluators aware of the underlying logics associated to diverse project evaluation approaches.

**Research limitations/implications** – this study suggests that new conceptual approaches to deal with some of the major challenges in the project evaluation field. Practice-based views, narrative analysis and Actor-Network Theory (ANT) are likely to be useful tools to better understand and cope with the projects' uncertainty and complexity.

**Practical implications** – the findings of this research assist project management practitioners and particularly project evaluators to enhance their understanding of the subjectivity, complexity and dynamics of current projects. To increase the reflexivity and resilience of project evaluation practice, this study also proposes new directions to apply different criteria, sub-criteria and indicators to the evaluation practice.

**Originality/value** – the originality of this study relies on transcending the conventional objective and rational approaches prevailing in current project evaluation practices. It proposes a research agenda that pave the way to address the shortcomings of conventional project evaluation practice.

**Keywords:** project evaluation, framework, epistemology, literature review, evaluation criteria.

**Article Type:** Literature Review

## Introduction

Project evaluation is a multi-layered affair. Because projects vary in size, industrial sector, availability of resources and specific goals, they must be adapted to the uniqueness of its context, especially with changes occurring over time. Additionally, project evaluation also plays diverse roles. Project evaluation can be useful to demonstrate project transparency, accountability and allows for project lessons learned to be shared, constructing knowledge and expertise (Arrow et al., 2003; Andersen et al., 2002) that can be incorporated into policy and practice (Rolstadås et al., 2014; Sato & Chagas, 2014). Project evaluation can also provide a solid foundation for examining our prior assumptions and constraints to review whether they are still reliable (Davis, 2014; Hanisch & Wald, 2014). But the ‘official narrative’ of project evaluation can also be used to confer either status or stigma, legitimize particular behaviours or courses of action, justify large or risky projects, or distance the future from the past (McLeod et al., 2012; Snowden & Boone, 2007).

As a result of this multiplicity of project situations and diversity of roles project evaluation can play, there is a constellation of ways of evaluating projects. This brings a set of **issues** regarding how projects are really evaluated. There is a lack of consensus in the literature regarding how to evaluate projects (Anzoise & Sardo, 2016; Turner & Zolin, 2012); the project evaluation field is fractioned with multiple approaches attempting to show diverse angles of the phenomena to different audiences; most project evaluation approaches consider only time, cost and quality - called the golden triangle in project management (Anzoise & Sardo, 2016) and neglecting ‘soft’ criteria such as long term goals and impact on society and the environment (for exemptions see Ngacho & Das, 2014; Ika et al., 2012). The latter means the project evaluation literature has mainly concentrated on the more objective aspects of project evaluation and overlooked the subjective aspects that reflect the temporal, dynamic, complex and subjective nature of today’s projects.

Notably, our investigation shows the project evaluation literature is **bias** towards the application of **objective/tangible criteria** to evaluate projects. That is, while project evaluation criteria based on objective measures is widely used and uncontroversial, evaluation criteria looking at more subjective indicators is less commonly applied and still controversial. Several authors have expressed concern of the predominance of objectivist project management approaches (e.g. Ika, 2009; Söderlund, 2004). Because of the increasing complexity of projects due to uncertainty, ambiguity and known and unknown risks (Whitty & Maylor, 2009), new perspectives that account for both objective and subjective aspects of the project evaluation phenomena are needed (Hanisch

& Wald, 2014; Turner et al., 2009) since evaluation is, partly, based on informed judgment. Cicmil and Hodgson (2006) for example, called for the development of new conceptual project management trajectories that look at project management as non-neutral socially constructed phenomena constituted by interactions among people objects materials unexpected events, all permeated power relations (Linde and Linderoth, 2006).

In this article we develop a meta-framework that helps to grasp the underlying strengths and weaknesses of diverse project evaluation approaches. Based on this examination, we propose a novel research agenda that can help to address some of the shortcomings pinpointed in our analysis.

We argue for the unfeasibility of a general framework for project evaluation. Instead, we contend for an adaptive approach, that considers simultaneously objective and subjective criteria as well as timing. That is, project evaluation needs to be customized. Every single project needs to be treated differently and appropriately based on ongoing conversation between different stakeholders involved with the evaluation process and how they make sense of project's outcome and results, which can be different in different times.

Our investigation reveals the project evaluation literature has overlooked the necessity to view project evaluation as a socially constructed endeavour, in which evaluators and those who are evaluated interact with each other in an ongoing basis to make sense the evaluation process and its outcomes. Specifically, we propose an adaptive meta-framework that can be used to gauge and fine-tune the evaluation criteria selected for specific projects. In this sense, the proposed meta-framework functions as a sorting device that can help project practitioners to recognise the strengths and weaknesses of their preferred project evaluation approach.

The proposed framework can be useful for practitioners as it helps to uncover the degree of subjectivity embedded in used evaluation criteria and timing aspect associated to the specific situation and; select balanced criteria to account simultaneously for both objective and subjective dimensions of projects. This means that the framework also advances project evaluation theory since it goes beyond the development of ad-hoc criteria for specific projects and its association to the simplistic examination of success and failure by looking to the extent to which criteria has been achieved.

This article is structured as follows. In section 2 the methodology used in this study is described in detail. The results of the literature review and the proposed conceptual framework for

the evaluation of large projects are presented in section 3. Sections 4 and 5 discuss the results and provide conclusions and directions for future research, respectively.

### **Methodological Considerations**

In this study we conducted a systematic literature review to explore project evaluation constructs. To build categories that explain the wide diversity of project evaluation criteria and perspectives used in the literature, we applied a thematic analysis on 138 articles. Following an inductive qualitative process, the authors independently selected criteria and classified in groups. Then, both authors jointly agreed on a final classification of project evaluation criteria. These methodological processes avoided bias and minimized chances of using pre-existing frameworks to interpret current project evaluation practices (Krippendorff, 2004).

This paper focuses on articles published in major project management journals. The literature search was performed using a number of keywords from the relevant project evaluation labels and definitions to obtain relevant samples of research. The search terms were then inserted into nine search engines. This first step identified 957 research papers. By improving the search analysis process and criteria, the number of findings was reduced systematically, as demonstrated in Figure 1. The relevant research background selection process relied on reading and understanding the literature including the research title, abstract, introduction and conclusion, together with a set of selection criteria. These selection criteria are listed as follows:

- The paper's topic obviously represents the project management context.
- The paper used a minimum one keyword.
- The paper focused on the evaluation concept in project environments.

The second phase involved an investigation of the reference lists of the refined articles (see Figure 1), as some of the most important works in the project evaluation field (which had to be included in the review because of the significance of the contributions) had appeared either in books or as articles. The 19 works added by this strategy were included in the sample (see Figure 1). In the end, a total of 72 papers were included in the literature review.

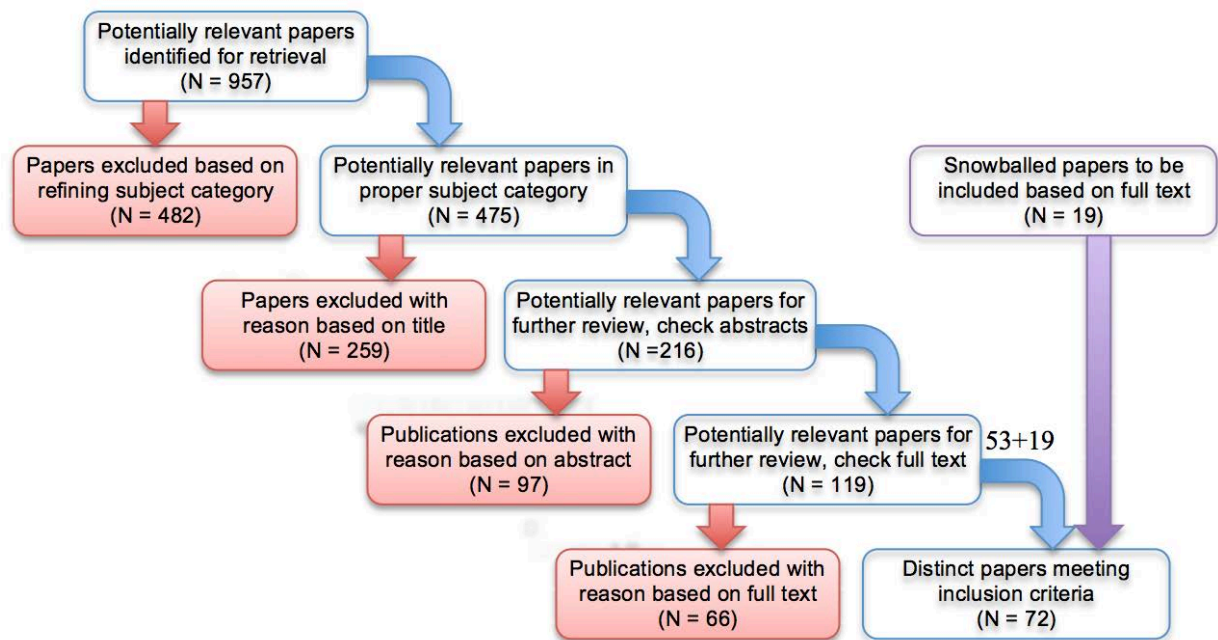


Figure 1: Flow diagram of literature selection process; adapted from Bakker (2010, p. 470)

In phase three, the 72 selected papers were organized using Zotero software for referencing and citation purposes, including managing notes, memos, and structuring them into identified themes. The initial analysis of the relevant literature revealed that the majority (54%) of the selected publications had been published in two project management journals: *International Journal of Project Management* (IJPM), and *Project Management Journal* (PMJ) (see Table 1 for list of all journals included). In phase four, the selected papers were critically analyzed to identify the research gaps, which lead to the development of the research questions in relation to the evaluation frameworks and the criteria of the projects. To map project evaluation criteria resulting from the systematic literature review, we developed a conceptual framework that is presented next.

[Table 1 – The journals used in the literature review]

### Mapping the Project Evaluation Literature – Types of evaluation criteria and Timing

In order to reframe the project evaluation literature, we developed a conceptual framework composed of two dimensions. The first dimension focuses on the type of project evaluation criteria used. Specifically, we looked at the extent to which project evaluation criteria used adheres to objectivist or to subjectivist world views. Objectivist views follow system-structural, functionalist and instrumental assumptions that fit the principles of positivist epistemology (Burrell & Morgan, 2019; Huber & Daft, 1987). That is, embedded in these criteria are the belief that project management events and situations are concrete; they can be examined and quantified through

rational means (e.g. indicators, benchmarks). The prevailing assumption in the project evaluation practice is that there are crystal clear principles to evaluate projects and that people act rationally 24/7. Thus, objective project evaluation criteria are suitable to evaluate projects that unfold in stable environments and have clear, goals, established processes and tangible outcomes.

Conversely, subjective views follow interpretive assumptions (Burrell and Morgan, 1979; Spender & Grant, 1996; Weick et al., 2005). That is, embedded in criteria is the assumption that the social world is continuously build transformed and reproduced via social interactions. As a result, situations are ambiguous and open to divergent meanings. Then the focus is on the meanings of the project evaluation criteria. In this perspective, project evaluation is mostly subjective and relational. That is, project evaluation outcomes depend on the intentions, world views and interests of evaluators, evaluands as well as on the expectations and degree of interests of a variety of stakeholders. This means that individual judgment, context, social temporality and dynamics of the evaluation team have a considerable effect on the evaluation outcome (Cicmil et al., 2006; Haass, 2018). It follows that subjective lenses are appropriate to explain the project evaluation in situations in which project goals, processes and outcomes are dynamic—i.e. change over the project and product life cycle.

The second dimension considers time, as it is a crucial aspect in any human endeavor (Ancona et al., 2001; Crossan et al., 2005). Project outcomes and associated criteria are relevant over the timeframe of a project; once a product or service is delivered, product outcomes and the criteria become increasingly relevant as the product or service is used (or not) within its operational environment. In project evaluation there are two main approaches to understand time (Koskinen, 2013; McLeod et al., 2012). Firstly, quantitative or clock time approaches time from an objectivist perspective. Accordingly, time is unfolding linearly and it is objective since exists independently of events and objects. Consequently, it can be measured, and it is valued as a commodity. Secondly, qualitative or social time is subjective, socially constructed and exposed to multiple interpretations.

Thus, type of evaluation criteria and timing help to explain the underlying logics and roles played by diverse project evaluation approaches. While objectivist assumptions and clock time look for reducing project evaluation uncertainty and finding an ‘objective’ truth that is ‘out there’; subjective assumptions and social time recognizes the unavoidable ambiguity associated to the fragmented political and messy world of project management situations and; the need to make-sense diverse project evaluation processes through the development of new language, new categories as well as identities and behaviors (Palmer & Hardy, 1999; Weick et al., 2005)

## Reinterpreting the project evaluation literature

Based on a thematic analysis of the systematic literature review, we identified a wide range of project evaluation criteria. To make sense of this wide range of evaluation criteria used, we grouped and mapped criteria used by the literature in the proposed two-dimensional framework—project evaluation types and timing. Figure 2 provides a landscape view of the distribution of project evaluation criteria along these two dimensions.

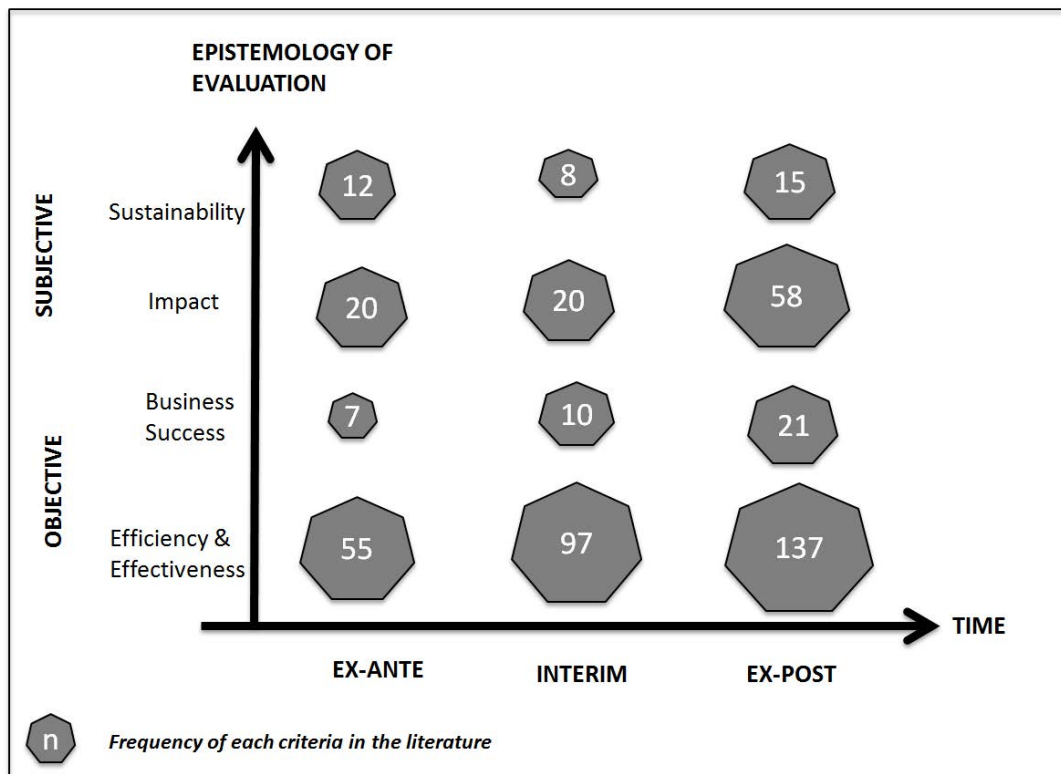


Figure 2: Reframing Project evaluation criteria

**Project evaluation criteria.** From the systematic literature review of project evaluation criteria, four categories emerged: effectiveness and efficiency, business success, impact, sustainability. A closer examination of these categories shows that diverse criteria are associated to different types of criteria.

*Project efficiency and effectiveness.* While we have grouped these criteria for the sake of simplicity, they are different. *Project efficiency* is a measure of how economic resources are converted to the desired results (Ngacho & Das, 2014; Xu & Yeh, 2014; Dvir et al., 2006) and indicates whether or not the project met its schedule, budget and quality metrics. Tangible indicators are used to measure project efficiency. Project efficiency albeit, is limited criteria as there are other factors that contribute to the overall outcome of the project (Serrador and Turner, 2015). *Project effectiveness* is the extent to which the project's objectives, set out in the project plan, were



achieved (Hanisch & Wald, 2014; Rolstadås et al., 2014; McLeod et al., 2012). It also seeks to determine the factors that influence the achievement or non-achievement of the objectives of the projects (Davis, 2014; Mir & Pinnington, 2014). The most commonly used indicator in the literature for measuring project effectiveness is ‘how well the project’s product satisfies users’ need’ (Ika et al., 2012). These two criteria also proposed by OECD<sup>1</sup> to evaluate international development programs (Chianca, 2008). Then, project efficiency and effectiveness criteria focus on measuring objective outcomes and processes.

There are two project evaluation approaches that rely on efficiency and effectiveness criteria—tactical (or operational) evaluation (Im et al., 2015) and goal-oriented evaluation (Marsh, 1978). **Tactical** (or operational) **evaluation** focusses on measurement of objective operational factors and/or outcomes of the project or program. Criteria for evaluating operational indicators are the most well developed and applied by practitioners (see Figure 2) and, can be applied ex-ante, interim or ex-post (Eder et al., 2006). In **goal-oriented evaluation**, like in tactical evaluation, the specification and measurement of project’s goals is the central aspect of evaluation (Marsh, 1978). It is based on LFA (Logical Framework Approach) that in turns is grounded on the principles of planning and control. That it, embedded within this model there are assumptions about clear cause and effect relationships; linearity of events; and the pre-determination of the project’s goals processes and outputs. Thus, it is possible to say that both tactical and goal-oriented evaluation approaches fall within the objectivist approach of project evaluation (see figure 2).

Objectivist approaches of project evaluation are suitable for projects which perform in stable contexts/situations with stable goals, inputs, processes, stakeholders, resources available and outputs (e.g. Crawford & Bryce, 2003). Their objective character, nevertheless, brings some shortcomings. (i) To be measurable, factors/outcomes to be measured need to be narrowly defined. This is problematic because project outcomes are the result of combinations of multiple variables. (ii) Operational criteria are unable to consider aspects of the project which are difficult to measure or aspects which there is no available hard data. (iii) Tactical and goal-oriented approaches overlook subjective aspects that affect both the evaluation process and evaluation outcomes. (iv) Dependency on project objectives. This is a concern since project objectives can be as diverse as its stakeholders (Baccarini, 1999). In short, objectivist PE approaches do not seem to address projects in which nonlinear relations emerge; no strong connections between effects and causes could be made; goals/outputs keep changing along the project and; there is no agreement among key stakeholders on the project’s goals and objectives (Cicmil et al., 2006).

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<sup>1</sup> Organisation for Economic Co-operation and Development

*Business success* is concerned with the wider organisation (the firm, consortium, government), sponsoring the project, and its long-term viability (Ika et al., 2012; Müller & Turner, 2007; Shenhar and Dvir, 2007). This criterion considers the accomplishment of strategic objectives and benefits, as well as the impacts on markets and competitors, business development or expansion, and the ability to react to future opportunities or challenges (Mir & Pinnington, 2014; McLeod et al., 2012; Shao et al., 2012). It also encompasses project team gains—learning, motivation and lessons learnt (Davis, 2014; Maylor et al., 2006). We consider this criterion at medium level of subjectivity as (i) it usually uses a mix of both tangible and intangible data and (ii) stakeholders are likely to agree on the financial bottom line as definition of business success. While interim and ex-post financial benefits can be measured by objective data such as costs and income, it is hard to quantify ex-ante and interim strategic benefits since they might be either long-term or unknown at the time of project development. Conversely, the strategic benefits can be accurately measured, but in the long term (ex-post) only.

*Project impact* refers to the direct or indirect, primary and secondary long-term effects produced by a project, intentionally or unintentionally (Ika et al., 2012). This criterion assesses whether the outcomes achieved address the needs, problems, and issues of key stakeholders including project investors, project sponsors, contractors, customers and project team (Ngacho & Das, 2014; Ika et al., 2012; Shenhar and Dvir, 2007). That is, this criterion goes beyond the set project's goals. Because of this project impact criteria apply more subjective than objective criteria. For example, achievement of strategic goals of the organization or impact on the project team can hardly be quantitatively measurable and specific.

*Project sustainability* is related to the extent to which the project's outcome maximises inter-generational welfare and maintenance of the environment (Müller & Turner, 2007), rather than solely maintenance of the economy's productive base (Ngacho & Das, 2014; Ika et al. 2012). This criterion is also subjective as there are too many definitions of the concept of sustainability as stakeholders and, sustainability outcomes are usually long-term affairs. We have conceptualised sustainability as an independent criterion because, being indirect and long-term in nature, it is not covered under any of the other criteria (Ngacho & Das, 2014). The sustainability criterion is especially relevant in development projects, which deal with a range of social, economic, environmental, cultural, and political concerns, usually occurring during the project execution, and after the project completion (Ika et al. 2012, Tatikonda & Rosenthal, 2000). Table 2 summarizes the above criteria.

**Table 2: Project Evaluation Criteria; a synthesis from the literature**

**Timing of project evaluation** in the project life cycle. The examination of criteria used in the literature considering time lead us to categorise evaluation criteria used by the literature into three different scales including: ex-ante, interim and ex-post.

*‘Ex-ante’ evaluation* evaluates a project prior to its implementation. It is conducted by project investors or on their behalf, to ensure that the project is feasible and will provide returns on investment. Usually criterion in this category follows clock time logic. Ex-ante evaluation usually follows a combination of objective and subjective criteria. While it is based on past hard data (economic indicators, cost of labour), it also uses subjective views to justify taken-for-granted contextual assumptions embedded in objective criteria, such as the famous ‘ceteris paribus’ principle that orthodox economist apply and the view that the future is repetition of the past. Of course, the latter is hardly true since projects are unique (Makarova & Sokolova, 2014).

*Interim project evaluation* reflects the status and progress of the project against its plan. At this stage the actual data and information regarding project’s performance and its results are collected and analysed during its implementation. Like in the previous category, clock time is used here. This type of evaluation works well when focusing on criteria that deal with highly tangible outcomes that can be assessed through application of different project management techniques such as Earned Value Analysis.

*Ex-post evaluation* mostly focuses on the long-term outcomes of the project. Because it is a medium and/or long-term exercise, most ex-post evaluation criteria follow a social time perspective. A key characteristic to these criteria is its high level of subjectivity. There is neither agreed definition of criteria nor calculative device to measure it. For instance, the concept of sustainability is defined differently in diverse industrial sectors, by practitioners, academics and government organisations (Ngacho & Das, 2014; Turner & Zolin, 2012).

Differently, ex-post evaluation is based on factual results at the end of the project, but there is no definition on what to measure and how to measure. Further, it occurs under the umbrella of social time as the time to perform an ex-post evaluation is socially negotiated among key stakeholders. Timing of ex-post evaluation is customised and depends on stakeholders’ intentions, aims, and resources to influence the timing and terms of reference of ex-post evaluation (Muller et al., 2012; Muller and Turner, 2007; Hanisch & Wald, 2014).

In the case of ex-post evaluation of sustainability, for example, uses actual data from a concluded project to examine the project’s benefits (or harms) to the environment. While it relies less on assumptions to evaluate this criterion, still it can be considered subjective as the definition

of sustainability varies significantly from author to author; the scope of available data can also vary significantly from project to project and; uses social time since it is performed whenever main stakeholders agree. Important to note, earlier or latter timing of sustainability evaluation might affect evaluation outcomes since data at different timelines will picture diverse outcomes for diverse stakeholders (Turner & Zolin, 2012; Ngacho & Das, 2014).

Table 3 maps project evaluation criteria highlighting Timing of project evaluation.

*Table 3: Mapping the project evaluation criteria across two temporality and epistemology dimensions*

Returning to Table 3 and taking a landscape view, it is possible to observe that project evaluation practitioners have over emphasised their evaluation efforts in the efficiency & efficacy category before (ex-ante), during and after (ex-post) the project. This is hardly a surprise since objectivist criteria have been the landmark of project evaluation. The other aspect that needs to be highlighted is the little emphasis of evaluation efforts on subjective criteria, especially in the least tangible of groups: sustainability and impact across time—before, during and after project. This denotes that long-term evaluation of the project's impacts on society and the environment are overlooked by most projects, despite the increasing governmental and societal demands for considering environment impacts while managing projects (e.g. ISO 14000 in construction industry). The most important feature of the framework, however, is related to its utility for helping project evaluators and practitioners to select the appropriate project evaluation criteria for their projects.

Then, how can be interpreted the use of a wide range of project evaluation criteria by practitioners? Next, we elaborate on *why* projects are evaluated in some ways and not in another ones.

## **Discussion**

The examination of the criteria used to evaluate projects indicates that wide variety of criteria, following diverse world-view assumptions and focusing on particular timeframes, do exists. On one side, there seems to be agreement in the project evaluation literature regarding the use of objective criteria to evaluate project efficiency, efficacy and partly, impact. On the other side, there seems to be no agreement on how to evaluate subjective aspects, including what indicators to use, how and when. This issue is connected to the predominant world-view used to evaluate projects—positivistic. Shenhar et al. (2001), for example, proposed a conceptual project evaluation framework combining objective and subjective criteria and, considering short, medium and long-term impacts. Their framework links project outcomes with competitive advantage, and includes: efficiency; impact on customers; business success; and preparing for the future. While these approaches are multidimensional and constitute important advances in the project evaluation literature, still they neither explicitly consider nor address most of the challenges of evaluating subjective aspects on projects and, adopt a positivist bias.

This shows the fragmented character of the project evaluation field and, the unfeasibility of a unified framework that accounts most of the challenges of project evaluation processes. Instead, it is necessary to recognise the pluralistic voices emerging from project evaluation practice that continuously (re)construct meaning of diverse forms of evaluation. This means that evaluation is *per se* a reflexive practice that fosters and supports adaptive changes, as well as

learning through the continuous generation of feedback loops among the evaluator, the management team and, other stakeholders (Anzoise & Sardo, 2016; Todorović et al., 2015). Reflexivity is the “systematic exploration of the unthought categories of thought, which delimit the thinkable and predetermine the thought” (Lessard, 2007, p. 1760).

Within this line of thinking it is necessary to question the underlying uses of project evaluation approaches. While we have already pinpointed the important role played by the context in which a project performs, to determine suitable project evaluation approach to apply), still there is a need to understand *why* projects are evaluated in some ways and not in other ways.

In order to elaborate in this crucial point, we use Barbara Czarniawska’s (2014) observation regarding logic of statements made by practitioners when ‘organizing’ projects. Drawing from Czarniawska’s (2014), it is possible to suggest that projects are evaluated along three logics: The logic of theory, in which rational arguments are deployed to sustain, for example, the feasibility of a project (ex-ante). The logic of practice, in which the situation drives actions deployed. It is concrete (situated in time and space) and usually applies post-fact narrative for evaluating projects. The logic of representation, as the name suggests, aims at constructing an official representation of the outcomes of the project. It combines formal rationality (logic of theory) with concrete examples (logic of practice) in order to construct an image that presents projects outcomes in an acceptable way to the established institutional order—that is acceptable for key stakeholders. Narrative methodological strategy (Czarniawska, 2004) is likely to assist the project evaluation team to perceive project outcomes from different perspectives and to make-sense contradictory outcomes and interpretations that are likely to emerge over time. In short, the logic of representation “demands a kind of imitation of the logic of theory, legitimated by the claim that it originated in the logic of practice” (Czarniawska, 2014: 11).

Then, we can say that that projects performing in stable context situations are evaluated adhering to objectivist views (e.g. tactical and goal-oriented evaluation) and, follow a logic of theory to produce their arguments. Differently, projects performing in dynamic context situations are usually evaluated following subjectivist views (e.g. strategic and goal-free evaluation) and, follow either a logic of practice or a logic of representation to back their arguments.

In order to shed further light on the world of project evaluation, in the following paragraphs we highlight three aspects that help to understand the character and challenges of project evaluation practices. We also outline avenues to address some of those challenges.

(i). *The challenges of evaluating subjective aspects in projects.* Because pluralistic stakeholders are generally part of the evaluation process, different values, interests, needs, and expectations become relevant to particular stakeholders' interpretations, depending on context in which the project is situated. Institutional forces, organizational commitments, sectional interests, professional affiliations and individual agendas may influence an individual's evaluation of a project's outcome. In McLeod et al. (2012)'s words "any development of a shared understanding of the project outcome necessarily involves the communication and negotiation of individual and collective perceptions, expectations, and evaluations." (p. 71).

First, while project evaluation seems to be a relational and subjective affair, objective evaluation criteria are the most widely applied. This contradiction may help to explain the shortcomings of the analytical tools used to define success/failure of projects.

Second, a critical issue in project evaluation is the underlying objective versus subjective dichotomy embedded in conventional project evaluation criteria. This is not only controversial, but also unhelpful. The application of this dichotomy to evaluate projects means that evaluators play the role of describers of the world, looking for a single truth from the described world (Guba & Lincoln, 1989). To advance project evaluation theory it is necessary to reframe how do we think about the roles of project evaluation and acknowledge the taken-for-granted assumptions that underpin its operationalization. One way to overcome this issue is by shifting paradigm to evaluate projects. This requires the collapse of dichotomies and the embrace of a holistic view of the world, in which the world is simultaneously objective and subjective; the objective is understood through subjective lenses, and the subjective is in continuous evolution and (re)creation (Latour, 2012). We propose the need to use conceptual approaches that adhere to non-dichotomy world-views—practice-based and narrative approaches (more about this below).

Third, because pluralistic stakeholders *judge* project outcomes at different timeframes (Turner & Zolin, 2012), it is likely a wide range of interpretations of project's outcomes are likely to emerge. A critical issue in project evaluation therefore, is how project evaluators (and other stakeholders too) make judgements to understand and interpret phenomena associated to the project in different time frames. It has been suggested that evaluators do this by applying criteria to the project's outcomes; measuring products/results to obtain data; and by comparing criteria with obtained data/facts (Chang et al., 2013; Shenhar & Dvir, 2007; Turner & Zolin, 2012; Parfitt & Sanvido, 1993). Albeit, during application measurement and comparison, evaluators' judgement plays a crucial role. Then, an important avenue for further research is to look at how evaluators' judgement unfolds during the evaluation process. One avenue to advance on this issue is to apply Boltansky and Thevenov (2000)'s situated judgement scheme. They consider people, contexts,



objects, chances and, the individuals' position within arrangements of people and objects to examine what they called situated judgement.

Fourth, a remarkable feature of the project evaluation literature is the total absence of the consideration of nonhumans—objects, artifacts, raw materials and their materiality, conceptual devices and calculative devices among others. That is, while the conventional approach on project evaluation has focused on how do humans develop / drive / affect / impact the project evaluation process, there has been little research on how the materiality of nonhumans impact / drive / constrain / support project evaluation processes (for exceptions see Khan et al., 2013; Corn et al., 2012; Alderman & Ivory, 2011). Some open research questions in this respect include, How does the materiality of resources affects the processes and outcomes of the project?; How does the interaction of diverse resources with different materiality affects the outcome of the project?; How project evaluation tools can incorporate the role materiality of key project's resources plays in the project's outcomes? Addressing some of these questions involves the incorporation of to the project evaluation process (i) non-humans (objects, materials, equipment and conceptual objects) that influence both how evaluation is defined measured and interpreted; (ii) the role of the interactions and connections between a set of heterogeneous humans and nonhumans.

Practice-based approaches (Nicolini 2012; Gherardi, 2012; Cetina et al., 2005) can be useful as the analytical focus shifts from outcomes to how those outcomes were constructed by arrangements of people, objects and conceptual devices, through sayings, doings and performances. To this end, the application of Latour's (2005) Actor-network theory (ANT) would be useful to the project evaluation field. ANT considers how humans and nonhumans (objects, conceptual devices, artefacts) continuously interact to form networks that support specific social ordering process (i.e. particular outcomes of project evaluation) (Czarniawska, 2017).

Fifth, further research is also necessary to understand the role of uncertainty in project evaluation processes (Turner & Muller, 2006). To achieve this, stakeholders' expectations, subjectivity and temporality need to be recognised and considered during project evaluation processes (Weick & Sutcliffe, 2007), since managing projects encompasses managing stakeholders' expectations, and how to deal with their perceptions about project outcomes as well as the consideration of contingency (Loch, DeMeyer & Pich, 2011).

(ii). *Stakeholders engagement in project evaluation is necessary but problematic.* Stakeholder engagement throughout the evaluation process decreases potential challenges and issues and helps to improve project outcomes. Cooperation and collaboration between the project's key stakeholders and evaluation team is key for a comprehensive project evaluation (Khan et al., 2013; Corn et al., 2012; Molenaar et al., 2012). Albeit, it is naive to think that pluralistic stakeholders,

with diverse aims and agendas, will voluntarily collaborate with the examination of their work, especially if some stakeholders support the project and others are against it (Coupasson et al., 2012). While power and politics are aspects that permeate any human activity (Clegg, 2009; Fleming & Spices, 2014), with a handful of exceptions, the project evaluation literature overlooks the power dimension (Cicmil and Hodgson, 2006). Some key research question waiting for research include:

- What are the relations between project evaluation and diverse forms of power?
- How and why the structure of project evaluation triggers political activity?
- To what extent project evaluators need to deal with political issues?
- To what extent resistance affects the project evaluation process?

(iii). *Project evaluation timing.* Most of the examined literature focuses on ex-ante and short-term ex-post evaluation at the expense of long-term ex-post evaluation (Eduardo et al., 2014). This not only reflects a positivist world-view, but also eclipses the evaluation of major project outcomes in the long-term. The timing of the evaluation also affects stakeholders' interpretation of the impact of the project.

An evaluation process that includes ex-ante, interim and long term ex-post criteria is likely to provide comprehensive understanding of the development and outcomes of a project (Turner & Zolin, 2012) however, few project evaluation approaches consider project evaluation across diverse timelines. An exception is Turner et al. (2009), who developed a model of project evaluation that reflects an assessment by different stakeholders against the different levels of the project results (outputs, outcomes and impacts), over different time scales.

## Conclusion

In this study the project evaluation literature was reviewed and reframed considering two dimensions that permeate the wide range of criteria used to evaluate projects—the world-views associated to project evaluation criteria and, timing of criteria application. This enabled the examination of the logics underlying diverse project evaluation approaches as well as to highlight their strengths and challenges.

We categorised project evaluation criteria considering the degree of subjectivity of the criteria and its timing. Five groups were derived based on degree of subjectivity: efficiency, effectiveness, business success, impact and sustainability. The examination of evaluation criteria considering time, led us to note that project evaluation practices are used in three main timeframes: ex-ante, execution and ex-post evaluation.

This examination revealed that both project management theory and practice suffer from the lack of frameworks that considers the emerging and evolving temporality, dynamism, subjectivity and complexity of projects. Current project evaluation approaches are bias towards objectivist short-term evaluation of projects, overlooking long-term impacts of project on society and environment. The latter requires subjective lenses to describe and understand them.

Further, there are aspects of the evaluation process that have been overlooked by the literature. The role of non-human actors, such as machines, materials, conceptual tools and their interactions with humans, within the project environment is a significant gap in the current project evaluation literature. We suggested that new conceptual approaches to deal with some of the major challenges in the project evaluation field. Practice-based views, narrative analysis and ANT are likely to be useful tools to better understand and cope with the uncertainty and complexity of today's projects.

This study contributes to advance theory on project evaluation. We have highlighted the strengths and challenges of project evaluation. We concluded that current frameworks developed for project evaluation fail to address the increasing complexity, temporality, subjectivity and dynamism of today's project environments. Moreover, the value of this research is looking at the evaluation practice beyond dominant subjective-objective duality and interpreting this process through a social construction lens. This new approach helps researchers to better understand how really projects are being evaluated via ongoing sense-making and sense-giving processes between key actors particularly evaluators and those who are evaluated within this process.

Finally, it is important to return to the conspicuous question—why do projects fail? A fundamental previous question that needs to be addressed is to examine whether or not the conceptual tools used to evaluate projects are adequate for the complexity surrounding contemporary evaluation of projects. Then, it is necessary to learn how do we customise project evaluation tools to be aligned with the type of project we are evaluating? What are the implicit assumptions (logics) that underpin the project evaluation tool at hand? How do those taken-for-granted assumptions influence the outcomes of the evaluation process? Only after the development of more sophisticated concepts and tools to evaluate projects it will be possible to better understand why projects fail. This task is work in progress.

**Table 1 – The journals used in the literature review**

No.	Journal name	No. of articles	%
1	International Journal of Project Management (IJPM)	25	34%
2	Project Management Journal (PMJ)	15	20%
3	International Journal of Managing Projects in Business	3	5%
4	Evaluation and Program Planning	3	3%
5	Journal of Management in Engineering	3	3%
6	IEEE Transactions on Engineering Management	2	2%
7	Cost Engineering	1	1.5%
8	Harvard Business Review	1	1.5%
9	Other Journals with only one article in the list	34	30%
<b>Total</b>		<b>72</b>	<b>100%</b>

**Table 2: Project Evaluation Criteria; a synthesis from the literature**

Criteria	Sub-criteria	Authors
<b>Efficiency</b> - Time - Cost - Quality	Project achievements Product achievements Financial performance Project management performance	Sheffield & Lemétayer, 2012; Muller et al., 2012; Ika, 2009; Söderlund, 2004; Chan, 1996; Chua et al., 1999; Atkinson, 1999; Davis, 2014; Naoum, 1994; Brown & Adams, 2000; Cheung et al., 2000; Wang & Huang, 2006; Diallo & Thuillier, 2004; Mishra et al., 2011; Beringer et al., 2013; Milosevic & Patanakul, 2005; Andersen et al., 2002; Muller and Turner, 2007; Hanisch & Wald, 2014; Ngacho & Das, 2014; Wohlin & Andrews, 2001; Lim & Mohamed, 1999; Prakash & Nandhini, 2015; Maloney, 1990; Doloi et al., 2011; Freeman & Beale, 1992; Tayler, 1992; Parfitt & Sanvido, 1993; Riggs et al., 1992; Bushait & Almohawis, 1994; Kumaraswamy & Thorpe, 1995; Chan et al., 2002; Westerveld, 2003; Liu & Walker, 1998; Serrador & Pinto, 2015; Serrador & Turner, 2015; Chang et al., 2013; Mazur et al., 2014; McLeod et al., 2012; Ika et al., 2012; Bryde & Robinson, 2005; Mir & Pinnington, 2014; Habison, 1985; Dvir et al., 2003; Molenaar et al., 2013; Turner & Zolin, 2012; Cleland and Ireland, 2002; Pinto & Slevin, 1988; Baker et al., 1988; Pinto & Rouhiainen, 2001; Shenhar et al., 1997; Xu & Yeh, 2014; Polydoropoulou & Roumboutsos, 2009
<b>Effectiveness</b> How well the project's product satisfies users' need	Project achievements Product achievements Financial performance Project management performance	Muller et al., 2012; Muller and Turner, 2007; Hanisch & Wald, 2014; Tatikonda & Rosenthal, 2000; Alderman & Ivory, 2011; Mollaoglu-Korkmaz et al., 2011; Pisarski et al., 2011; Xu & Yeh, 2014; Al-Meshekeh & Langford, 1999; Ika et al., 2012; McLeod et al., 2012; Andersen et al., 2002; Turner et al., 2009; Serrador & Turner, 2015; Mazur et al., 2014; Dvir et al., 2003; Chang et al., 2013; Sheffield & Lemétayer, 2012; McLeod et al., 2012; Andersen et al., 2002; Khan et al., 2013; Ali et al., 2008;

Criteria	Sub-criteria	Authors
		Rolstadås et al., 2014; Chan, 1996; Parfitt & Sanvido, 1993; Chan et al., 2002; Khan et al., 2013; Ali et al., 2008; Polydoropoulou & Roumboutsos, 2009; Wohlin & Andrews, 2001; Toulemonde, et al., 1998; Freeman & Beale, 1992; Tayler, 1992; Riggs et al., 1992
<b>Business Success</b> - Increased market share -Increased parent company's profit	Financial benefits Strategic benefits	Turner & Zolin, 2012; Norris, 1990; Freeman & Beale, 1992; Tayler, 1992; Parfitt & Sanvido, 1993; Milosevic & Patanakul, 2005; Shenhar & Dvir, 2007; Chan et al., 2002; Milosevic & Patanakul, 2005; Jugdev & Muller, 2005; Shenhar et al., 1997; Dvir et al., 2003; McLeod et al., 2012; Mir & Pinnington, 2014; Hanisch & Wald, 2014; Muller et al., 2012; Muller & Turner, 2007; Ika, 2009; Turner & Zolin, 2012; Chang et al., 2013; Shao et al., 2012; Heravi & Ilbeigi, 2012; Frinsdorf et al., 2014; Henriksen & Christian Røstad, 2010; Chen, 2015; Menches & Hanna, 2006; Albert et al., 2017; Barclay, 2008; Henriksen & Christian Røstad, 2010; Lenfle, 2012; Barclay, 2008
<b>Impact</b> -Stakeholder satisfaction -Project team empowerment	Stakeholder impact Environmental & social impact Organizational impact	Muller et al., 2012; Naoum, 1994; Larson, 1995; Muller & Turner, 2007; Liu & Walker, 1998; Freeman & Beale, 1992; Chan et al., 2002; Shenhar & Dvir, 2007; Kumaraswamy & Thorpe, 1995; Serrador & Pinto, 2015; Westerveld, 2003; Ika, 2009; Lim & Mohamed, 1999; Parfitt & Sanvido, 1993; Bryde & Robinson, 2005; Khan et al., 2013; Pinto & Slevin, 1988; Baker et al., 1988; Pinto & Rouhiainen, 2001; Milosevic & Patanakul, 2005; Chang et al., 2013; Sheffield & Lemétayer, 2012; Prakash & Nandhini, 2015; Mir & Pinnington, 2014; Shenhar et al., 1997; Turner & Zolin, 2012; McLeod et al., 2012; Sheffield & Lemétayer, 2012; Ika, 2009; Dvir et al., 2003; Polydoropoulou & Roumboutsos, 2009; Dendena & Corsi, 2015; Ngacho & Das, 2014; Prakash & Nandhini, 2015; Turner & Zolin, 2012; Parfitt & Sanvido, 1993; Toulemonde, et al., 1998; Ika et al., 2012; Delarue & Cochet, 2013; Pisarski et al., 2011; Turner et al., 2009; Serrador & Turner, 2015; Diallo & Thuillier, 2004; Pisarski et al., 2011; Chang et al., 2013; Shenhar & Dvir, 2007; Andersen et al., 2002; Turner & Zolin, 2012; Parfitt & Sanvido, 1993; Chang et al., 2013; Wang & Huang, 2006; Kumaraswamy & Thorpe, 1995; Jugdev & Muller, 2005; Prakash & Nandhini, 2015; Bushait & Almohawis, 1994; Kumaraswamy & Thorpe, 1995; Chan et al., 2002; Shao et al., 2012; Ali et al., 2008
<b>Sustainability</b> -social concerns -environmental concerns	Environmental sustainability Social sustainability Economic sustainability	Kumaraswamy & Thorpe, 1995; Liu & Walker, 1998; Chan et al., 2002; Ngacho & Das, 2014, Muller & Turner, 2007, Arrow et al., 2003; Ika et al., 2012; Turner & Zolin, 2012; Ngacho & Das, 2014, Muller & Turner, 2007, Arrow et al., 2003; Ika et al., 2012; Mishra et al., 2011; Mollaoglu-Korkmaz et al., 2011; Ika et al., 2012; Bamberger, 1989; Henriksen & Christian Røstad, 2010; Masrom et al., 2015; Cha & Kim, 2011; Park et al., 2013; Bamberger, 1989; Henriksen & Christian Røstad, 2010; Masrom et al., 2015; Bamberger, 1989; Henriksen & Christian Røstad, 2010; Holvoet & Renard, 2003; Zvingule et al., 2013; Bueno Cadena & Vassallo Magro, 2015; Ugwu et al., 2006; Samset & Christensen, 2017; Van Wee, 2012; Bueno Cadena & Vassallo Magro, 2015; Ugwu et al., 2006

*Table 3: Mapping the project evaluation criteria across two temporality and epistemology dimensions*

Subjectivity Level	Criteria	Temporality of the evaluation criteria		
		Ex-ante evaluation	Interim evaluation	Ex-post evaluation
SUBJECTIVE	Sustainability	<p><b>Environmental sustainability</b> (Holvoet &amp; Renard, 2003; Zvingule et al., 2013; Bueno Cadena &amp; Vassallo Magro, 2015; Ugwu et al., 2006)</p> <p><b>Social Sustainability: The positive effects persist after the conclusion of the project, Ethics, Health &amp; Safety</b> (Samset &amp; Christensen, 2017; Van Wee, 2012; Bueno Cadena &amp; Vassallo Magro, 2015; Ugwu et al., 2006)</p> <p><b>Economic sustainability: Resource utilization</b> (Bueno Cadena &amp; Vassallo Magro, 2015; Ugwu et al., 2006)</p>	<p><b>Environmental sustainability</b> (Bamberger, 1989; Henriksen &amp; Christian Røstad, 2010; Masrom et al., 2015; Cha &amp; Kim, 2011)</p> <p><b>Social Sustainability: Public welfare</b> (Park et al., 2013; Bamberger, 1989; Henriksen &amp; Christian Røstad, 2010; Masrom et al., 2015)</p> <p><b>Economic sustainability</b> (Bamberger, 1989; Henriksen &amp; Christian Røstad, 2010)</p>	<p><b>Environmental sustainability</b> (Kumaraswamy &amp; Thorpe, 1995; Liu &amp; Walker, 1998; Chan et al., 2002; Ngacho &amp; Das, 2014, Muller &amp; Turner, 2007, Arrow et al., 2003; Ika et al., 2012)</p> <p><b>Social Sustainability: Social costs, social benefits, Ethics</b> (Turner &amp; Zolin, 2012; Ngacho &amp; Das, 2014, Muller &amp; Turner, 2007, Arrow et al., 2003; Ika et al., 2012; Mishra et al., 2011)</p> <p><b>Economic sustainability: Sustainable project outcomes</b> (Mollaoglu-Korkmaz et al., 2011; Ika et al., 2012)</p>
	Impact	<p><b>Stakeholders Impact: Quality of stakeholder participation in the planning process - openness, equity, dialogue, Customer satisfaction, End user satisfaction, Benefits for external and internal users</b> (Van Buuren &amp; Nooteboom, 2009; Raschke &amp; Sen, 2013; Barbin Laurindo &amp; Moraes, 2006; Jukić et al., 2013)</p> <p><b>Organizational Impact: Top management, Subjective, Risk, technological and behavioural impact, Integration of the project achievements with the existing knowledge, proximity and productivity effects, investment and land use impacts and employment effects</b> (Rosacker &amp; Olson, 2008; Pillai et al., 2002; Stefanou, 2001; Oviedo-García, 2016; Laird &amp; Venables, 2017)</p> <p><b>Environmental and Social Impact: What other positive or negative effects may occur because of the project, Project impact, effect of the project on gender equity, Social Cost Benefit Analysis –SCBA, Equity, Nature effects, esthetics, specific social effects, distribution effects, Environmental impacts, job creation, awareness campaigns, Socioeconomic and environmental impact, Environmental impact analysis</b> (Samset &amp; Christensen, 2017; Holvoet &amp; Renard, 2003;</p>	<p><b>Stakeholders Impact: Customer satisfaction</b> (Kärnä &amp; Junnonen, 2017; Willar, 2017; Albert et al., 2017; Shek &amp; Sun, 2006; Zhang &amp; Fan, 2013; Masrom et al., 2015; Tohumcu &amp; Karasakal, 2010; Barclay, 2008; Icmeli Tukul &amp; Rom, 2001; Almahmoud et al., 2012; Heravi &amp; Ilbeigi, 2012)</p> <p><b>Environmental and Social Impact</b> (Bamberger, 1989; Eriksen &amp; Lensink, 2015; Henri Maurice Veillard et al., 2013)</p> <p><b>Organizational Impact: Staff skills, cooperation, learning and Innovation, relationship, benefit, knowledge accumulation, education, international collaboration</b> (Kärnä &amp; Junnonen, 2016; Kärnä &amp; Junnonen, 2017; Willar, 2017; Barclay, 2008; Masrom et al., 2015; Park et al., 2013)</p>	<p><b>Stakeholders Impact: Client, customer, project team and end user satisfaction</b> (Muller et al., 2012; Naoum, 1994; Larson, 1995; Muller &amp; Turner, 2007; Liu &amp; Walker, 1998; Freeman &amp; Beale, 1992; Chan et al., 2002; Shenhar &amp; Dvir, 2007; Kumaraswamy &amp; Thorpe, 1995; Serrador &amp; Pinto, 2015; Westerveld, 2003; Ika, 2009)</p> <p><b>Environmental and Social Impact</b> (Dendena &amp; Corsi, 2015; Ngacho &amp; Das, 2014; Prakash &amp; Nandhini, 2015; Turner &amp; Zolin, 2012; Parfitt &amp; Sanvido, 1993; Toulemonde, et al., 1998; Ika et al., 2012; Delarue &amp; Cochet, 2013; Pisarski et al., 2011))</p> <p><b>Organizational Impact: Project team empowerment, learning, good relationship with stakeholders, aesthetics, organization's understanding of project management as a strategic asset, health and safety impact, professional image, organizational, marketing and innovative capabilities, perceived performance impact</b> (Chang et al., 2013; Shenhar &amp; Dvir, 2007; Andersen et al., 2002; Turner &amp; Zolin, 2012; Parfitt &amp; Sanvido, 1993; Chang et al., 2013; Wang &amp; Huang, 2006)</p>

	<b>Business Success</b>	<p><b>Financial Benefits: Profitability, Operational benefit</b> (Irani &amp; Love, 2002; Liu et al., 2014)</p> <p><b>Strategic Benefits: Strategic and Tactical benefits, Market and non-market benefits, Organizational capacity, The political, general and other benefits, Private and social benefits</b> (Irani &amp; Love, 2002; Parra-López et al., 2009; Holvoet &amp; Renard, 2003; Jukić et al., 2013; Roper et al., 2004)</p>	<p><b>Financial Benefits: Profitability, Economic success</b> (Heravi &amp; Ilbeigi, 2012; Frinsdorf et al., 2014; Henriksen &amp; Christian Røstad, 2010; Chen, 2015; Menches &amp; Hanna, 2006; Albert et al., 2017; Barclay, 2008)</p> <p><b>Strategic Benefits: Growth</b> (Henriksen &amp; Christian Røstad, 2010) <b>Organizational capabilities</b> (Lenfle, 2012) <b>Benefit</b> (Barclay, 2008)</p>	<p><b>Financial Benefits: Financial performance, profitability, Increased market share, increased parent company's profit</b> (Turner &amp; Zolin, 2012; Norris, 1990; Freeman &amp; Beale, 1992; Tayler, 1992; Parfitt &amp; Sanvido, 1993; Milosevic &amp; Patanakul, 2005; Shenhar &amp; Dvir, 2007; Chan et al., 2002; Milosevic &amp; Patanakul, 2005)</p> <p><b>Strategic Benefits: Benefits to the organization and preparing for the future, Project / product / business success, Reoccurring business, Strategic objective of client organizations and business success, Reputation, consumer loyalty, benefits, relationships, Providing capabilities for the organization</b> (Jugdev &amp; Muller, 2005; Shenhar et al., 1997; Dvir et al., 2003; McLeod et al., 2012; Mir &amp; Pinnington, 2014; Hanisch &amp; Wald, 2014; Muller et al., 2012; Muller &amp; Turner, 2007; Ika, 2009; Turner &amp; Zolin, 2012; Chang et al., 2013; Shao et al., 2012)</p>
	<b>Effectiveness</b>	<p><b>Project achievements: Expectations are fulfilled, Operational effectiveness - increased revenue and market-share, Project relevance, Validity, Fairness, Reliability, The need for the project - relevance</b> (Samset &amp; Christensen, 2017; Raschke &amp; Sen, 2013; Holvoet &amp; Renard, 2003; Zvingule et al., 2013; Van Wee &amp; Roeser, 2013; Ling 2003; Barbin Laurindo &amp; Moraes, 2006; Mehrizi et al., 2009; Mutz et al., 2015)</p> <p><b>Product achievements: Appropriateness, Level of attainability / achievement, Requirement, Technical specifications, Quality of the solutions -usefulness, applicability, Technical and business quality, Merit</b> (Makarova &amp; Sokolova, 2014; Rosacker &amp; Olson, 2008; Ward et al., 2016; Van Wee &amp; Roeser, 2013; Ling 2003; Barbin Laurindo &amp; Moraes, 2006; Mehrizi et al., 2009; Van Buuren &amp; Nooteboom, 2009; Feldman &amp; Kelley, 2006; Pillai et al., 2002)</p>	<p><b>Project achievements: Meeting customer needs, Achievements of project's goals, Value added, Credibility, feasibility, Relevance</b> (Icmeli Tukel &amp; Rom, 2001; Zhang &amp; Fan, 2013; Bamberger, 1989; Makarova &amp; Sokolova, 2014; Shek &amp; Yu, 2012; Luras et al., 2010; Ramezani &amp; Lu, 2014; Kärnä &amp; Junnonen, 2016; Kärnä &amp; Junnonen, 2017; Heravi &amp; Ilbeigi, 2012; Zhang &amp; Fan, 2013; Bower &amp; Finegan, 2009; Cheng et al., 2013; Bhalla et al., 2013; Baccarini, 1999; Harnisch, 2001; Luras et al., 2010)</p> <p><b>Product achievements: Compatible products with international players, Functionality, Usability, reliability, flexibility, Technical performance, simplicity of the design, Appropriateness</b> (Bamberger, 1989; Makarova &amp; Sokolova, 2014; Shek &amp; Yu, 2012; Luras et al., 2010; Tadeu de Oliveira Lacerda et al., 2011; Lam et al., 2007; Chiu et al., 2008; Barclay, 2008; Harnisch, 2001; Olsson &amp; Bull-Berg, 2015; Tohumcu &amp; Karasakal, 2010)</p>	<p><b>Project achievements: Meeting the explicit and implicit objectives of the project set by - possibly multiple different-stakeholders, Meeting user requirements, Creating value for the stakeholders, problem solving</b> (Muller et al., 2012; Muller and Turner, 2007; Hanisch &amp; Wald, 2014; Tatikonda &amp; Rosenthal, 2000; Alderman &amp; Ivory, 2011; Mollaoglu-Korkmaz et al., 2011; Pisarski et al., 2011; Xu &amp; Yeh, 2014; Al-Meshekeh &amp; Langford, 1999; Ika et al., 2012; McLeod et al., 2012; Andersen et al., 2002; Turner et al., 2009; Serrador &amp; Turner, 2015; Mazur et al., 2014; Dvir et al., 2003; Chang et al., 2013)</p> <p><b>Product achievements: Addresses a need, product is used, Functionality, Maintainability, Reliability, availability, safety, Meeting technical performance specifications</b> (Sheffield &amp; Lemétayer, 2012; McLeod et al., 2012; Andersen et al., 2002; Khan et al., 2013; Ali et al., 2008; Rolstadås et al., 2014; Chan, 1996; Parfitt &amp; Sanvido, 1993; Chan et al., 2002; Khan et al., 2013; Ali et al., 2008; Polydoropoulou &amp; Roumboutsos, 2009; Wohlin &amp; Andrews, 2001; Toulemonde, et al., 1998; Freeman &amp; Beale, 1992; Tayler, 1992; Riggs et al., 1992)</p>

OBJECTIVE	Efficiency	<p><b>Financial Performance:</b> Net-present value (NPV), Internal Rate of Return (IRR), Return on Investment (ROI), Payback, Budget constraint, Probability assess, Cost-benefit analysis – CBA, Net Present Worth – NPW, Construction price level, domestic economic conditions, money market conditions, unemployment level, capital market conditions, population growth, and global economic climate, The costs of planning, development, implementation and operation – Project life cycle costing and risks, Energy efficiency, Benefits, cost, ranking, Sensitivity analysis, Realistic analysis (Rosacker &amp; Olson, 2008; Makarova &amp; Sokolova, 2014; Remenyi, 1999; Jovanović, 1999; Stefanou, 2001; Reddy &amp; Sharma, 2014; Arrow et al., 2003; Kelly et al., 2015; Ward et al., 2016; Van Wee, 2007; Van Wee &amp; Roeser, 2013; Van Wee, 2012; Dikmen et al., 2007; Holvoet &amp; Renard, 2003; Ling, 2003; Zvingule et al., 2013)</p> <p><b>Project Management Performance:</b> The uses of resources and time are reasonable, Project life cost, time of project delivery, Cost, benefits, risk, Value, Business Case, Operational efficiency - cost, time, product/service quality, Internal quality assurance, accountability, supervision, Procedural quality of the planning process - transparency, timeliness, Risk Analysis (Samset &amp; Christensen, 2017; Pillai et al., 2002; Stefanou, 2001; Raschke &amp; Sen, 2013; Janssens &amp; de Wolf, 2009; Holvoet &amp; Renard, 2003; Ling, 2003; Zvingule et al., 2013)</p>	<p><b>Financial Performance:</b> Life cycle costs, Cost, (Tadeu de Oliveira Lacerda et al., 2011; Polydoropoulou &amp; Roumboutsos, 2009; Almahmoud et al., 2012; Lam et al., 2007; Hwang et al., 2013; Najmi et al., 2009; Heravi &amp; Ilbeigi, 2012; Albert et al., 2017; Cheng et al., 2012; Zhang &amp; Fan, 2013; Ming Tam &amp; Harris, 1996; Masrom et al., 2015; Cha &amp; Kim, 2011; Tohumcu &amp; Karasakal, 2010; Barclay, 2008; Ikpe et al., 2014)</p> <p><b>Project Management Performance:</b> Project efficiency, Time / Schedule performance, Quality, meeting technical specifications, Scope, Payment, Legal issues, delivery method, selection methods, stakeholder commitments, Changes and rework, Project Management, Safety, Productivity, performance, Value for money, Project management leadership, staff, policy and strategy, partnership and resources, project life cycle management processes and project management key performance indicators, Risk and Security, Communication between team members, Human resource management, subcontractor management, overseas dependence (Shenhar et al., 1997; Bamberger, 1989; Lenfle, 2012; Makarova &amp; Sokolova, 2014; Shek &amp; Yu, 2012; Lauras et al., 2010; Olsson &amp; Bull-Berg, 2015; Baccarini, 1999; Cao &amp; Hoffman, 2011; Locatelli et al., 2014; Icmeli Tukul &amp; Rom, 2001; Polydoropoulou &amp; Roumboutsos, 2009; Almahmoud et al., 2012; Lam et al., 2007; Hwang et al., 2013; Najmi et al., 2009; Heravi &amp; Ilbeigi, 2012; Albert et al., 2017; Cheng et al., 2012; Zhang &amp; Fan, 2013; Ming Tam &amp; Harris, 1996; Masrom et al., 2015; Cha &amp; Kim, 2011; Tohumcu &amp; Karasakal, 2010; Barclay, 2008; Messner &amp; Sanvido, 2001; Ikpe et al., 2014)</p>	<p><b>Financial Performance:</b> Meeting cost / budget goals (Toulemonde, et al., 1998; Sheffield &amp; Lemétayer, 2012; Muller et al., 2012; Ika, 2009; Söderlund, 2004; Chan, 1996; Chua et al., 1999; Atkinson, 1999; Davis, 2014; Naoum, 1994; Brown &amp; Adams, 2000; Cheung et al., 2000; Wang &amp; Huang, 2006; Diallo &amp; Thuillier, 2004; Mishra et al., 2011; Beringer et al., 2013; Milosevic &amp; Patanakul, 2005; Andersen et al., 2002; Muller and Turner, 2007; Hanisch &amp; Wald, 2014; Ngacho &amp; Das, 2014; Wohlin &amp; Andrews, 2001; Lim &amp; Mohamed, 1999; Prakash &amp; Nandhini, 2015; Maloney, 1990; Doloi et al., 2011; Freeman &amp; Beale, 1992; Tayler, 1992; Parfitt &amp; Sanvido, 1993; Riggs et al., 1992; Bushait &amp; Almohawis, 1994)</p> <p><b>Project Management Performance:</b> Meeting time, quality and scope goals, Productivity, Efficient use of (project) resources; (project) management success, Project efficiency, Project manager's efficiency, Safety, site disputes, Project peer rating, Achieved level of quality targets, operational project life quality improvements, Features, performance, Risk, Safety, completed work (Sheffield &amp; Lemétayer, 2012; Muller et al., 2012; Ika, 2009; Söderlund, 2004; Chan, 1996; Chua et al., 1999; Atkinson, 1999; Davis, 2014; Naoum, 1994; Brown &amp; Adams, 2000; Cheung et al., 2000; Wang &amp; Huang, 2006; Diallo &amp; Thuillier, 2004; Mishra et al., 2011; Beringer et al., 2013; Milosevic &amp; Patanakul, 2005; Andersen et al., 2002; Muller and Turner, 2007; Hanisch &amp; Wald, 2014; Ngacho &amp; Das, 2014; Wohlin &amp; Andrews, 2001; Lim &amp; Mohamed, 1999; Prakash &amp; Nandhini, 2015; Maloney, 1990; Doloi et al., 2011; Freeman &amp; Beale, 1992; Tayler, 1992; Parfitt &amp; Sanvido, 1993)</p>
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**Table 4: Overview of project evaluation approaches in the literature**

Items	Project Evaluation Approaches		
	Dynamic	Collaborative	Comprehensive
<b>Authors</b>	Anzoise & Sardo, 2016; Todorović et al., 2015; Williams et al., 2012; Cao & Hoffman, 2011; Radcliff, 2003	Khan et al., 2013; Corn et al., 2012; Molenaar et al., 2012; Alderman & Ivory, 2011; Thompson, 1991	Eduardo et al., 2014; Turner & Zolin, 2012; Polydoropoulou & Rouboutsos, 2009; Turner et al., 2009
<b>Core arguments</b>	- Rests on two theoretical foundations, learning organizations and system dynamics	- Evaluator's engagement with the project management team can enhance the project performance and will provide a dynamic feedback loop in project.	- Including: ex-ante, on-going and ex-post evaluation. - Identifies three levels of results, or objectives, assessed over differing timeframes including: 1- Project Outputs, 2- Project Outcomes, and 3- Impact.
<b>Disagreement with the literature</b>	- Conventional factors of evaluating projects, which has been adopted by earlier researchers, such as time, cost and quality.	- Evaluation team is an external party in the evaluation process.	- Definition of project success based on the triple constraints: time, cost and quality. - All the stakeholders cannot judge all the levels of the results.
<b>Gaps/Issue</b>	- Can be improved by contributing a collaborative approach and multiple perspectives from key stakeholders in a multiple timeframe.	- Bias of the research results to some specific fields. - Assumes the existence of a collaborative environment	- Bias of the research results to specific fields. - Ignores project effectiveness in project success definition. - Assumes main stakeholder's willingness to evaluate long-term outcomes.

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**Table 1 – The journals used in the literature review**

No.	Journal name	No. of articles	%
1	International Journal of Project Management (IJPM)	25	34%
2	Project Management Journal (PMJ)	15	20%
3	International Journal of Managing Projects in Business	3	5%
4	Evaluation and Program Planning	3	3%
5	Journal of Management in Engineering	3	3%
6	IEEE Transactions on Engineering Management	2	2%
7	Cost Engineering	1	1.5%
8	Harvard Business Review	1	1.5%
9	Other Journals with only one article in the list	34	30%
<b>Total</b>		<b>72</b>	<b>100%</b>

**Table 2: Project Evaluation Criteria; a synthesis from the literature**

Criteria	Sub-criteria	Authors
<b>Efficiency</b> - Time - Cost - Quality	Project achievements Product achievements Financial performance Project management performance	Sheffield & Lemétayer, 2013; Muller et al., 2012; Ika, 2009; Söderlund, 2004; Chua et al., 1999; Atkinson, 1999; Davis, 2014; Naoum, 1994; Brown & Adams, 2000; Cheung et al., 2000; Wang & Huang, 2006; Diallo & Thuillier, 2004; Mishra et al., 2011; Beringer et al., 2013; Milosevic & Patanakul, 2005; Andersen et al., 2002; Muller and Turner, 2007; Hanisch & Wald, 2014; Ngacho & Das, 2014; Wohlin & Andrews, 2001; Lim & Mohamed, 1999; Prakash & Nandhini, 2015; Maloney, 1990; Doloi et al., 2011; Freeman & Beale, 1992; Tayler, 1992; Parfitt & Sanvido, 1993; Riggs et al., 1992; Bushait & Almohawis, 1994; Chan et al., 2002; Westerveld, 2003; Liu & Walker, 1998; Serrador & Pinto, 2015; Serrador & Turner, 2015; Chang et al., 2013; Mazur et al., 2014; McLeod et al., 2012; Ika et al., 2012; Bryde & Robinson, 2005; Mir & Pinnington, 2014; Dvir et al., 2003; Turner & Zolin, 2012; Pinto & Slevin, 1988; Shenhar et al., 1997; Xu & Yeh, 2014; Polydoropoulou & Rouboutsos, 2009
<b>Effectiveness</b> How well the project's product satisfies users' need	Project achievements Product achievements Financial performance Project management performance	Muller et al., 2012; Muller and Turner, 2007; Hanisch & Wald, 2014; Tatikonda & Rosenthal, 2000; Alderman & Ivory, 2011; Mollaoglu-Korkmaz et al., 2011; Xu & Yeh, 2014; Ika et al., 2012; McLeod et al., 2012; Andersen et al., 2002; Turner et al., 2009; Serrador & Turner, 2015; Mazur et al., 2014; Dvir et al., 2003; Chang et al., 2013; Sheffield & Lemétayer, 2012; McLeod et al., 2012; Andersen et al., 2002; Khan et al., 2013; Rolstadås et al., 2014; Chan, 1996; Parfitt & Sanvido, 1993; Chan et al., 2002; Polydoropoulou & Rouboutsos, 2009; Wohlin & Andrews, 2001; Freeman & Beale, 1992; Tayler, 1992; Riggs et al., 1992
<b>Business Success</b> - Increased market share - Increased parent company's profit	Financial benefits Strategic benefits	Turner & Zolin, 2012; Freeman & Beale, 1992; Tayler, 1992; Parfitt & Sanvido, 1993; Milosevic & Patanakul, 2005; Shenhar & Dvir, 2007; Chan et al., 2002; Milosevic & Patanakul, 2005; Jugdev & Muller, 2005; Shenhar et al., 1997; Dvir et al., 2003; McLeod et al., 2012; Mir & Pinnington, 2014; Hanisch & Wald, 2014; Muller et al., 2012; Muller & Turner, 2007; Ika, 2009; Chang et al., 2013; Shao et al., 2012; Heravi & Ilbeigi, 2012;

Criteria	Sub-criteria	Authors
		Frinsdorf et al., 2014; Henriksen & Røstad, 2010; Chen, 2015; Menches & Hanna, 2006; Albert et al., 2017; Barclay, 2008; Lenfle, 2012
<b>Impact</b> -Stakeholder satisfaction -Project team empowerment	Stakeholder impact Environmental & social impact Organizational impact	Muller et al., 2012; Naoum, 1994; Muller & Turner, 2007; Liu & Walker, 1998; Freeman & Beale, 1992; Chan et al., 2002; Shenhar & Dvir, 2007; Serrador & Pinto, 2015; Westerveld, 2003; Ika, 2009; Lim & Mohamed, 1999; Parfitt & Sanvido, 1993; Bryde & Robinson, 2005; Khan et al., 2013; Pinto & Slevin, 1988; Baker et al., 1988; Pinto & Rouhiainen, 2001; Milosevic & Patanakul, 2005; Chang et al., 2013; Sheffield & Lemétayer, 2012; Prakash & Nandhini, 2015; Mir & Pinnington, 2014; Shenhar et al., 1997; Turner & Zolin, 2012; McLeod et al., 2012; Sheffield & Lemétayer, 2012; Ika, 2009; Dvir et al., 2003; Polydoropoulou & Roumboutsos, 2009; Dendena & Corsi, 2015; Ngacho & Das, 2014; Prakash & Nandhini, 2015; Turner & Zolin, 2012; Parfitt & Sanvido, 1993; Toulemonde, et al., 1998; Ika et al., 2012; Delarue & Cochet, 2013; Pisarski et al., 2011; Turner et al., 2009; Serrador & Turner, 2015; Diallo & Thuillier, 2004; Chang et al., 2013; Shenhar & Dvir, 2007; Andersen et al., 2002; Parfitt & Sanvido, 1993; Chang et al., 2013; Wang & Huang, 2006; Jugdev & Muller, 2005; Prakash & Nandhini, 2015; Bushait & Almohawis, 1994; Kumaraswamy & Thorpe, 1996; Chan et al., 2002; Shao et al., 2012
<b>Sustainability</b> -social concerns -environmental concerns	Environmental sustainability Social sustainability Economic sustainability	Kumaraswamy & Thorpe, 1996; Liu & Walker, 1998; Chan et al., 2002; Ngacho & Das, 2014; Muller & Turner, 2007; Arrow et al., 2003; Ika et al., 2012; Turner & Zolin, 2012; Ngacho & Das, 2014; Muller & Turner, 2007; Arrow et al., 2003; Ika et al., 2012; Mishra et al., 2011; Mollaoglu-Korkmaz et al., 2011; Ika et al., 2012; Bamberger, 1989; Henriksen & Røstad, 2010; Cha & Kim, 2011; Bamberger, 1989; Masrom et al., 2015; Bamberger, 1989; Holvoet & Renard, 2003; Zvingule et al., 2013; Bueno Cadena & Vassallo Magro, 2015; Samset & Christensen, 2017; Van Wee, 2012; Bueno Cadena & Vassallo Magro, 2015

*Table 3: Mapping the project evaluation criteria across two temporality and epistemology dimensions*

Subjectivity Level	Criteria	Temporality of the evaluation criteria		
		Ex-ante evaluation	Interim evaluation	Ex-post evaluation
SUBJECTIVE	Sustainability	<p><b>Environmental sustainability</b> (Holvoet &amp; Renard, 2003; Zvingule et al., 2013; Bueno Cadena &amp; Vassallo Magro, 2015)</p> <p><b>Social Sustainability: The positive effects persist after the conclusion of the project, Ethics, Health &amp; Safety</b> (Samset &amp; Christensen, 2017; Van Wee, 2012; Bueno Cadena &amp; Vassallo Magro, 2015)</p> <p><b>Economic sustainability: Resource utilization</b> (Bueno Cadena &amp; Vassallo Magro, 2015)</p>	<p><b>Environmental sustainability</b> (Bamberger, 1989; Henriksen &amp; Røstad, 2010; Masrom et al., 2015; Cha &amp; Kim, 2011)</p> <p><b>Social Sustainability: Public welfare</b> (Park et al., 2013; Bamberger, 1989; Henriksen &amp; Røstad, 2010; Masrom et al., 2015)</p> <p><b>Economic sustainability</b> (Bamberger, 1989; Henriksen &amp; Røstad, 2010)</p>	<p><b>Environmental sustainability</b> (Kumaraswamy &amp; Thorpe, 1996; Liu &amp; Walker, 1998; Chan et al., 2002; Ngacho &amp; Das, 2014, Muller &amp; Turner, 2007, Arrow et al., 2003; Ika et al., 2012)</p> <p><b>Social Sustainability: Social costs, social benefits, Ethics</b> (Turner &amp; Zolin, 2012; Ngacho &amp; Das, 2014, Muller &amp; Turner, 2007, Arrow et al., 2003; Ika et al., 2012; Mishra et al., 2011)</p> <p><b>Economic sustainability: Sustainable project outcomes</b> (Mollaoglu-Korkmaz et al., 2011; Ika et al., 2012)</p>
	Impact	<p><b>Stakeholders Impact: Quality of stakeholder participation in the planning process - openness, equity, dialogue, Customer satisfaction, End user satisfaction, Benefits for external and internal users</b> (Van Buuren &amp; Nooteboom, 2009; Raschke &amp; Sen, 2013; Jukić et al., 2013)</p> <p><b>Organizational Impact: Top management, Subjective, Risk, technological and behavioural impact, Integration of the project achievements with the existing knowledge, proximity and productivity effects, investment and land use impacts and employment effects</b> (Rosacker &amp; Olson, 2008; Oviedo-García, 2016; Laird &amp; Venables, 2017)</p> <p><b>Environmental and Social Impact: What other positive or negative effects may occur because of the project, Project impact, effect of the project on gender equity, Social Cost Benefit Analysis –SCBA, Equity, Nature effects, esthetics, specific social effects, distribution effects, Environmental impacts, job creation, awareness campaigns, Socioeconomic and environmental impact, Environmental impact analysis</b> (Samset &amp; Christensen, 2017; Holvoet &amp; Renard, 2003; Van Wee, 2012; Van Wee &amp; Roeser, 2013; Van Wee, 2012; Zvingule et al., 2013; Cubí et al., 2014)</p>	<p><b>Stakeholders Impact: Customer satisfaction</b> (Kärnä &amp; Junnonen, 2017; Willar, 2017; Albert et al., 2017; Zhang &amp; Fan, 2013; Masrom et al., 2015; Tohumcu &amp; Karasakal, 2010; Almahmoud et al., 2012; Heravi &amp; Ilbeigi, 2012)</p> <p><b>Environmental and Social Impact</b> (Bamberger, 1989; Eriksen &amp; Lensink, 2015; Veillard et al., 2013)</p> <p><b>Organizational Impact: Staff skills, cooperation, learning and Innovation, relationship, benefit, knowledge accumulation, education, international collaboration</b> (Kärnä &amp; Junnonen, 2016; Kärnä &amp; Junnonen, 2017; Willar, 2017; Barclay, 2008; Masrom et al., 2015; Park et al., 2013)</p>	<p><b>Stakeholders Impact: Client, customer, project team and end user satisfaction</b> (Muller et al., 2012; Naoum, 1994; Larson, 1995; Muller &amp; Turner, 2007; Liu &amp; Walker, 1998; Freeman &amp; Beale, 1992; Chan et al., 2002; Shenhar &amp; Dvir, 2007; Kumaraswamy &amp; Thorpe, 1996; Serrador &amp; Pinto, 2015; Westerveld, 2003; Ika, 2009)</p> <p><b>Environmental and Social Impact</b> (Dendena &amp; Corsi, 2015; Ngacho &amp; Das, 2014; Prakash &amp; Nandhini, 2015; Turner &amp; Zolin, 2012; Parfitt &amp; Sanvido, 1993; Toulemonde, et al., 1998; Ika et al., 2012; Delarue &amp; Cochet, 2013; Pisarski et al., 2011))</p> <p><b>Organizational Impact: Project team empowerment, learning, good relationship with stakeholders, aesthetics, organization's understanding of project management as a strategic asset, health and safety impact, professional image, organizational, marketing and innovative capabilities, perceived performance impact</b> (Chang et al., 2013; Shenhar &amp; Dvir, 2007; Andersen et al., 2002; Turner &amp; Zolin, 2012; Parfitt &amp; Sanvido, 1993; Chang et al., 2013; Wang &amp; Huang, 2006)</p>



	<b>Business Success</b>	<p><b>Financial Benefits: Profitability, Operational benefit</b> (Irani &amp; Love, 2002; Liu et al., 2014)</p> <p><b>Strategic Benefits: Strategic and Tactical benefits, Market and non-market benefits, Organizational capacity, The political, general and other benefits, Private and social benefits</b> (Irani &amp; Love, 2002; Parra-López et al., 2009; Holvoet &amp; Renard, 2003; Jukić et al., 2013)</p>	<p><b>Financial Benefits: Profitability, Economic success</b> (Heravi &amp; Ilbeigi, 2012; Frinsdorf et al., 2014; Henriksen &amp; Røstad, 2010; Chen, 2015; Menches &amp; Hanna, 2006; Albert et al., 2017; Barclay, 2008)</p> <p><b>Strategic Benefits: Growth</b> (Henriksen &amp; Røstad, 2010)</p> <p><b>Organizational capabilities</b> (Lenfle, 2012) <b>Benefit</b> (Barclay, 2008)</p>	<p><b>Financial Benefits: Financial performance, profitability, Increased market share, increased parent company's profit</b> (Turner &amp; Zolin, 2012; Norris, 1990; Freeman &amp; Beale, 1992; Tayler, 1992; Parfitt &amp; Sanvido, 1993; Milosevic &amp; Patanakul, 2005; Shenhar &amp; Dvir, 2007; Chan et al., 2002; Milosevic &amp; Patanakul, 2005)</p> <p><b>Strategic Benefits: Benefits to the organization and preparing for the future, Project / product / business success, Reoccurring business, Strategic objective of client organizations and business success, Reputation, consumer loyalty, benefits, relationships, Providing capabilities for the organization</b> (Jugdev &amp; Muller, 2005; Shenhar et al., 1997; Dvir et al., 2003; McLeod et al., 2012; Mir &amp; Pinnington, 2014; Hanisch &amp; Wald, 2014; Muller et al., 2012; Muller &amp; Turner, 2007; Ika, 2009; Turner &amp; Zolin, 2012; Chang et al., 2013)</p>
	<b>Effectiveness</b>	<p><b>Project achievements: Expectations are fulfilled, Operational effectiveness - increased revenue and market-share, Project relevance, Validity, Fairness, Reliability, The need for the project - relevance</b> (Samset &amp; Christensen, 2017; Raschke &amp; Sen, 2013; Holvoet &amp; Renard, 2003; Zvingule et al., 2013; Van Wee &amp; Roeser, 2013; Barbin Laurindo &amp; Moraes, 2006)</p> <p><b>Product achievements: Appropriateness, Level of attainability / achievement, Requirement, Technical specifications, Quality of the solutions -usefulness, applicability, Technical and business quality, Merit</b> (Makarova &amp; Sokolova, 2014; Rosacker &amp; Olson, 2008; Van Wee &amp; Roeser, 2013; Ling 2003; Barbin Laurindo &amp; Moraes, 2006; Van Buuren &amp; Nooteboom, 2009)</p>	<p><b>Project achievements: Meeting customer needs, Achievements of project's goals, Value added, Credibility, feasibility, Relevance</b> (Icmeli Tukel &amp; Rom, 2001; Zhang &amp; Fan, 2013; Bamberger, 1989; Makarova &amp; Sokolova, 2014; Shek &amp; Yu, 2012; Luras et al., 2010; Ramezani &amp; Lu, 2014; Kärnä &amp; Junnonen, 2016; Kärnä &amp; Junnonen, 2017; Heravi &amp; Ilbeigi, 2012; Zhang &amp; Fan, 2013; Bower &amp; Finegan, 2009; Cheng et al., 2013; Bhalla et al., 2013; Baccarini, 1999; Luras et al., 2010)</p> <p><b>Product achievements: Compatible products with international players, Functionality, Usability, reliability, flexibility, Technical performance, simplicity of the design, Appropriateness</b> (Bamberger, 1989; Makarova &amp; Sokolova, 2014; Shek &amp; Yu, 2012; Luras et al., 2010; de Oliveira Lacerda et al., 2011; Barclay, 2008; Harnisch, 2001; Olsson &amp; Bull-Berg, 2015; Tohumcu &amp; Karasakal, 2010)</p>	<p><b>Project achievements: Meeting the explicit and implicit objectives of the project set by - possibly multiple different- stakeholders, Meeting user requirements, Creating value for the stakeholders, problem solving</b> (Muller et al., 2012; Muller and Turner, 2007; Hanisch &amp; Wald, 2014; Tatikonda &amp; Rosenthal, 2000; Alderman &amp; Ivory, 2011; Mollaoglu-Korkmaz et al., 2011; Pisarski et al., 2011; Xu &amp; Yeh, 2014; Al-Meshekeh &amp; Langford, 1999; Ika et al., 2012; McLeod et al., 2012; Andersen et al., 2002; Turner et al., 2009; Serrador &amp; Turner, 2015; Mazur et al., 2014; Dvir et al., 2003; Chang et al., 2013)</p> <p><b>Product achievements: Addresses a need, product is used, Functionality, Maintainability, Reliability, availability, safety, Meeting technical performance specifications</b> (Sheffield &amp; Lemétayer, 2012; McLeod et al., 2012; Andersen et al., 2002; Khan et al., 2013; Rolstadås et al., 2014; Chan, 1996; Parfitt &amp; Sanvido, 1993; Chan et al., 2002; Khan et al., 2013; Polydoropoulou &amp; Roumboutsos, 2009)</p>

OBJECTIVE	Efficiency	<p><b>Financial Performance:</b> Net-present value (NPV), Internal Rate of Return (IRR), Return on Investment (ROI), Payback, Budget constraint, Probability assess, Cost-benefit analysis – CBA, Net Present Worth – NPW, Construction price level, domestic economic conditions, money market conditions, unemployment level, capital market conditions, population growth, and global economic climate, The costs of planning, development, implementation and operation – Project life cycle costing and risks, Energy efficiency, Benefits, cost, ranking, Sensitivity analysis, Realistic analysis (Rosacker &amp; Olson, 2008; Makarova &amp; Sokolova, 2014; Reddy &amp; Sharma, 2014; Arrow et al., 2003; Kelly et al., 2015; Van Wee &amp; Roeser, 2013; Van Wee, 2012; Holvoet &amp; Renard, 2003; Ling, 2003; Zvingule et al., 2013)</p> <p><b>Project Management Performance:</b> The uses of resources and time are reasonable, Project life cost, time of project delivery, Cost, benefits, risk, Value, Business Case, Operational efficiency - cost, time, product/service quality, Internal quality assurance, accountability, supervision, Procedural quality of the planning process - transparency, timeliness, Risk Analysis (Samset &amp; Christensen, 2017; Pillai et al., 2002; Stefanou, 2001; Raschke &amp; Sen, 2013; Holvoet &amp; Renard, 2003; Ling, 2003; Zvingule et al., 2013)</p>	<p><b>Financial Performance:</b> Life cycle costs, Cost, (Tadeu de Oliveira Lacerda et al., 2011; Polydoropoulou &amp; Roumboutsos, 2009; Almahmoud et al., 2012; Lam et al., 2007; Hwang et al., 2013; Najmi et al., 2009; Heravi &amp; Ilbeigi, 2012; Albert et al., 2017; Cheng et al., 2012; Zhang &amp; Fan, 2013; Masrom et al., 2015; Cha &amp; Kim, 2011; Tohumcu &amp; Karasakal, 2010; Barclay, 2008; Ikpe et al., 2014)</p> <p><b>Project Management Performance:</b> Project efficiency, Time / Schedule performance, Quality, meeting technical specifications, Scope, Payment, Legal issues, delivery method, selection methods, stakeholder commitments, Changes and rework, Project Management, Safety, Productivity, performance, Value for money, Project management leadership, staff, policy and strategy, partnership and resources, project life cycle management processes and project management key performance indicators, Risk and Security, Communication between team members, Human resource management, subcontractor management, overseas dependence (Shenhar et al., 1997; Bamberger, 1989; Lenfle, 2012; Makarova &amp; Sokolova, 2014; Shek &amp; Yu, 2012; Luras et al., 2010; Olsson &amp; Bull-Berg, 2015; Baccarini, 1999; Cao &amp; Hoffman, 2011; Locatelli et al., 2014; Icmeli Tukul &amp; Rom, 2001; Polydoropoulou &amp; Roumboutsos, 2009; Lam et al., 2007; Albert et al., 2017)</p>	<p><b>Financial Performance:</b> Meeting cost / budget goals (Toulemonde, et al., 1998; Sheffield &amp; Lemétayer, 2012; Muller et al., 2012; Ika, 2009; Söderlund, 2004; Chan, 1996; Chua et al., 1999; Atkinson, 1999; Davis, 2014; Naoum, 1994; Brown &amp; Adams, 2000; Cheung et al., 2000; Wang &amp; Huang, 2006; Diallo &amp; Thuillier, 2004; Mishra et al., 2011; Beringer et al., 2013; Milosevic &amp; Patanakul, 2005; Andersen et al., 2002; Muller and Turner, 2007; Hanisch &amp; Wald, 2014; Ngacho &amp; Das, 2014)</p> <p><b>Project Management Performance:</b> Meeting time, quality and scope goals, Productivity, Efficient use of (project) resources; (project) management success, Project efficiency, Project manager's efficiency, Safety, site disputes, Project peer rating, Achieved level of quality targets, operational project life quality improvements, Features, performance, Risk, Safety, completed work (Sheffield &amp; Lemétayer, 2012; Muller et al., 2012; Ika, 2009; Söderlund, 2004; Chan, 1996; Chua et al., 1999; Atkinson, 1999; Davis, 2014; Naoum, 1994; Brown &amp; Adams, 2000; Cheung et al., 2000; Wang &amp; Huang, 2006; Diallo &amp; Thuillier, 2004; Mishra et al., 2011; Beringer et al., 2013; Milosevic &amp; Patanakul, 2005; Andersen et al., 2002; Muller and Turner, 2007; Hanisch &amp; Wald, 2014)</p>
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