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Methods for measuring project management effectiveness: overview and classification of approaches

Abstract

Research background and purpose: The study aims to identify existing methods for measuring project management effectiveness and to propose a new set of measures and indicators designed to address identified gaps in current academic and professional practice.
Design/methodology/approach: A systematic literature review (SLR) was conducted using explicit inclusion and exclusion criteria. The review synthesises diverse global approaches across various sectors and contexts to provide a comprehensive overview of how effectiveness is currently evaluated.
Findings: The findings emphasise a notable absence of integrated analytical methods that concurrently examine organisational, technical, and human-resource factors. To mitigate this, the study proposes a framework of seven indicators, five original and two adapted, focused on organisational capacity, offering a more holistic way to measure.
Value added and limitations: As this study is based on a systematic literature review, the proposed indicators require further empirical validation in specific industrial contexts. However, the research provides a theoretical foundation for more nuanced, multi-criteria analysis of project management.

Keywords: *project management effectiveness, indicators of effectiveness, measurements of effectiveness, performance measurement, systematic literature review*

JEL Classification: M21; M10; M14

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1. Introduction

Contemporary organisations operate in an environment characterised by rapid change, competitive pressure and complexity (Kerzner, 2019). In conditions of growing uncertainty and the need to adapt flexibly to a changing environment, project management is one of the key ways to implement organisational strategy (Korhonen et al., 2023; Bukoye et al., 2022). Projects are not only a means of achieving operational goals, but also a foundation for building long-term strategic value and competitive advantage (De Reyck et al., 2005; Gemünden et al., 2018).

The evolution of project management methods, from traditional sequential approaches to agile methodologies and contemporary hybrid models, has brought new challenges in evaluating their effectiveness (Blomquist et al., 2016; Malik et al., 2021). Traditional measures of project success, such as delivering specific results within time, budget, and scope, are now deemed insufficient (Turner & Zolin, 2012). It is essential to adopt more complex and integrated approaches to assess the effectiveness of project management (Serra & Kunc, 2015; Korhonen et al., 2023).

In the literature, the concept of effectiveness is often used ambiguously and is frequently equated with efficiency, project success or productivity (Zidane & Olsson, 2017). Effectiveness refers to project managers' ability to generate intended results and long-term benefits aligned with organisational and social goals (Serra & Kunc, 2015). Meanwhile, efficiency refers to implementing a project within optimal time and budget constraints, while project success also encompasses stakeholder satisfaction, end-product quality, and environmental impact (McLeod et al., 2012; Ika, 2009).

Much of the literature concentrates on efficiency and success indicators (Joslin & Müller, 2016; Kerzner, 2023), while effectiveness measures are often neglected or generalised. This variation in measurement methods and the associated heterogeneity in terminology complicate comparisons of research findings and hinder the operationalisation of effectiveness as a measurable analytical category (Marques et al., 2011; McClory et al., 2017). Nevertheless, organisations are increasingly making strategic decisions based on project portfolios, which means that the way their effectiveness is measured substantially impacts the efficiency and sustainability of the entire management system (Varajão et al., 2022; Zidane et al., 2016).

Previous research confirms that project effectiveness is a multidimensional phenomenon influenced by industry, cultural context, stakeholders, and the project life cycle stage (Morcov et al., 2021). It requires the use of diverse measurement tools that consider not only formal objectives but also the project's impact on organisational and social environments. In this sense, effectiveness should be regarded as a dynamic construct, necessitating continuous monitoring and adjustment of indicators to adapt to changing external and internal conditions (Gemünden et al., 2018).

There are many models and tools for evaluating project effectiveness in the literature (Albert et al., 2017), but there is a noticeable research gap in the area of project effectiveness evaluation, especially with regard to methods that enable the integration of quantitative and qualitative, operational and strategic data (Shenhar & Dvir, 2007; Sundqvist et al., 2014). This article analyses scientific publications from several databases from 2000 to 2024, using a literature review method. The aim of the study is to identify methods for measuring project management effectiveness and to develop proposals for metrics and indicators to fill this gap. To address these issues and provide a structured path for investigation, this study poses the following research questions:

RQ1: What methods are mentioned in the scientific literature for measuring the effectiveness of project management?
RQ2: What are the strengths and weaknesses of selected measurement methods in the context of practical application?
RQ3: What gaps exist in the existing literature on the assessment of project management effectiveness?

The answers to these questions will not only enhance understanding of the evolution of approaches to effectiveness assessment and project management but will also aid in developing integrated measurement models tailored to the realities of modern organisations and stakeholder expectations.

2. Literature review

2.1. Terminological heterogeneity of project management effectiveness

Project management effectiveness is one of the most complex issues in the literature on the subject. The term is often used interchangeably with concepts such as project management success or efficiency (Zidane et al., 2016), and the differences in their definitions are fundamental to how projects are measured and evaluated. According to Zidane and Olsson (2017), effectiveness means doing the right things (achieving the right goals), while efficiency means doing things right (using resources well). Project success, on the other hand, encompasses a broader set of criteria, including stakeholder satisfaction, product quality, the achievement of project objectives within a specified time frame, and the sustainability of results (Ika, 2009; Marques et al., 2011).

While the literature offers many methods for evaluating the success and effectiveness of project management, considerably less attention is given to the systematic measurement of management effectiveness itself – that is, the quality of management processes,

managerial competencies, and organisational capabilities for project delivery (Shenhar & Dvir, 2007). The core issue is that existing measurement approaches primarily focus on project outcomes, whereas management effectiveness concerns the quality of the activities performed. Furthermore, project management effectiveness also involves the levels of processes, team and manager competencies, and their impact on the organisation (Winter et al., 2006; Bryde, 2008).

Recognising the differences between project effectiveness, success, and efficiency in the literature, this publication treats all instances of terms such as 'success' or 'efficiency' as falling under the broader category of 'effectiveness'. This approach arises from the study's focus on measurement methods rather than analysing terminological distinctions or developing new conceptual definitions. Moreover, the use of the term "effectiveness" as an overarching concept for success and efficiency aligns with the idea of proxy variables in systematic studies (Zidane & Olsson, 2017).

2.2. The evolution of the project management effectiveness measurement paradigm

The history of measuring project management effectiveness mirrors broader shifts in management science. Recognition of the importance of project success and the effectiveness of project management has evolved over time. The traditional model of the so-called iron triangle, emphasising time, cost, and scope, has long been the prevailing paradigm for assessing projects (McLeod et al., 2012). Despite its simplicity and intuitiveness, this model has faced criticism for its narrow focus and failure to consider the broader organisational context, including stakeholder needs (Jugdev & Müller, 2007).

In response to this criticism, other concepts have emerged that expand the definition of project success. Among them is the five-dimensional model by Shenhar and Dvir (2007), which considers not only efficiency but also business success, customer impact, organisational readiness for the future, and project team satisfaction.

Additionally, sustainability criteria are increasingly influencing project evaluation. Including environmental, social, and governance (ESG) factors in assessing project management effectiveness responds to rising social and regulatory expectations. This means projects are now evaluated not only by their immediate outcomes but also by their impact on the environment, social relations, and corporate governance standards. This shift has led to a move from using single indicators to comprehensive assessment systems, applicable at operational, tactical, and strategic levels across the organisation (Zidane et al., 2016). In essence, the focus has shifted from simply completing projects as planned to assessing their significance for the organisation's development, adaptability, and stakeholder satisfaction. The literature also highlights the importance of structural and systemic factors, such as the role of the project

management office (PMO), the maturity of project processes, and the integration of projects with strategic goals (Gemünden et al., 2018). Effectiveness in this context is therefore complex and systemic, relying on interconnected layers of activities, structures, and decision-making mechanisms.

The evolution of the paradigm for measuring project management effectiveness shows a clear shift from narrow, objective criteria of economic efficiency to broad, multidimensional models of effectiveness (McLeod et al., 2012; Varajão et al., 2022). This change necessitates the use of flexible, contextually adaptive methods, which justifies the authors' focus on a more balanced, integrated approach to assessing project management effectiveness. Rather than relying solely on traditional metrics, this study combines newly developed organisational and human resource indicators with established quantitative benchmarks to offer a comprehensive framework for measuring effectiveness. While methods for assessing effectiveness that incorporate financial indicators (e.g., ROI, NPV, EVA) and quantitative metrics (e.g., EVM, cost variance) are well-established, they often fail to capture organisational and human resource dimensions. This stems from the need for an in-depth analysis of qualitative and organisational measurement methods, which remain poorly described (Serra & Kunc, 2015). Therefore, this study aims to synthesise selected traditional quantitative benchmarks with newly developed qualitative indicators to create a holistic measurement framework.

2.3. Methodological dimension of measuring the effectiveness of project management

The contemporary project environment requires a flexible approach to measuring project management effectiveness. An analysis of the literature on the subject identifies methodological issues as key challenges in measuring the effectiveness of project management.

Contemporary organisations increasingly consider the development of organisational competencies and the long-term impact of projects on strategy execution in their evaluations (Serra & Kunc, 2015). Consequently, the effectiveness of project management cannot be judged solely on financial criteria (Hailey & Sorgenfrei, 2004). Therefore, the significance of qualitative aspects of effectiveness, such as the capacity to learn quickly, experiment, and adapt, is rising. This also results in the integration of diverse measurement methods, including non-financial and qualitative indicators (Albert et al., 2017).

However, measuring the qualitative effectiveness of project management is neither simple nor unchallenging. First of all, effectiveness often depends on the perceptions of different stakeholder groups, which may have conflicting expectations (Pankratz & Basten, 2014). Another difficulty is the operationalisation of "soft" dimensions such as

trust, self-efficacy or the quality of teamwork (Mathieu et al., 2008; Leilaee & Rezaeian, 2021). In addition, the value of a project may materialise long after its completion, making it difficult to assess its effectiveness at that time (Serra & Kunc, 2015). Finally, a number of effectiveness assessment methods rely on surveys, interviews, or subjective opinions, which do not always meet validity and reliability criteria (Murphy & Cormican, 2015).

The above methodological challenges led the authors to intentionally narrow the scope of the analysis and concentrate on organisational capacity and resource-based metrics.

2.4. Contextual conditions for measuring the effectiveness of project management

The methodological dimension of measuring effectiveness does not function in isolation from the conditions in which projects are implemented. As a result, another factor influencing the measurement of management effectiveness is the contextual conditions that determine the choice of measurement methods and the interpretation of results. Projects are not implemented in a vacuum, as each operates in a specific organisational, industry, and cultural context, which is essential for assessing their effectiveness.

Traditionally, effectiveness was assessed after project completion. Modern methods focus on continuous monitoring and real-time evaluation, enabling ongoing progress tracking, risk identification, and quick responses. Flyvbjerg (2013) argues that qualitative control offers a more objective assessment of the project.

The belief in universal measurement methods is evolving. Previously, the same effectiveness assessment methods were used regardless of project type or context. Macheridis (2022) notes that a method suitable for one project may be inadequate for another.

Industry specifics shape performance measurement approaches. Infrastructure projects focus on technical and schedule compliance (Eriksson et al., 2023), while Chapman (2024) highlights net present value and profitability. IT and social projects prioritise strategic value, user satisfaction, and social impact (Anderson & Lannon, 2018; Varajão et al., 2022). Pankratz and Basten (2014) note IT project managers define success multidimensionally, blending traditional and soft criteria.

On the other hand, in projects with a high degree of uncertainty, such as mega infrastructure projects, measuring effectiveness requires additional criteria. Boateng et al. (2015) propose the Analytic Network Process (ANP) model to prioritise risks using a risk-priority index.

Project management effectiveness is also gauged through organisational culture and communication (Gemünden et al., 2018). Blomquist et al. (2016) highlight that a project

manager's self-efficacy influences outcomes. Though hard to quantify, these factors notably affect project success and should not be overlooked.

Korhonen and co-authors (2023) aptly note that measuring effectiveness can enhance success in project-based operations, but this requires alignment between project-level metrics and organisational goals. This means that project effectiveness should be viewed not as an isolated phenomenon, but as part of a broader organisational strategy.

2.5. Dynamics of change in project management in the context of measuring project management effectiveness

The identified contextual conditions constantly change. Contemporary measures of project management effectiveness adapt to dynamic business and social environments. Expectations for evaluation systems evolve and must meet emerging needs. Volden and Welde (2022) note that assessing project management, especially in public projects, should include the perspectives of citizens and taxpayers. Methods from knowledge management, strategic integration, and teamwork assessment are increasingly important. Agile projects evaluate leadership effectiveness, while social projects focus on building trust and empowerment.

In addition, the ongoing digital transformation of organisations has presented decision-makers with both new challenges and opportunities for measuring the effectiveness of project management. Advanced analytical tools, business intelligence systems and artificial intelligence-based solutions enable more precise monitoring of project parameters and prediction of potential risks.

As a result of these changes, effectiveness should be considered from different time perspectives and levels of analysis (Shenhar & Dvir, 2007). Its measurement should therefore focus on goal-oriented metrics that combine project success with organisational success (Murphy & Cormican, 2015).

The above considerations lead to the conclusion that contemporary measurement of project management effectiveness requires not only new methods but, above all, a paradigm shift in evaluation – from a universalistic to a personalised approach, from ex-post evaluation to continuous monitoring, and from exclusively financial indicators to the integration of financial, qualitative, and strategic dimensions.

3. Research method

This study used a literature review, which ensures the quality, transparency and repeatability of the research process and minimises subjectivity in the selection and interpretation of data (Snyder, 2019). The publication selection process consisted of six stages (Figure 1). Searches were conducted in three databases: Web of Science, Scopus,

and ScienceDirect. The identification stage involved searching for publications using three combinations of concepts (Core Concepts, Effectiveness, Measurement Focus) linked by logical operators (AND, OR):

(1) Concept 1 (Core Concepts): "project management" OR "project portfolio";
(2) Concept 2 (Effectiveness): "effectiveness" OR "measurement of effectiveness" OR "metrics of effectiveness" OR "indicators of effectiveness" OR "project success" OR "project performance";
(3) Concept 3 (Measurement Focus): "measurement' OR "evaluation" OR "assessment".

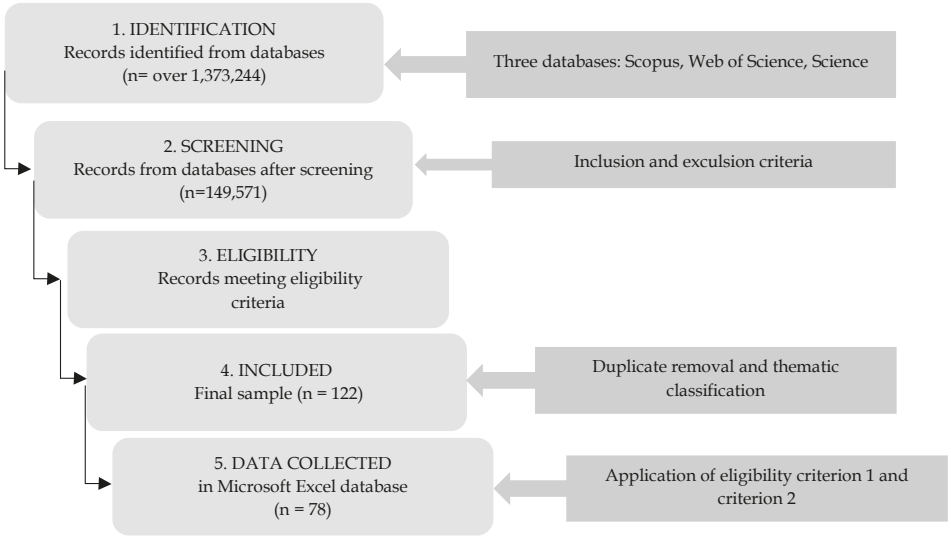

Figure 1. **The course of the research procedure**

Source: own elaboration

Simultaneously, both inclusion and exclusion criteria were applied. The first group comprised elements such as: (1) publications in English, (2) peer-reviewed scientific articles and book chapters available through open access, (3) publication period: 2000–2024, and (4) publications in journals related to project management and organisations, including effectiveness measurement, management, and business categories. The exclusion criteria group included: (1) grey literature (reports, conference materials, master's and doctoral theses), (2) publications outside the specified time

frame, (3) publications focusing solely on economic efficiency, financial metrics, quantitative indicators (e.g. EVM, ROI, NPV), and cost control tools, and (4) works of low methodological quality or lacking peer review. Combining all three concept groups using the AND operator further narrowed the results to publications directly addressing the research topic (Criterion 1). In the subsequent selection step, attention was directed to specialist journals with titles that included the word 'project' (Criterion 2). This enabled the identification of high-quality sources in project management, while excluding general managerial content in favour of strictly project-related topics. The inclusion process began by removing duplicates across databases. Each database was then classified according to the adopted operational definition introduced by Zidane and Olsson (2017) in Section 2. The authors show that 'effectiveness' encompasses efficacy, success, and efficiency, as proxy constructs (Zidane & Olsson, 2017). The 44 publications were excluded from further analysis because they were not directly relevant to the project results. They primarily described processes, educational issues, and management without effectiveness metrics.

The final thematic classification yielded 78 publications on measuring project management effectiveness, focusing on the study of effects, success factors, or measurement frameworks. Data from selected publications were collected using Microsoft Excel, which contained information on items such as author, title, year of publication, publication details (journal, volume, issue), and effectiveness measurement indicators, indicating advantages and disadvantages. This enabled the collection of all selected publications in one place and the standardisation of the data contained within.

4. Research results

The systematic literature review analysed 78 publications from 2000 to 2024. In the first decade, only seven papers (8.97%) on the effectiveness of project management were published. A notable rise in interest was observed during 2010-2019 (38.46%) (Table 1).

Table 1. **Distribution of publications over time periods**

Period of time	Number of publications	Percentage (%)
2000–2009	7	8,97
2010–2019	15	38,46
2020–2024	41	52,57
Total	78	100,00

Source: own elaboration

However, the largest share of publications (52.57%) falls within the 2020–2024 period, suggesting growing interest in this topic among researchers. At the same time, an analysis of publication distribution by journal indicates a clear concentration of research in several key industry journals (Table 2).

Table 2. **Distribution of publications by journal and their frequency**

Title of Journal	Number of publications	Percentage (%)
International Journal of Project Management	39	50,00
Project Leadership and Society	10	12,80
International Journal of Information Systems and Project Management	8	10,30
Journal of Project Management	6	7,70
International Journal of Managing Projects in Business	4	5,10
Others	11	14,10
Total	78	100,00

Source: own elaboration

The vast majority of studies were published in the International Journal of Project Management, accounting for 50.00% of all analysed works (39 out of 78). The remaining publications are spread across several other specialist journals and many individual items, with Project Leadership and Society accounting for the largest share (10 out of 78).

4.1. Analysis of methods for measuring project management effectiveness and their limitations

This section addresses research questions RQ1 and RQ2 by examining existing methods and highlighting their strengths and weaknesses in practical application. Analysing the publications included in the study shows that the evolution of measurement methods does not happen in isolation. It is part of a broader global trend of developing integrated Performance Measurement Systems (PMS) within organisations. Within a PMS framework, project management effectiveness is no longer seen as a standalone silo but becomes a key part of the organisation's overall operational and strategic performance. A clear progression demonstrates the increasing complexity and depth of analysis, as well as the greater integration of different perspectives in assessing project management effectiveness. Contemporary methods range from simple technical indicators to

relational and strategic qualitative measures, up to complex models that integrate multiple assessment dimensions.

To give a thorough overview, Table 3 summarises the chosen methods, their purpose, and their respective strengths and weaknesses.

Table 3. **Evaluation of selected methods for measuring project management effectiveness**

Approach	Methods/ Indicators	Context / Purpose of Measurement	Advantages	Disadvantages
Traditional indicators	Time Cost Scope/Quality	Basic measure of meeting schedule, budget, and technical scope.	Foundation of evaluation. Simple, widely used, enables quick cross-project comparisons.	Reductionist: ignores strategic, social, and innovative impacts.
Stakeholder-oriented metrics	Customer satisfaction, trust Stakeholder engagement Stakeholder values	Measures the perspectives of key stakeholders; assesses the quality of relationships and communication.	Reflects true value delivered to stakeholders; supports relationships.	Highly subjective; context-dependent; difficult to standardise.
Strategic and innovative metrics	Innovativeness creativity preparing for the future, collaborative problem-solving, organizational success	Measures impact on organisational development, intellectual capital, and future readiness.	Supports long-term adaptability and transformational value.	Difficult to measure unambiguously; outcomes are often delayed past project closure.
Human Capital Metrics	Team involvement, PM self-efficacy, leadership style	Assesses competencies, motivation, team development, and leadership quality.	Strengthens culture; supports competence development and motivation.	Difficult to measure objectively; highly dependent on specific management styles.
Integrated multidimensional models	MPMS, Balanced Scorecard (BSC), MCDM (ANP, TOPSIS, ANN)	Integrates tangible results, processes, and organisational context into a balanced evaluation.	Allows weighting multiple factors; supports strategic decisions across perspectives.	High complexity of input data; difficulties in implementation; requires high organisational maturity.
Knowledge management and learning	Knowledge Management, Use of Lessons Learned, Social Engineering Integration	Assessing the organisation's capacity to learn, accumulate, and utilise project knowledge.	Supports continuous improvement and organisational resilience.	Difficult to systematise; requires a culture highly conducive to knowledge sharing.

Risk management	Risk Management Performance Measurement, Risk matrix, RPI	Assessment of the effectiveness of identification, analysis, and response to design risk.	Better management of uncertainty; supports complex decision-making.	Subjectivity of assessments; effectiveness relies heavily on team competence.
Continuous control methods	Project Health Check, Earned Value Management	Ongoing monitoring of project status for early detection of deviations.	Allows active monitoring and rapid problem detection during implementation.	Focuses primarily on technical parameters; overlooks qualitative and broader context.
Industry methods	IT metrics, Agile criteria, specific tech specifications	Adapted to the specific dynamics, technology, and stakeholders of a given industry.	Highly tailored to context; supports strict industry compliance and norms.	Prevents cross-industry comparisons; may overlook broader strategic goals.

Source: own elaboration based on Abudaqqa & Ab-Samat (2024); Almahmoud et al. (2012); Ansari et al. (2024); Aramali et al. (2021, 2024); Arviansyah et al. (2015); Badrinarayanan (2024); Blomquist et al. (2016); Boateng et al. (2015); Bukoye et al. (2022); Chapman (2024); Costantino et al. (2015); de Bakker et al. (2010); Dikmen et al. (2007); Eriksson et al. (2023); Flyvbjerg (2013); Gemünden et al. (2018); Korhonen et al. (2023); Leilaee & Rezaeian (2021); Marques et al. (2011); McLeod et al. (2012); Montequín et al. (2013); Özturan et al. (2019); Pankratz & Basten (2014); Rahman & Adnan (2020); Sajid et al. (2021); Sekasi et al. (2024); Varajão et al. (2022); Volden & Welde (2022); Zidane et al. (2016)

The foundation of measurement still depends on traditional indicators (the iron triangle). While they allow quick comparisons and serve as a baseline for control systems, modern PMSs are shifting their role from purely administrative control to providing fundamental process data. Researchers increasingly emphasise their limitations, pointing out that they are reductionist and fail to reflect the complexity of modern projects, such as collaboration quality or broader organisational impact (Korhonen et al., 2023; Pankratz & Basten, 2014).

To address these gaps, stakeholder-oriented metrics have gained prominence, especially in IT projects where success is multidimensional (McLeod et al., 2012; Varajão et al., 2022). They effectively reflect the value delivered to users. In the public sector, this extends to include social responsibility (Volden & Welde, 2022). However, their interpretation remains subjective and heavily reliant on cultural and organisational context, which can restrict their standardisation (Badrinarayanan, 2024).

Similarly, strategic and innovative metrics shift the focus towards long-term outcomes such as organisational success and intellectual capital, which are essential for R&D projects (Gemünden et al., 2018). While they reflect a project's transformational value, these results are seldom visible immediately after project completion, making them difficult to measure.

The literature also strongly emphasises human capital metrics, highlighting the view that people, not just processes, are key to effectiveness. Indicators such as team engagement and project manager self-efficacy offer deeper insights into the mechanisms behind success and leadership effects (Blomquist et al., 2016; Müller & Turner, 2005). However, their inherent subjectivity greatly limits objective comparisons between projects.

The increasing complexity of project environments has naturally led to the development of integrated multidimensional models (e.g., BSC, MPMS, MCDM). These hybrid approaches are highly effective at combining hard financial data with soft organisational aspects, thereby substantially supporting strategic decision-making (Montequín et al., 2013; Murphy & Cormican, 2015). However, their high complexity and the need for advanced input data limit their practical application to organisations with a high level of project maturity (Leilaee & Rezaeian, 2021).

Other highly contextual yet vital approaches include knowledge management, where an organisation's ability to utilise "lessons learned" marks its maturity (Aramali et al., 2021), and risk management, which is heavily reliant on advanced tools such as ANP to navigate uncertainty (Rahman & Adnan, 2020). Both areas significantly enhance organisational resilience but face challenges in operationalisation and subjective calibration.

Finally, practical implementation often depends on continuous control methods such as the Project Health Check, which provide excellent early warning systems during execution but frequently overlook qualitative data (Almahmoud et al., 2012). Conversely, industry-specific methods (tailored for IT, infrastructure, or agile environments) ensure high contextual relevance at the expense of eliminating cross-sector comparability.

None of the analysed groups of methods is without limitations. Their effectiveness depends entirely on the application context, the organisation's maturity, and the capacity to integrate different evaluation perspectives. The future of measuring project management effectiveness clearly lies in hybrid models that combine hard and soft metrics, prioritise stakeholder values, and are meticulously tailored to the specific dynamics of a given project.

4.2. Identified gaps in the literature on project management effectiveness assessment

The literature on the subject remains fragmentary, inconsistent, and often focused on specific aspects of project management effectiveness assessment. Analysis of the collected material reveals several gaps that limit both the theoretical understanding of effectiveness and the practical ability to assess it. This tries to address the research question RQ3. In particular, there is a lack of consensus on the definition of effectiveness,

its dimensions, and measurement methods across different organisational and industry contexts.

The first and most obvious gap is the lack of a universal, agreed-upon set of effectiveness indicators. As Głodziński (2019) notes, the literature does not offer a uniform assessment system acceptable across different industries and types of organisations. As a result, practitioners are forced to use solutions that are often based on intuition or internal standards. This hinders their operationalisation and standardisation, and thus the comparability of results and the ability to benchmark. Assessment methods are often based on subjective opinions, surveys, or interviews, which do not always meet criteria for accuracy and reliability (Murphy & Cormican, 2015).

The second area of shortcomings is the limited ability to adapt measurement methods to the specific project context. IT, infrastructure, R&D and agile projects require different approaches, as confirmed by numerous studies, but this is not fully reflected in standardised assessment models (Anderson & Lannon, 2018; Joslin &Müller, 2016; Malik et al., 2021). Leilaee and Rezaeian (2021) point out that even within a single industry (e.g., construction), sets of indicators vary depending on location or organisational culture. This contextual specificity reflects the diversity of challenges and objectives characteristic of different types of projects.

The third gap is the insufficient consideration of the time perspective in effectiveness assessment. The dominant ex-post approach focuses on analysing results after the project is completed, while effectiveness assessment is mostly a long-term activity. Although the literature highlights the importance of risk management (Rahman & Adnan, 2020), tools such as risk matrices or fuzzy assessments remain difficult to implement and are often subjective. In addition, continuous control and real-time assessment methods are becoming increasingly important, but their integration with project management systems remains limited (Flyvbjerg, 2013; Almahmoud et al., 2012).

The fourth gap is the discrepancy between project success and organisational success. In many cases, achieving project objectives does not translate into added value for the organisation (Korhonen et al., 2023). There is a lack of tools that allow for the systematic linking of project results to hard organisational productivity parameters, such as resource efficiency or the return on intellectual capital. The dominant approach focuses on "task completion", overlooking how a project optimises business processes or increases the enterprise's overall productive capacity. As a result, many projects considered "successful" in operational terms (time, budget) turn out to be ineffective in the context of long-term productivity (Pankratz & Basten, 2014).

In response to these deficits, the following section introduces a framework of seven indicators (five original and two adapted). These have been designed to bridge the

gap between operational project management and a strategic PMS. By focusing on organisational capacity, the proposed metrics shift the emphasis from mere timeliness to measuring the productivity of the resources involved in the project and verifying the actual value added by the project to the organisational structure.

Finally, the role of knowledge management as a dimension of effectiveness is often underappreciated. Although increasing numbers of authors highlight the importance of an organisation's ability to learn, accumulate, and utilise project knowledge (Abudaqqa & Ab-Samat, 2024), there is a lack of consistent models for assessing this area and tools for measuring it systematically and comparably. Meanwhile, the success of a project is increasingly defined by its capacity to generate value and knowledge for various stakeholder groups – from customers and users to project teams.

It is also notable that most of the identified methods require the subjective determination of component weights, which presents a fundamental methodological challenge. The absence of empirically justified weighting systems can lead to results being influenced by the evaluator's preferences, thereby undermining the objectivity of the measurements (Macheridis, 2022). This issue is especially apparent in complex hybrid indicators, where arbitrary weighting can significantly impact the final effectiveness assessment. For instance, in the Project Health Index, altering component weights can lead to differing conclusions about a project's health (Almahmoud et al., 2012).

Many of the identified methods (especially those related to conceptual frameworks and maturity models) lack specific calculation formulas, which limits their practical application (Costantino et al., 2015). This points to a gap between theoretical concepts and practical implementation tools. In addition, other methods require empirical verification in real design environments (Abudaqqa et al., 2024). Overall, this highlights the need for more practical research into the effectiveness of the proposed solutions.

There is a need to develop tools that combine measurement precision with practical applicability across a variety of design contexts. In other words, tools that are not only theoretically consistent but also practically useful, that take into account both hard and soft metrics, are stakeholder value-oriented, and are adaptable to different organisational contexts.

5. Discussion and concept for proprietary project management effectiveness indicators

The research gaps identified in the literature review and the fragmentary nature of existing methods for measuring project management effectiveness form the basis for developing a comprehensive measurement framework. Existing methods are characterised by a lack of methodological consistency, which hampers the comparability of results and the transfer of best practices between organisations. In response to these

limitations, a framework of seven indicators (five original and two adapted) focused on organisational capacity has been proposed for organisations that include project management in their operations.

The first three indicators concentrate on the institutional and competency-based aspects of project management effectiveness. The proposed Organisational Support for Project Management Index (OSIPM) assesses the level of institutional commitment to project management through the PMO-to-administrative-staff ratio. Based on the Resource-Based View, the OSIPM signifies that the organisation regards project management as a core competence, thereby supporting the implementation of advanced control systems (Table 4).

Table 4. **Original indicators for measuring project management effectiveness**

Indicator name	Pattern	Description
Organisational Support Indicator in Project Management	$OSIPM = \frac{\sum N_{SPM}}{\sum N_{ASU}}$	Number of project management office employees(N_{SPMO}) / Number of administrative staff in the organisation (N_{ASU})
HR Engagement Indicator in Project Management	$HREIPM = \frac{\sum N_{SPM}}{\sum N_{RSU}}$	Number of project management office employees(N_{SPMO}) / Number of staff of the organisation (N_{RSU})
Project Office Staff Certification Index	$POSCI = \frac{\sum N_{CSPM}}{\sum N_{SPM}}$	Number of certified project management office employees (N_{CSPM}) / Number of project management office employees (N_{SPMO})
Project Management IT Usage Index	$PMITUI = \frac{\sum N_{ITT}}{\sum N_{SPM}}$	Number of IT tools supporting project management (N_{ITT}) / Number of project management office employees (N_{SPMO})
Project Acquisition Effectiveness Indicator	$PAEI = \frac{\sum N_{SP}}{\sum N_{A}}$	Sum of Accepted Projects for Funding (N_{SP}) / Sum of all submitted projects by a given organisation (N_{AP})
Schedule Performance Index	$SPI = \frac{\sum N_{PT}}{\sum N_{AT}}$	Planned project implementation period (in months) (N_{PT}) / Actual project implementation period (in months),(N_{AT})
Settled Costs Indicator	$CSI = \frac{\sum N_{SP}}{\sum N_{AM}}$	Funds settled in the project (N_{CP}) / Funds allocated in the project (N_{FR})

Legend: N-number, SP-submitted projects, AP-accepted projects, SPM-staff of project management office, CSPM-certified staff of project management office, ITT-IT project management tools, ASU-administration staff of the organisation, RSU-research staff of the organisation, PT-planned time, AT-actual time, CF-cleared funds, FR-funds received.

Source: own elaboration

Another newly developed indicator, the Human Resource Engagement in Project Management (HREIPM) indicator, measures the ratio of PMO staff to research staff, reflecting the degree of professionalisation of project management in the organisation. According to the Organisational Maturity Model, a higher HREIPM score indicates a transition from ad hoc management to a systematic, process-based approach (Kerzner, 2023).

The Project Office Staff Certification Index (POSCI), on the other hand, is a measure of PMO team competence based on the concept of human capital (Human Capital Theory). Possession of international certifications correlates with higher effectiveness and the ability to adapt to industry best practices (Blomquist et al., 2016). The POSCI indicator assesses an organisation's ability to implement unified performance evaluation tools and adapt to industry best practices.

The remaining indicators address the technical infrastructure and the traditional performance dimensions of time and cost. Using the Project Management IT Tool Usage Index (PMITUI), the intensity of IT integration can be measured relative to the size of the project portfolio. The Technology Acceptance Model (TAM) assesses the effectiveness of planning and monitoring (Venkatesh et al., 2003). This reflects the organisation's readiness for Industry 4.0 and its capacity to handle the complexity of measurement. The Project Acquisition Effectiveness Indicator (PAEI) is defined as the ratio of the amount of money in projects accepted for funding (NZP) to the total amount of money in projects submitted by a given organisation. The data obtained in this way makes it possible to verify the effectiveness of acquiring new projects, where a higher value indicates greater efficiency in a given organisation.

The last two indicators, while based on established project management methodologies, have been adapted and integrated into the proposed holistic framework to provide a comprehensive evaluation of project outcomes. The first of these, the Schedule Performance Index (SPI), represents effectiveness as the ratio of planned to actual project completion time. Although derived from the Earned Value Management (EVM) methodology (Fleming & Koppelman, 2016), the model's application focuses on its role as a universal metric within a broader, multi-criteria assessment. In project management, $SPI > 1$ indicates the schedule is ahead of schedule, $SPI = 1$ indicates the project is on schedule, and $SPI < 1$ indicates delays.

Similarly, the Cost Settlement Index (CSI) addresses the gap in financial performance measurement by operationalising an organisation's ability to use allocated funds effectively. This index, based on the theory of allocative efficiency, complements the newly developed organisational indicators and responds to the need for unified assessment tools identified in the literature review.

The proposed indicators directly address the identified lack of integrated, multidimensional tools. By combining organisational (OSIPM, HREIPM), human

(POSCI), technical (PMITUI), and operational (SPI, CSI) metrics, this framework provides a comprehensive view of effectiveness.

6. Conclusions

The approach to measuring project management effectiveness has evolved from simple indicators of time, budget, and scope to multidimensional frameworks that account for strategic outcomes and value-added results**.** Traditional metrics, while still relevant for baseline control, are increasingly viewed as insufficient for assessing a project's true contribution to an organisation's long-term productivity and stakeholder value.

A systematic review of 78 publications from 2000 to 2024 reveals a rising interest in research activity between 2020 and 2024. This trend underscores a growing institutional and academic interest in effectiveness as a driver of organisational excellence. The concentration of relevant research in peer-reviewed journals signals the tendency towards professionalisation and standardisation of effectiveness measurement as a critical sub-discipline of management science.

Despite this progress, the current state of knowledge indicates that project management effectiveness remains a complex operational construct without a universally accepted definition and established measurement methods (Winter et al., 2006; Müller et al., 2019). While qualitative measures (such as satisfaction, trust, and innovation) are gaining prominence, they often lack the rigour of a unified Performance Measurement System (PMS), leading to subjective and inconsistent evaluations. In practice, organisations are frequently left to navigate these complexities by tailoring metrics to their specific maturity levels, often settling for fragmented or "partial" assessments (Kerzner, 2019).

The analysis identified several critical gaps, most notably the absence of a standardised set of indicators that allows for cross-industry benchmarking and objective productivity analysis. Many existing methods lack specific calculation formulas or rely on subjective weighting systems, limiting their practical utility. Furthermore, there is a persistent disconnect between operational project success and the achievement of strategic organisational outcomes, such as enhanced adaptability and the growth of intellectual capital.

The seven performance indicators proposed in this study (OSIPM, HREIPM, POSCI, PMITUI, PAEI, SPI, and CSI) were designed specifically to bridge these gaps. By operationalising the organisational, competency-based, and technical dimensions, these indicators provide a cohesive framework for assessing effectiveness through the lens of resource productivity and the Resource-Based View. They provide a structured foundation for research and development organisations to align their project activities with a broader, strategy-driven PMS.

Finally, project effectiveness must be understood as a hierarchical phenomenon. The performance of project teams underpins the success of individual projects. These, in turn, drive the effectiveness of the project portfolio and, ultimately, the realisation of the organisational strategy (Mathieu et al., 2008; Martinsuo & Lehtonen, 2007).

As organisations move toward more complex and transformational environments, the project portfolio acts as the essential conduit, aggregating operational results and converting them into measurable strategic value and enhanced organisational productivity (Killen et al., 2008; Müller et al., 2008).

The analysis of the literature reveals the systemic nature of the problems associated with measuring project management effectiveness. The multidimensionality of contemporary projects, while reflecting their actual complexity, paradoxically hinders the creation of universal measurement models and a compromise between standardisation and contextual understanding of project processes. The identified gaps point to an urgent need for further research focusing on:

- developing terminological and methodological standards for effectiveness assessment,
- empirical validation of existing models in various sectoral and organisational contexts,
- the operationalisation of qualitative indicators and soft aspects of project management,
- the development of objective, empirically justified weighting systems,
- the development of tools combining project effectiveness assessment with strategic value for the organisation,
- the integration of continuous assessment systems with project management practice.

The effectiveness indicators proposed in this study address some of the identified challenges; however, their practical use requires further empirical research and validation across different organisational settings. The trend towards combining different methodological approaches and integrating quantitative and qualitative perspectives points towards future directions for developing measurement tools in project management.

Authors' contribution

M.W.: theoretical content of the article, research methods applied, conducting the research, data collection, data collection, analysis and interpretation of results, draft manuscript preparation. **J.K**: article conception, theoretical content of the article, analysis and interpretation of results, draft manuscript preparation.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors did not use Generative AI and AI-assisted technologies in the writing process.

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