Research article

Impact of methodologies and standards on the owner's economic benefit in projects

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ABSTRACT

Many researchers address the benefits of using methodologies, standards, but they rarely go beyond the direct effects, and get to the ownership. The owner is one of the key participants in project management. This research aims to explore a possible association between the methodologies, standards applied in organizations, and owner's value. The data set serves as a base of the statistical analysis, where the respondents are employees working in a project management environment. The complex analysis of this study justified a significant relationship between standards and methodologies, and the creation of owner's value. Therefore, this finding could be employed to assess the chances of creating owner's value, e.g., in rapid evaluation methods in project management. Such a justified relationship can be used not only in project management.

1. Introduction

At the project level, the role of an owner is defined by its functions, such as being responsible for the project's business success, ensuring the alignment of the project with the company's strategy, providing financial resources, accepting project completion (Müller and Turner, 2005). At the portfolio level, when a project is evaluated, the owner has a fundamental role in deciding what statuses to assign to the projects in the portfolio, which projects should receive more attention from the management and take more resources from the resource pool. Increasing owner's value is behind every project decision at the end of the line; however, more and more other aspects may emerge strongly as well (Szilágyi et al., 2020). There are several traditional, widespread methods for the economic evaluation of projects, such as Net present value (NPV), Return on Investment (ROI), Internal Rate of Return (IRR), Payback Period (PBP), Discounted Payback, and Benefit-Cost Ratio (BCR) addressed in almost all major project management textbooks and standards (Kerzner, 2009; Pinto, 2015; Project Management Institute, 2017; Turner and Simister, 2000).

Companies make a deliberate effort to evaluate projects, so many companies have an evaluation strategy that serves as a guideline for the evaluation process. However, before making more accurate, time-consuming, and tiresome calculations, it is often necessary to form a preliminary opinion on the projects in practice. In the portfolio of a multinational company, there can be thousands of projects. Their preliminary and continuous rapid evaluation is a considerable task. Rapid assessments play an important role in practice, not just in project management. The crucial task of rapid assessment methods is to obtain a balance between the speed, appropriateness, and reliability of the information. The purpose of rapid assessment is to employ tools to obtain the necessary information and provide the results to those who need them as quickly as possible. Although one of the most specific tools is the checklist, there are more than 100 tools to employ optionally besides it (Barksdale and Lund, 2006; McNall and Foster-Fishman, 2007).

Identifying a factor that impacts the owner's value is more straightforward and faster than an otherwise inevitable and necessary traditional economic analysis later. Thus, these two conditions (speed and simplicity) are met by examining the new factor we propose. So, if we could find a factor that helps to increase the owner's benefit, then, on the one hand, we have already received a useful piece of information that will help decision-makers from the first moment; on the other hand, it could be revealed in which direction to expand the various rapid assessment techniques. The suggestion includes what new aspect to add to a possible evaluation checklist. Going one step further and narrowing the research area, the question is whether we can approach owner's value creation from the side of methodology and standards. This study follows the interpretation of the owner and other project participants by Páidar et al. (2017).

This research is based on the conjecture that there is a positive association between methodology and standards for processes of the

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organization, and owner's value. This conjecture is the basis of the research, and will be formulated further to be the formal research question. Our initial null hypothesis is determined for this assumption, and we examined a questionnaire sample of 111 participants to see if this hypothesis should be rejected. In the research, not only did this relationship prove statistically significant, but more in-depth analysis revealed other valuable results. Thus, the simple relationship can be interpreted in a more comprehensive, much broader framework creating new opportunities for future applications. As this is a meaningful context, we propose a possible practical application of the project evaluation results. We thoroughly reviewed the opportunities of this proposal to reveal any benefit later, hoping there will be research to proceed in this direction.

2. Literature review

2.1. Methodologies and standards in project environment

Methodologies play a vital role in the life of organizations. Therefore, many organizations adopt a general project management methodology interpreted for their corporate specificity or develop their methodology (e.g., PROPS - Project for Project Steering, Ericsson's general model for all types of projects in the entire organization), which is built entirely on their unique characteristics. The role of project management standards and methodologies in an organization's processes is to support project management in delivering the project products and achieving the project objectives. Consequently, the choice of an appropriate project management standard is a strategic decision that should be taken with careful attention due to the significant influence it has on project success. The various approaches supporting project management orientation are classified into standards accepted by international standardization organizations (e.g., PMBoK Guide, ISO 21500, DIN 69901, BS 6079:2019), and methodologies (e.g., PRINCE2) that are sophisticated at a similar level and play precisely the same role in the management of organizational projects (Wideman, 2002; Matos and Lopes, 2013). However, the standardizing organizations do not consider them official standards. The difference between de jure (official) and de facto standards is their official recognition by standardizing organizations. De facto standards exist in practice and are applied successfully in projects (e.g., company standards), even though they have not undergone any formal process, and are not officially recognized by institutions (Campbell et al., 2012).

Hübner et al. (2018) provided a comprehensive classification system based on whether the standard is recognized by the appropriate standardization organizations or applied only as a standard without formal accreditation. Also, they investigate whether the standard is general or industry-specific and serve as a maturity model. The official standardizing associations publish de jure standards, which can be the basis of formal project management (Hübner et al., 2018). At the international level, there are several examples such as the International Standards Organization (ISO), the British Standards Institute (BSI), and the German National Standards Institute (Deutsches Institut für Normung, DIN). These associations published a general guidance in project management that can be used by any organization like DIN 69901, ISO 10006, IEC 62198, and ISO 21500. Additionally, the professional communities produce the second type of project management standard, which is called de facto standards (Garel, 2013; Grau, 2013). These standards are mainly based on experience. Typically, the information and experience are collected and structured in the Body of Knowledge (Hübner et al., 2018; Project Management Institute, 2017). The knowledge is published in books or on the web by the community of project managers (e.g., homepages of Project Management Institute (PMI, 2021), Association for Project Management (APM, 2021), or International Project Management Association (IPMA, 2021)). Usually, it constitutes essential elements in a complex preparation system for training and certification, for example, The International Competence Baseline (ICB 3.0), PMBoK, PRINCE 2, PM-Kanon, ProjectManager, PM3.

For instance, the Guide to the Project Management Body of Knowledge (PMBoK) has initially entered the profession’s circulation as a de facto standard and later became an official one, accredited by the American National Standards Institute (ANSI). ANSI adopts PMI’s PMBoK (ANSI/PMI 99-001-2017) as the only PM standard in the United States. Moreover, PMBoK carries the characteristics of the two categories (standards and methodologies) (Hübner et al., 2018; Project Management Institute, 2017). The third type of standards is the specialized standards, which are developed for specific industries and must be adopted by prospective big organizational customers. These standards are specific regulations, norms, and best practices (e.g., V-Modell XT, Scrum, VDA 4.3, HOAI, VOB/FIDIC). Finally, the technical standards are between the official and the de facto standard sets based on their industrial application. The closely related maturity models must be mentioned as well, which evaluate project excellence (for example, the Organizational Project Management Maturity Model (OPM3) published by PMI, PM-Delta, and the project excellence model published by IPMA, CMMI, and SPICE) (Grau, 2013; Hübner et al., 2018). These models are not official standards, but they can play a fundamental role in corporate project management culture. Moreover, project management standards should be placed and interpreted in this system. Due to this diversity in standards types, organizations have a challenging task in selecting and implementing the appropriate project management standards. Generally, the major issues in implementing standards comprise administrative overheads and excessive expenditures, as well as a lack of acceptability among project management practitioners.

A recent study pointed out that in Germany and Switzerland, project management standards are seldom used for the project management practices of organizations (Ahlemann et al., 2009). Undoubtedly, the presence of project management standards and their application in organizations is not self-evident, and anxious considerations related to standards are also worth addressing.

Generally, the weak performance of a project does not necessarily arise from weak implementation of project management methodologies. At the strategic and organizational level, the perceived contribution of project management methodologies differs from the project's perceived benefits and operational levels. Therefore, organizations should be aware that project management standards are experienced as beneficial but do not lead alone to the expected results per se. Wells (2012) stated that project management methodologies do not guarantee positive project results. Therefore, the expected benefits are often not realized even when the standards are implemented effectively. Undoubtedly, there are many other factors that influence a project’s result, but if a suitable, relevant project-oriented standard is chosen, the probability of success is also higher. The application of project-oriented standards positively increases the chances of success compared to comprehensive ones (Abdulla and Al-Hashimi, 2020). On the one hand, their application is not trivial in any of the organizations. On the other hand, their various positive effects are evident.

Despite the anomalies mentioned above, the advantages of project management standards are evident, as presented in the literature. Hübner et al. (2018) claimed that project management standards incorporated into the organizational guidelines have a positive impact on project success. Moreover, the well-developed and improved standards are more common and applied more often than underdeveloped and less widely spread standards (Grau, 2013). In addition, the project management standards have an advantage over general standards in a complex environment containing projects because comprehensive standards focus essentially on technical aspects, e.g., the project-oriented PMBoK concentrates on the project aspects of the substantially identical processes or activities (Xue et al., 2016).

Research initiated by the German Institute for Standardization (DIN) and the German Federal Ministry of Economic Affairs and Technology (BMWi) considered project management standards ‘enablers of more effective and efficient use of resources delivering sustainable economic development’ (Bredillet, 2003). This study found a correlation between
economic benefits and the use of standards; moreover, it pointed out that standards are superior to patents and licenses in contributing to economic growth, and organizations that actively participate in standards have a significant advantage over their competitors when it comes to responding to market needs, new organizations, and technology. Kristiningrum et al. (2021) came to the conclusion that applying standards had a beneficial impact on the industry. Standards provide advantages that are not just economic, but also positively associated with the influence of innovation, technology, and society as an intangible benefit. Economic benefits were achieved through cost-effectiveness of the business function or increased profit from production. In addition to the undeniable benefits of various standards, it would now be worthwhile to examine their specific relationship with the owner, and although a favorable relationship is assumed, this has not yet been examined.

2.2. Rapid assessment methods for project management

The project assessment process has become an essential activity in managing any project, and indirectly necessary to the owner. Pre-evaluation determines the project’s main expected parameters (e.g., profitability, success) before execution. There are several business processes in which not only the preciseness of the preparation of the decision is important, but also its speed and immediacy (e.g., large project portfolio pre-evaluation). Anker et al. (1993) defined the rapid assessment method as ‘a need for a quick, accurate, and economical method of evaluating facilities and client satisfaction’. The rapid assessment methods are designed to develop and guide programs or projects and provide an overall evaluation of the value of programs or projects at the critical decision points to enhance the decision-making quality, reflecting on the effectiveness of future actions (Harris et al., 1997; McNall and Foster-Fishman, 2007). Therefore, many project owners, decision-makers, and project financiers emphasize the importance of the role that the rapid project assessment process plays in project success, its continuity, and the achievement of its objectives. Clearly, rapid assessment is helpful because of its speed, and it has its place and function in corporate processes, but it must always be used at the earliest project stages. It also helps to predict the amount of effort involved in the assessment process, and it will exclude some of the many ill-conceived plans. The rapid assessment methods are easier to incorporate in organizations with low disagreement or conflict among stakeholders (Bridger, 1986; McNall and Foster-Fishman, 2007). The contribution of rapid assessments to a well-prepared decision is critical. However, rapid procedures may not sufficiently resolve the potentially crucial elements entirely for an in-depth and final evaluation (Manderson and Aaby, 1992).

According to Hargreaves (2014), rapid assessment has several necessary basic principles, regardless of complexity. Firstly, rapid assessment methods should keep the right balance between short-term objectives and long-term objectives. The majority of managers said they would forgo an investment that provided a reasonable return on capital if it meant a loss of quarterly earnings expectations (Graham et al., 2005). Therefore, a short-sighted concentration on immediate objectives (subsystem optimization) should not endanger the achievement of long-term objectives (optimizing the entire system). Secondly, rapid assessment should not only be a measurement or diagnostic tool. It should be part of an immersive and adaptive management process that utilizes the outcomes and the external reviews together in an ongoing process to validate and review the overall approach (Hargreaves, 2014). Thirdly, the collected information evaluated and interpreted should be used ‘as a catalyst for continuous development’, in which data and action plans are reconsidered (Hargreaves, 2014). Original assumptions are tested through a reflective, double-loop learning mechanism that encourages rethinking project priorities and goals (Argyris, 1982).

The Construction Industry Institute (CII) formed a research team to develop reliable and easy-to-use tools for pre-project planning that expanded and developed previous research efforts in which owners and contractors could better achieve business, operational, and project goals (CII, 1996). They developed the Project Definition Rating Index (PDRI), a comprehensive and detailed weighted checklist of critical scope definition factors that must be discussed in the pre-project planning process. PDRI offers a clear and easy-to-use guide for the project team to critically assess a project’s current status during pre-project planning. It allows project stakeholders to quickly and efficiently evaluate the scope definition package and predict factors that could impact project risk, especially concerning industrial and construction projects. If the identified scope factors are not clearly addressed, the project is more likely to have a less than successful project performance (cost/schedule performance). One of the major phases of the project life cycle is pre-project planning. This stage starts after the owner (investor) decides to move forward with the project idea and continues until the comprehensive and detailed design is created. That is, according to the sample projects, weak pre-project planning practice in these aspects is more probable to reflect negatively on project performance (cost or schedule performance) (Wang and Gibson, 2006).

3. Methodology

The analysis of a project’s profitability and the economic calculation of a projected investment is crucial to the owner more than the other participants. In a project, decisions related to capital budgeting and investment planning affect all other project processes and involve almost all participants to varying degrees. There is no doubt that this process is always necessarily included in the first phases of projects. As the ex-ante project evaluation is based on pre-estimated expected returns, the probabilities play a significant role in the process. The well-established and widely used methods and tools of finance theory are requisite elements of these evaluations. Simultaneously, a rapid pre-evaluation, including an economic assessment, could include the chances that the application of project management standards would increase the probability of a positive economic benefit. Once we have clarified our motivation with the conjecture of a positive correlation, the following research question covers its purpose.

Is there any association between the application of standards/ methodologies and the economic profit generated to the owner during a project?

This research question captures the essence of the problem. However, in the course of the work, for a proven answer, it is necessary to explore other relationships that can be substantively connected to the question and show the whole picture (i.e., to what extent the sector influences the findings). Let us suppose there is a correlation between applying methodologies and standards, and owner’s value, with a positive impact. In that case, the phenomenon could play a major role in project management, for instance, in the rapid preliminary evaluation of project portfolios.

From a managerial point of view, an important question may also arise, whether we could concentrate on the organization’s maturity and the competency level of project management focusing on the customer level in rapid evaluation. It is worth looking for further correlations between them in future research.

3.1. Collecting data and data set

As reaching a large number of people working on projects is a special task, and there is no fully comprehensive database available, inviting a highly reputable professional organization to help with the dissemination of the questionnaire, and interviewing MBA graduate students already working at different management levels seems to be a solution, and a snowball data collection method is reasonable. Accordingly, we targeted those who are reached through the Project Management Institute local chapter and those in the MBA program at the region’s leading university of technology, so responses came primarily from these two sources. The questionnaire was designed to
examine the effectiveness and success of the projects, narrowing the focus to certain areas. On the one hand, it scrutinizes the quantitative, well-measurable side, and on the other hand, the subjective, perceptual side of possible causes. This study focuses only on quantifiable, objective elements, and explores those that match the approach to the success of traditional project management (i.e., evaluates project performance over time and financial indicators). All of this research covers the issues of application of standards/methodologies, differentiating where they are put into operation, generally at the company or specifically in the projects. Economic profit is of key importance among financial indicators, which, in our interpretation, means the part above normal or expected profit. This is the owner’s minimum return requirement for a project, and can be calculated by multiplying the expected return and the investment (the expected return is what you give up by investing in the project rather than the stock market at the same risk level (Brealey et al., 2010)). Respondents had an insight into the project and were involved in it in some way. The questionnaire refers to a specific project for each respondent, either in economic terms or in terms of putting standards and methodologies into operation for the particular project.

A total of 111 respondents participated in a questionnaire survey. The statistical analysis of the responses aimed to answer the research question formulated above. The data acquisition period was between February 2019 and March 2020. The fundamentally exploratory research targeted an unidentifiable multitude.

The applied sampling procedure was snowball sampling. This procedure is not a statistically representative sampling method, but a representative sampling technique would have been inappropriate given the research subject. The descriptive statistical processing of the responses confirms that the research reached a wide range. Respondents work for small, medium, and large companies, and they participate in projects employing from 1–9 people to more than 250 people. Table 1 presents the profile of company data collected from the questionnaire. Among the respondents, 56% and 22% of the respondents work at large corporations and medium companies, respectively. In terms of projects, 44% of the projects employed less than 10 people, and 39% employed between 10 and 49 people.

The projects had an average budget of approximately $20 million, and overall, 2/3 of the projects ended with a profit. Nearly 2/3 of the projects (60%) were implemented in the business sector, 26% in the public (government) sector, and 14% in the civil sector. The proportion of profitable projects is almost the same among public/government and business projects, but only 1/3 of the projects running in the civil sector ended with a profit (in the non-profit sector, participants can make a profit but they are not permitted to distribute it to any person (leaders or members) in the organization, or anyone outside the organization). The generated profit may only be used for its activities specified in the memorandum of association (Salamon and Anheier, 1992). The vast majority of the respondents were direct participants in the projects, most of them (45%) working as a team member, with an average of 1.8 years of experience in project management, and 42% of them working as a project manager, a member of the project management team, or as a team manager, with an average four years of experience in project management. Given the applied sampling method, it was expected that the majority of the examined projects, a little over 2/3 (68.5%), were projects implemented in Hungary. The rest (31.5%) were foreign or mixed, multi-country projects.

### Table 1. Profile of companies, respondents, and projects.

| Size of company          | % of respondents | % of projects |
|-------------------------|------------------|---------------|
| Micro (1–9 people)      | 10%              | 44%           |
| Small (10–49 people)    | 12%              | 39%           |
| Medium (50–249 people)  | 22%              | 11%           |
| Large corporation (more than 250 people) | 56% | 6% |

4. Data analysis and discussion

During the survey, the respondents assessed project success based on the traditional project evaluation criteria (lead time, budget, and compliance with regulations). Lead time and budget compliance were measured on a five-point scale, while compliance with regulations was measured on a three-point ordinal scale. As a dichotomous variable, we asked if there was any general work or safety procedure orientation in the organization, whether the organization applied safety regulations/standards or project management standards during the examined project. Also, the questionnaire assessed whether the project was profitable. In terms of time, budget, and compliance with regulations, project evaluations are summarized in Table 2, where \( n \) is the frequency (number of responses). In all, 77.7% of the companies/institutions use some regulation regarding work or safety at the company level; however, only 36% of them apply such standards particularly on their projects. In 26.2% of the projects, some known certain project management standard or methodology was used.

During the data analysis, we performed \( \chi^2 \)-tests based on the contingency table to explore the associative relationships between the variables measured on the nominal and ordinal scale. The Cramer associative coefficient was used to measure the closeness of the connection between the significant relationships. As Cramer’s V value only shows the closeness of the relationship, not its direction, in the case of significant relationships, the nature of the relationship—which categories ‘attract’ and ‘repel’ each other—was determined based on the difference in theoretical and experiential frequencies and the adjusted residuals calculated from this (Upton, 2000). The condition for applying the \( \chi^2 \)-test is the appropriate theoretical frequency, and therefore in some cases, when creating contingency tables, to ensure appropriate cell frequencies, we merged two or more response options into one category, compared to the original questionnaire categories. A sufficient theoretical frequency is required to perform the test. As shown in Table 2, 96.4% of the projects were completed on time or late, and only four projects were executed earlier than planned, so these four projects were merged with the projects completed on time. The two categories showing projects that were not completed in time (late and very late) were also merged. Based on the budget, we formed three groups during the analysis. We merged the two categories that performed below the planned budget, and those two that exceeded the budget.

In addition to these aggregations, we merged categories in two additional cases during the study, which were denoted by hash signs in Table 4 presenting the results of the statistical studies, giving the two aggregated categories as well. Merging was due to the reduced sample size, as the responses of the non-profit category were taken out, and thus the frequency would not have been significant in some cells for the \( \chi^2 \)-test. This table shows the results of the independence tests. The given grouping factors are indicated by the serial number of the questions in the questionnaire, which is summarized in Table 3.
One of the aims of this study is to explore whether these factors are influenced by the standards used at the company and in its projects, assessed according to traditional project evaluation criteria (time, cost and compliance with specification). However, the assessment of economic performance raises the question of whether the sector influences the appraisal of economic performance. The questionnaire contains a question targeting the sector: ‘Is your organization in the public (government), private or NGO sector?’ (referred to as Q36). Based on the answers to this question, we distinguished the three categories. We found that the economic efficiency of the projects in the NGOs differs significantly from the efficiency of those of the private, or the public sector. Therefore, after a thorough examination of all the data, we repeated the analysis without projects in the civil sphere (NGOs). Eventually, a total of $2 \times 21$ contingency tables were analyzed. The summarized independence test results are shown in Table 4. The cells show the calculated values of the $\chi^2$-tests, the p-value, and Cramer’s V value, only where the p-value indicates a significant relationship.

The cells above the main diagonal show the results of analyses performed from all data, and those below the main diagonal show the results of the repeated analyses without NGOs. In the studies without NGOs, only those relationships are indicated where the p-value changed significantly compared to the first analyses. Only the substantive changes are included in the table. Where no value is given means that the value of p above the main diagonal has changed, but this does not generate any change in the evaluation because, in these cases, the two factors are independent of each other. Therefore, the cases are listed in the table below the main diagonal, where the statistical conclusion has changed. Non-significant relationships (p $> 0.05$) became significant (p $< 0.05$), and in one case, conversely, a significant relationship became non-significant.

As a central issue in this research is ownership value creation, the relationships with question Q6 need to be explored. After the comparison with shareholder value, there are unambiguously significant relationships in some cases. On the one hand, the relationship with Q7 must be highlighted, which examines whether project management standards or methodologies have been applied during the project. On the other hand, the significant relationship with question Q17 on work and attention to public safety procedures also helps answer the research question. After the statistical analysis, one may reveal that the safety and project management regulations, standards, and methodologies used in the project impact profitability. This justified relationship is precious information for the owner in their various processes.

When presenting the study’s background, the conjecture arose that the proportion of profit-generating projects implemented in the civil sector was significantly lower than in public (government) and private sectors. When we examined the relationship between economic profit (Q6) and the corporate/institutional sector (Q36), the performed $\chi^2$-test confirmed the preliminary assumption. The calculated value of the test was 6.75, the p-value was 0.034, and the Cramer’s V-value was 0.275, which shows a moderately strong relationship between the two factors. The sector and the ratio of profitable projects are not independent of each other. This finding of the statistical analysis emerges significantly and clearly from other results.

Based on the statistical analyses, there was no significant relationship between questions Q3, Q4, Q5, Q7, Q16, Q17 (see Table 4), and the sector (Q36). Although the present study primarily focuses on the relationship between applied project standards and internal corporate work

### Table 4. $\chi^2$ - tests results.

|   | Q3  | Q4     | Q5     | Q6     | Q7     | Q16    | Q17    |
|---|-----|--------|--------|--------|--------|--------|--------|
| Q3 | –   | 7.494  | 0.751  | 3.480  | 0.925  | 0.994  | 0.154  |
|   |     | 0.024* | 0.687  | 0.062* | 0.336  | 0.319  | 0.694  |
|   |     |        | 0.263  |        | 0.189  |        |        |
| Q4 | 10.875 | –      | 1.796* | 0.553  | 0.068  | 0.370  | 0.617  |
|   | 0.004** |        | 0.407  | 0.759  | 0.967  | 0.831  | 0.735  |
|   | 0.353 |        |        |        |        |        |        |
| Q5 | –   | 3.526  | 4.949  | 1.064  | 0.587  | 0.174  |        |
|   |     | 0.172  | 0.106  |        |        |        |        |
|   |     |        |        |        |        |        |        |
| Q6 | 0.913 | 6.844**| –      | 8.493  | 4.896  | 0.027**| 0.373  |
|   | 0.339 | 0.009* |        | 0.004* |        |        |        |
|   |     | 0.298  |        | 0.330  | 0.243  |        |        |
| Q7 | –   |        |        |        |        | 2.652  | 13.586 |
|   |     |        |        |        |        | 0.103  | 0.000**|
|   |     |        |        |        |        | 0.454  | 0.520  |
| Q16| –   | 6.765  |        |        |        | 18.080 |        |
|   |     | 0.009**|        |        |        | 0.000**|        |
|   |     | 0.313  |        |        |        |        |        |

* Merged ‘under’ and ‘on budget’ categories in question Q4 due to frequencies.

** Merged ‘better’ and ‘exactly’ categories in question Q5 due to frequencies.

Significant at the 10% level.

* * Significant at the 5% level.
or safety procedures, and effectiveness, these issues have not been affected by the industry (according to Global Industry Classification Standard categories). Nevertheless, we examined how the previous study results (summarized in Table 4) change when only projects in the government and private sectors are considered. The analyses performed based on these merged categories gave nearly the same results. As expected, the differences appeared mainly among the relationships between question Q6 and other aspects of the examination.

The strongest relationships are between questions Q7–Q17 and Q16–Q17. In both cases, Cramer’s V value is around 0.5, and in both cases, in the main diagonal categories (Yes–Yes, No–No), ‘attract’ and the opposite answers (Yes-No, No–Yes), ‘repel’ each other. The values of the corrected residues are 3.7 in the main diagonal of Table Q7–Q17. They are ~3.7 in the secondary diagonal, and 4.25 and ~4.25 in Table Q16–Q17. The relationships between Q7–Q16 and Q6–Q17 are not significant. Among the traditional evaluation aspects of project success (Q3, Q4, Q5), there is a relationship between time and budget (Q3, Q4). Based on adjusted residuals (Late-Over budget: 1.7; On time- Under budget: 2.6), overdue projects are more likely to have budget overruns, and conversely, the projects staying on schedule are less likely to cost more than planned. Contrary to our initial expectations, there is no statistically significant relationship between budget (Q5) and project profitability (Q6) issues. Profitability of projects without NGO projects is related to compliance with the specification (Q5), and not only the project standard/methodology used in the project (Q7), but also the general attitude of the company to the application of safety standards (Q16). In all three cases, the relationship can be moderately strong, with Cramer’s V values around 0.3, and cases in the main diagonal (Yes–Yes, No–No, or Better/Exactly–Yes, Imperfectly–No for Q5) strengthen and those in the cross diagonal weaken each other. The corrected residues for each question (with positive signs in the main diagonals and negative signs in the antidiagonal) were 2.6 for Q6–Q5 and Q6–Q16 relationships, and it was 2.9 for Q6–Q7.

5. Conclusions and further research

The main aim of this study is to explore whether the owner’s economic success is influenced by the standards used at the company or in its projects. In this study, we discovered and proved the relationship between safety and project management standards, methodologies, and the owner's economic benefit. This study explored a definite association with descriptive statistical methods between the application of standards/methodologies and the economic profit generated to the owner in a project. Although this study revealed the importance of standards and methodologies, it is irrelevant if it is a general orientation or standard at the organization level, or a methodology implemented for a particular project. Since owners have an interest in profitable business, this result is significant for owners.

While pre-determining owner’s value requires complex financial calculations, surveying the methodologies and standards used is quick and straightforward. The findings of this research can be applied to processes where the projects need quick evaluation, and it involves the owner's interest. The authors suggest a possible application of the results that can facilitate decision-making processes, e.g., in determining PDRI. The PDRI is a weighted checklist with seventy scope definition factors (aspects that must be defined in the project pre-planning process) grouped into fifteen categories and further grouped into three main sections for the industrial projects and eleven categories for buildings projects and encompasses eight of sixty-four scope definition factors (Cho and Gibson, 2001). The evaluation of the PDRI for building projects showed a direct correlation between the score of the PDRI and the success of projects. This method has been successfully demonstrated for rapid project assessment; and includes elements related to the owner. The Business Justification sub-category is under the Business Strategy category serving as the basis of the project decision, where the output is linked to owner’s value (NASA, 2000). In the case of the owner, the assessment accommodates many aspects (e.g., possible competitors, level of amenities, target consumers, location, building utilization justification, sales, or rental levels). However, taking into account the statistical results of this article, the authors recommend including applied safety and project management regulations, standards, and methodologies used in the project among other factors. There is a clear relationship between owner’s value and the application of methodologies and standards. More specifically, the PDRI method application could find a place for our proposal in the Business Justification category since this category identifies the project driving forces and specifies what is most important from the owner's viewpoint, including both needs and expectations.

On the one hand, the outcome of the descriptive statistical analyses in the article provides a big picture of the application of standards and methodologies, and may trigger further research based on these results. On the other hand, the process could be defined and elaborated not only for the suggested particular rapid evaluation method based on an industrial implementation resource (PDRI), but also other methods, where determining the economic value of a project in an alternative stochastic way can be practical. All in all, hiring the association explored by this research, a new range of future research projects can be launched.

Declarations

Author contribution statement

Zoltán Sebestyén, János Erdei and Dina Alfredahat: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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