From hypothesis to evidence: testing the Ika and Pinto four-dimensional model of project success

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Abstract

The concept of project success has evolved significantly, nonetheless consensus remains elusive among academics and practitioners regarding its definition. Traditional models, such as the Iron Triangle, focus narrowly on cost, time, and quality metrics, often overlooking broader dimensions such as stakeholder satisfaction, organisational benefits, and societal impacts. Recently, the Ika and Pinto 'Tesseract' model of project success has been proposed, theorising a multidimensional approach that incorporates these extended criteria. This article examines the empirical validity of this model through the analysis of a large-scale survey of over 1,000 project practitioners. Employing exploratory factor analysis, the findings reveal four distinct factors that align with the Tesseract's dimensions, including project constraints, internal organisational benefits, societal outcomes, and end-user impacts. These results substantiate the Tesseract model's multidimensional structure, suggesting that traditional metrics alone are insufficient for capturing the full scope of project success in contemporary, complex environments. This study not only validates the Tesseract model's pertinence but also offers a basis for further research into expanded frameworks that reflect the diverse objectives of modern projects.

Keywords: project management, project success, megaproject, benefits realisation management, societal benefits.

1. Introduction

This article addresses the challenge posed by Ika and Pinto (2022) to provide supporting evidence for their 'Tesseract' model of project success by using quantitative analysis on a large-scale survey dataset to identify four different factors of project success. These four factors bear a strong resemblance to their four Tesseract dimensions; this article offers, as they challenged the community, empirical evidence to support their theoretical construct.

The topic of project success has evolved significantly over the past thirty years, from very fundamental conceptions where success is defined in terms of delivering within resource constraints to much broader conceptions, including stakeholders and benefits (Dacre, Eggleton, Cantone, et al., 2021; Dacre, Eggleton, Gkogkidis, et al., 2021; Eggleton et al., 2021). Despite this large body of research (APM, 2015; Howsawi et al., 2011; Hussein et al., 2015; Ika, 2009; Pinto and Slevin, 1988), there is still no general agreement amongst academics and practitioners regarding what qualifies as project success. This is particularly troubling as the lack of such clarity may be one of the underlying reasons for 80% of projects failing to wholly meet their planned objectives (APM, 2015). Those studies that have managed to create any agreement on the conceptualisation of project success have usually had to restrict their scope to specific industries or research areas (Savolainen et al., 2012; Soon Han et al., 2011). This issue is particularly relevant in standardised large-scale projects, such as those under the European Cooperation for Space Standardisation (Al-Mhdawi et al., 2023a). This article does not seek to solve these issues by creating another project success framework; it seeks to explore whether there is any empirical evidence to support a recently proposed Tesseract model of project success. This is achieved through the analysis of a large-scale survey of project managers with 1,010 responses—far more than is considered standard in project management research.

The project management literature demonstrates the broad criteria that constitute project success and identifies its multidimensional and dynamic character due to market and technical pressures (Albert et al., 2017; Bryde, 2005; Cleland and Ireland, 2006; Collins et al., 2003; Cooper and Kleinschmidt, 1987; Baker et al., 1983; DeCotiis and Dyer, 1979; Gomes and Romao, 2016; Shenhar et al., 2001). Market evolutions have led to the adoption of broader notions of success, encompassing macro dimensions and distinct key indicators (DeCotiis and Dyer, 1979; Dvir and Lechler, 2004; Shenhar et al., 2001). Moreover, emerging technologies, such as AI, are being integrated into project risk management processes to align project management success with overarching goals (Al-Mhdawi et al., 2023b). In industries such as agriculture, the use of agile methodologies to adapt to changing conditions has been a critical factor for project success (Dong et al., 2021a; Dong et al., 2021b). These success dimensions evolved based on a distinction between project success and project management success (de Wit, 1988). Project success tends to be represented in terms of stakeholder satisfaction (Freeman and Beale, 1992) and realising benefits for the organisation (Dvir and Lechler, 2004; Shenhar et al., 2001). In contrast, the criteria defining project management success tend to include traditional performance measures such as adherence to budget, schedule, and scope—traditionally known as the 'Iron' or 'Barnes Triangle' for its creator (Bryde, 2005; Morris and Hough, 1987).

Organisations have expanded their project management maturity by broadening the scope of project management success to include project success measures that capture project outcomes to contribute to organisational success (Cooke et al., 2012; Serrador and Pinto, 2015; Serra and Kunc, 2015). With this have come much broader conceptualisations of project success, including direct business success and preparation for the future that can be used as a source of differentiating an organisation's offering (Shenhar et al., 2001). This shift has been especially evident in sectors like manufacturing and supply chain management, where fuzzy-TOPSIS approaches have been adopted to enhance performance (Yan et al., 2023).

New dynamics have also emerged around the realisation of project benefits, which some studies identified as a very important success dimension in specific contexts (Bryde, 2005; Lipovetsky et al., 1997; Serra and Kunc, 2015). Yet, the literature surrounding project success makes little use of project benefits as integral to success criteria. For example, most studies assessing Critical Success Factors (CSFs) that could bring about project success adopted multidimensional success measures such as 'project extended performance' by including satisfaction criteria (Muller et al., 2012; Müller and Turner, 2007; Pinto and Mantel, 1990). Only a few studies have examined project benefits for the assessment of CSFs (Anand et al., 2010; Carvalho et al., 2015; Geoghegan and Dulewicz, 2008; Khalifeh et al., 2019; Shenhar et al., 2001; Yang et al., 2012; Atkinson, 1999). In complex industries such as construction, fuzzy-based optimisation models have also been proposed to enhance the evaluation of risk response strategies for project success (Al-Mhdawi et al., 2023a; Al-Mhdawi et al., 2023b).

A recent dynamic for project success has been to consider its societal effects with a particular emphasis on environmental sustainability (Ika and Pinto, 2022). AI applications in project management are also gaining traction as a crucial dynamic for ensuring both efficiency and success in modern project landscapes (Dacre & Kockum, 2022; Hsu et al., 2021). This creates something of a challenge for both project managers and project management academics; projects have traditionally had very definite starting points and very definite endpoints. Following project closure, all aspects of the project, including assets, project structure, and human resources, must be returned to their 'home' department and organisation. The challenge is therefore for these temporary endeavours to account for potentially long-lived legacies. This is something that has been implemented in some megaprojects, most notably for the London 2012 Olympics, where the 'legacy' societal impact became a major selling point for the initial bid. This is considered in more depth in the literature review.

The confusion surrounding project success criteria has resulted in many studies adopting a contingency approach toward project success (Atkinson, 1999; Müller and Turner, 2007; Sonjit et al., 2021c). Therefore, this article adds to this body of knowledge in two ways. Firstly, by bringing in further evidence on whether project benefits are now seen as an integral part of project success criteria in project management. Secondly, this research attempts to understand which multidimensional frameworks or which components thereof have proven themselves to be most effective at gaining mindshare amongst project practitioners (Dong et al., 2021).

2. Literature review

This section examines the most relevant bodies of literature related to the most prominent project success frameworks and new developments that have emerged since these frameworks were devised. It also contains an examination of other frameworks for conceptualising success in work more broadly.

2.1 Project success frameworks

The criteria against which project success can be measured are now considered multidimensional (Muller et al., 2012; Shenhar et al., 2001; Ika and Pinto, 2022). However, it is essential to understand the evolution of project success from its origins in terms of project management success through to these multidimensional frameworks (de Wit, 1988). The latter measures the project's overall objectives and takes a holistic view of the effects of projects both as vehicles for realising strategies or achieving outcomes. The second uses classic performance measures—cost, time, and quality—to determine success (Morris and Hough, 1987); this is often referred to as the 'Iron Triangle' or the 'Triple Constraint' model, originally developed by Martin Barnes in the late 1960s (Barnes, 1988, 2007). In larger, standardised projects, such as those managed under the European Cooperation for Space Standardisation, compliance frameworks have also emerged as important criteria for project success (Al-Mhdawi et al., 2023a). Furthermore, in agricultural and cooperative projects, sustainable and agile frameworks have become essential to addressing dynamic conditions and achieving long-term success (Dong et al., 2021a; Dong et al., 2021b).

2.2 Iron Barnes triangle framework

The original conception of project success emerged during the latter half of the last century. This framework used three parameters by which a project could be judged to be a success or failure-cost, time, and quality (Barnes, 2007). This 'Iron Triangle' framework has become one of the most fundamental tools for project managers to determine whether they are delivering successfully (Morris and Hough, 1987). Yet it is clear that the 'Iron Triangle' framework is limited to understanding project management success, as other components that could determine project success, such as whether the final product is successful in the market or stakeholder satisfaction, are not present in this framework. This was borne out in empirical evidence, as subsequent work challenged the use of the Iron Triangle by identifying that, despite implementing success factors, projects were still failing (APM, 2015). This provides empirical support for the argument that a pure Iron Triangle perspective may represent a restrictive measure for project success.

However, this model still has utility for judging one component of project success. In particular, de Wit (1988) distinguished between project success and project management success. The former can be measured against the project's overall objectives, while the latter is measured against widespread and traditional performance measures using the Iron Triangle. For example, the Iron Triangle constraints are considered unimportant after project closure (Pinto and Slevin, 1988). Success indicators can therefore be divided into those internal to project development, such as meeting budget, schedule, and technical performance, and external factors, such as customer needs and satisfaction (Eggleton et al., 2021).

2.3 Quadruple constraint model

Pinto and Slevin (1988) introduced an additional dimension to the model, based on earlier work (Baker et al., 1983), namely client satisfaction. Intuitively, one can understand why: an output that performs poorly due to market dynamics or inadequate performance is unlikely to be judged a success, regardless of its adherence to schedule, budget, and specifications. This was one of the first acknowledgements of differentiating characteristics between project success and project management success. A key differentiator is that project success or failure often becomes clear over extended time periods and involves a broader range of assessors beyond internal human resources (Barber et al., 2021). The timing of a project success or failure assessment could also meaningfully impact the outcome (Pinto and Slevin, 1988). Furthermore, as technology advances, risk management and AI-based models have become integral to evaluating project success. These methods, such as those based on ISO 31000 standards, incorporate fuzzy optimisation techniques for evaluating risk response strategies in construction projects (Al-Mhdawi et al., 2023a; Al-Mhdawi et al., 2023b). Additionally, agile frameworks are increasingly used to manage client satisfaction dynamically across industries (Sonjit et al., 2021b).

2.4 Multidimensional model

The concept that project success involves a much broader set of criteria than just project management success emerged at the start of the current century. This movement began with the creation of the 'square route', which expanded project success to include benefits to organisations, stakeholder communities, and existing systems (Atkinson, 1999). Shenhar et al. (2001) characterised project success in much broader terms, encompassing both short- and long-term organisational benefits (Dacre et al., 2014). In more complex environments, such as construction, fuzzy-based optimisation models are proposed as ways to enhance the evaluation of risk response strategies and improve project outcomes (Al-Mhdawi et al., 2023b). Similarly, in post-crisis settings such as rural agricultural cooperatives, agile methodologies help manage sustainability and adaptability within complex projects (Dong et al., 2021; Dong et al., 2023).

2.5 Ika's three project success periods

Ika (2009) characterised project success through three distinct paradigms that evolved over time. The first period dominated project success research from the 1960s to the 1980s and defined project success solely in 'Iron Triangle' terms. As project management emerged as a distinct academic discipline, early work was primarily theoretical or based on anecdotal accounts, forming the foundation for further theoretical development. The second period, between the 1980s and the 2000s, saw a greater emphasis on empirical studies, expanding the academic definition of project success to include benefits and stakeholder satisfaction (Atkinson and Flint, 2001; Ika, 2009). The scope of project success literature also broadened to include how to best ensure that success would be achieved—these were described as Critical Success Factors (CSFs) (Pinto and Slevin, 1988). In the third, current period, there is a content-dependent set of project success criteria with programmes, portfolios, and projects all having their own criteria (Ika, 2009). Additionally, the rise of AI and technological advancements is becoming integral to modern success paradigms, particularly with agile methodologies helping project teams adapt to rapid changes (Dacre et al., 2020; Sonjit et al., 2021a; Hsu et al., 2021).

Table 1: A summary of the multidimensional project success paradigms examined in this section

Shenhar et al. (2001)	Atkinson (1999)
Project efficiency	Iron triangle
Impact on the customer	Benefits (stakeholder community)
Business success	Benefits (organisational)
Preparing for the future	The information system

2.6 Tesseract model

The Tesseract model is relatively new, proposed by Ika and Pinto (2022) as a means of synthesising development evaluation work into the broader project management field

(OECD, 2019). Yet, it contains a strong synergy with the Shenhar et al. (2001) multidimensional project success framework, with the primary contribution being that it integrates sustainability criteria into project success (Tite et al., 2021a, 2021b). In addition, new research highlights how agile practices (Baxter et al., 2023) in complex environments, such as those within space cooperation projects, contribute to project success (Dacre et al., 2020).

2.7 Knowledge gap and hypotheses

It is apparent from the above that there remains a gap in knowledge. Most of the project success paradigms discussed here have developed theory by drawing on project databases or literature reviews. Rarely has project success been examined from the perspectives of project practitioners. Those that have sought these views often take a qualitative approach through interviews to develop new theories (Shenhar et al., 2001). Given that Ika and Pinto (2022) stated that different stakeholder groups would attach varying levels of importance to each dimension of the Tesseract model of project success, it is reasonable to expect this to be reflected in empirical data. Emerging studies on AI and agile approaches fill this gap by providing insights into how modern tools can be employed to meet diverse stakeholder needs and sustainability goals (Dacre & Kockum, 2022).

3. Methodology

3.1 Data

This research is underpinned by a survey dataset gathered for the Association for Project Management (APM) funded study Dynamic Conditions for Project Success (Eggleton et al., 2021). As part of this study, a wide-ranging survey was completed, asking project practitioners what their conception of project success was and whether certain organisational, professional, and socio-economic factors acted as critical success factors (CSFs) that could help deliver that conception of success (Al-Mhdawi et al., 2023b). The primary focus of the study was the UK context, and this represents by far the most respondents. However, no formal barriers existed that prevented respondents from further afield from completing the survey.

Table 2: A hypothesis of how stakeholder groups may prioritise different Tesseract dimensions

Group	Most important dimension	Second most important dimension	Third most important dimension	Fourth most important dimension
Project managers	Project plan success	Business case success	Green efficacy	Shared stakeholder perspective
Owners	Business case success	Project plan success	Green efficacy	Shared stakeholder perspective
Society	Green efficacy	Shared stakeholder perspective	Business case success	Project plan success
Key stakeholders	Shared stakeholder perspective	Business case success	Green efficacy	Project plan success

Our population was formally defined as UK project practitioners, meaning any UK-based person involved in project management. Previous consultancy work indicates that there are around 2.13 million full-time equivalent workers who meet these inclusion criteria (APM & PwC Research, 2019). This population was operationalised through the APM's membership database, which contains the details of approximately 100,000 persons and provided the sampling frame. The survey was designed using the Qualtrics online platform, and data collection took place over Winter 2020/2021 (Sonjit et al., 2021a). Additional contacts were made with UK government institutions and the devolved administrations, who circulated the survey amongst their email lists.

After data cleaning for this research, which involved removing partially completed surveys and the removal of question responses that did not contribute meaningfully to the research questions, there were 1,012 full responses that contributed to this research. From the sample, the average project practitioner was aged in the 35-49 age bracket, with between ten and 15 years of experience in a project management role.

3.2 Exploratory factor analysis

The analysis for this research was conducted in two phases. The validation for the chosen analysis used a Kaiser-Meyer-Olkin (KMO) and Bartlett test of sphericity. These two statistical measures test the null hypothesis that the sample is suitable for factor analysis and that the sample correlation matrix is an identity matrix, where the variables have no relationship, respectively. With this data, the KMO test produced a statistic of 0.832[1], and all KMO values for the individual variables were greater than 0.74. The Bartlett test for sphericity produced a highly significant result ($\chi 2$ (91) = 2631.391, $p < 0.001$). On this basis, the analysis could proceed.

The analysis used an exploratory factor analysis to reduce the 14 different dimensions of project success offered to survey respondents into one or more composite variables using a varimax orthogonal rotation. Agile methodologies have played a key role in managing complex, adaptive processes within project environments, helping teams navigate shifting priorities and constraints (Dong et al., 2022). From these reduced factors, we mapped the results onto the constructs from pre-existing project success frameworks. This approach allowed for an understanding of how dimensions like green efficacy, shared stakeholder perspectives, and business case success are emphasised in the responses (Dacre & Kockum, 2022). The analysis was performed using R, a standard language for statistical analysis.

4. Results

Using Kaiser's criterion of 1, the final analysis retained four factors. Table 4 shows the loadings after rotation. Based on the co-located components, it is clear that there are commonalities amongst the factors that map onto pre-existing project success frameworks. Figure 1 shows the eigenvalues from the factor analysis, which can also be seen in tabular format in Table 4.

Factor 1 is clearly the iron/Barnes Triangle, as it shows its principal components of staying within project constraints, with the additional component of safety. This aligns with the traditional project management framework of balancing cost, time, and quality, but also highlights the growing emphasis on safety, especially in large-scale and regulated industries such as space standardisation (Al-Mhdawi et al., 2023a). Similar findings can be seen in construction projects, where fuzzy-based optimisation models are increasingly used to evaluate risk response strategies and project outcomes (Al-Mhdawi et al., 2023b).

[1] This sort of figure is considered to be 'meritorious'.

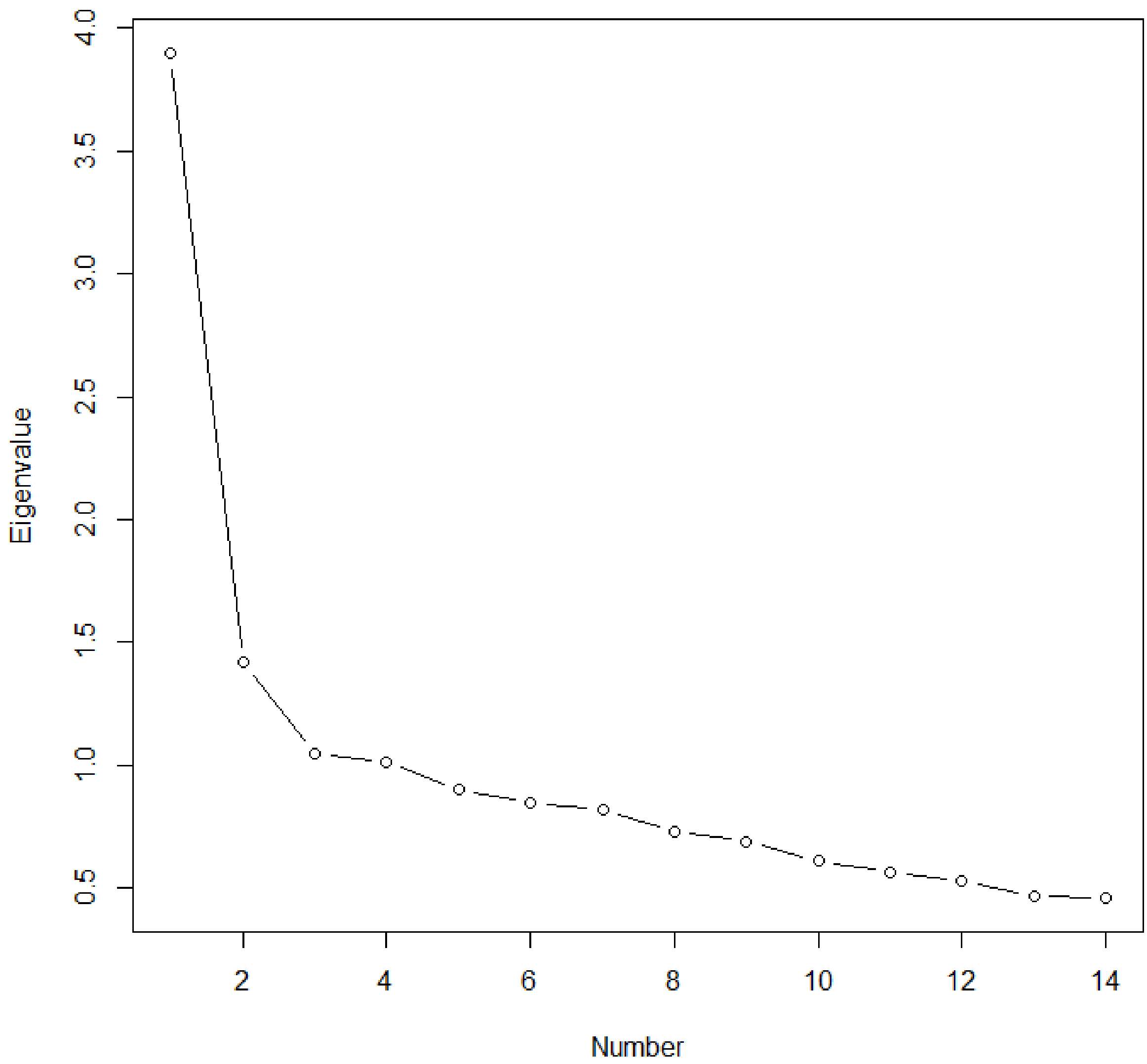

Figure 1: Scree plot of eigenvalues from data correlation matrix

Factor 2 appears to be ‘internal and upstream benefits’ to the organisation and its suppliers. This factor focuses on organisational benefits realised during project execution and collaboration with suppliers, reinforcing the importance of internal processes that drive success across the supply chain. This concept aligns with findings in rural agricultural cooperative projects, where collaboration and sustainability lead to organisational benefits and success (Dong et al., 2021b; Dong et al., 2023).

Factor 3 relates to societal benefits, which are often overlooked by the academic project management community, with some notable exceptions (Ika and Pinto, 2022; Shenhar et al., 2001). This factor emphasises the growing importance of considering societal outcomes, such as environmental sustainability, in project success models. With the increasing role of AI and emerging technologies in enhancing societal benefits (Brookes et al., 2020; Gong et al., 2022; Hsu et al., 2023; Yan, 2023), such as environmental efficiency, project management is beginning to take a more holistic view of project outcomes (Dacre et al., 2020). In post-crisis rural projects, agile frameworks have shown how societal benefits can be achieved through sustainability-focused project management (Dong et al., 2021a).

Table 3: Initial components and associated eigenvalues

Component	Eigenvalue
1	3.898
2	1.417
3	1.049
4	1.012
5	0.901
6	0.847
7	0.819
8	0.731
9	0.691
10	0.610
11	0.564
12	0.529
13	0.467
14	0.462

Factor 4 relates to ‘downstream benefits’ that accrue to end-users and customers. This factor focuses on the direct impact of the project on its intended beneficiaries, aligning with customer satisfaction and product success. Agile methodologies, particularly in managing customer-centric projects, underscore the importance of addressing the evolving needs of end-users (Sonjit et al., 2021b). The integration of agile principles into project management further enhances the downstream benefits seen in the final outputs.

Table 4: Correlation matrix of results

	timePerf	scopePerf	budgetPerf	safetyPerf	custSat	stakeSat	supplierSat	teamSat	publicSat	userBene	orgShortBene	orgLongBene	employeeRet	socBene
timePerf	1.00	0.28	0.48	0.28	0.28	0.21	0.18	0.26	0.15	0.27	0.12	0.26	0.14	0.16
scopePerf	0.28	1.00	0.27	0.28	0.28	0.25	0.18	0.26	0.16	0.31	0.15	0.26	0.16	0.19
budgetPerf	0.48	0.27	1.00	0.36	0.24	0.26	0.19	0.21	0.15	0.26	0.18	0.22	0.14	0.14
safetyPerf	0.28	0.28	0.36	1.00	0.17	0.21	0.27	0.28	0.24	0.16	0.12	0.25	0.26	0.30
custSat	0.28	0.28	0.24	0.17	1.00	-0.02	0.16	0.20	0.08	0.32	0.16	0.26	0.13	0.11
stakeSat	0.21	0.25	0.26	0.21	-0.02	1.00	0.24	0.26	0.15	0.20	0.20	0.28	0.18	0.21
supplierSat	0.18	0.18	0.19	0.27	0.16	0.24	1.00	0.40	0.33	0.12	0.23	0.20	0.31	0.26
teamSat	0.26	0.26	0.21	0.28	0.20	0.26	0.40	1.00	0.21	0.26	0.20	0.33	0.37	0.23
publicSat	0.15	0.16	0.15	0.24	0.08	0.15	0.33	0.21	1.00	0.14	0.11	0.18	0.21	0.45
userBene	0.27	0.31	0.26	0.16	0.32	0.20	0.12	0.26	0.14	1.00	0.07	0.15	0.13	0.17
orgShortBene	0.12	0.15	0.18	0.12	0.16	0.20	0.23	0.20	0.11	0.07	1.00	0.22	0.19	0.13
orgLongBene	0.26	0.26	0.22	0.25	0.26	0.28	0.20	0.33	0.18	0.15	0.22	1.00	0.29	0.26
employeeRet	0.14	0.16	0.14	0.26	0.13	0.18	0.31	0.37	0.21	0.13	0.19	0.29	1.00	0.30
socBene	0.16	0.19	0.14	0.30	0.11	0.21	0.26	0.23	0.45	0.17	0.13	0.26	0.30	1.00

Overall, the factor analysis appears to provide evidence supporting the Tesseract model of project success, which integrates various dimensions of project success, including internal and external benefits, societal impacts, and customer outcomes (Al-Mhdawi et al., 2023b). These findings provide justification for future research into expanding project success frameworks, particularly in terms of risk management and benefits realisation for different stakeholders. Further research into applying AI and agile methodologies to improve both internal and societal outcomes will help refine project success models in different industries (Hsu et al., 2023; Dacre et al., 2020).

Table 5: Factor analysis results

Component	Factor 1	Factor 2	Factor 3	Factor 4
budgetPerf	0.76			
timePerf	0.67			
stakeSat	0.59			
safetyPerf	0.48			
scopePerf	0.44			
orgShortBene		0.68		
teamSat		0.61		
employeeRet		0.60		
orgLongBene		0.53		
supplierSat		0.53		
publicSat			0.79	
socBene			0.76	
custSat				0.83
userBene				0.57

5. Discussion

The results of this study provide empirical support for the Tesseract model of project success, as proposed by Ika and Pinto (2022). The factor analysis yielded four dimensions that align with the model's theoretical constructs, reinforcing the multidimensional nature of project success. The findings align with the existing literature on project success, particularly in demonstrating the limitations of traditional frameworks such as the Iron Triangle (Barnes, 1988, 2007; Morris and Hough, 1987) and highlighting the need for more comprehensive, multifactorial approaches to success.

One of the most significant revelations from this study is the increasing importance of factors beyond traditional project constraints. As reflected in the empirical evidence, societal and environmental benefits, internal organisational processes, and customer satisfaction now form integral dimensions of project success. These findings support the arguments made in contemporary literature (Shenhar et al., 2001; Dacre & Kockum, 2022) that the criteria for project success have expanded to include both broader stakeholder perspectives and long-term sustainability.

The literature has long pointed to the shortcomings of frameworks that focus exclusively on internal performance measures (Atkinson, 1999; de Wit, 1988). This study reinforces those conclusions, particularly in showing that project success can no longer be measured purely by efficiency metrics. Factors such as societal impact and customer satisfaction, which were previously peripheral to project management success, are now becoming central to how projects are evaluated. This reflects a broader shift toward stakeholder-centric approaches.

One underexplored area in the literature that this study touches upon is the role of internal organisational benefits and their connection to upstream success factors. Previous studies have examined the importance of collaboration within organisations (Serra & Kunc, 2015), but this study highlights how internal alignment—particularly with suppliers—contributes directly to project success. This is particularly important in large-scale projects such as those within the construction or space sectors, where complex supply chains and collaboration are key to successful outcomes (Al-Mhdawi et al., 2023b). The interplay between internal and external organisational benefits suggests that successful projects rely not only on their ability to manage internal processes but also on their capacity to integrate these processes with wider stakeholder ecosystems.

Another notable insight is the increased relevance of societal benefits, as discussed by Ika and Pinto (2022) and reflected in this study's findings. While the Iron Triangle primarily focuses on internal efficiency metrics, contemporary frameworks must increasingly account for the broader societal and environmental impacts of projects. This reflects a growing trend toward evaluating projects not only for their immediate outputs but for their long-term sustainability and contribution to societal well-being (Bryde, 2005; Dacre et al., 2022, Dong et al., 2021a).

Finally, we shed light on the emerging importance of post-project evaluations, particularly the ongoing effects of projects once they are completed. Legacy impacts—whether societal, environmental, or business-related—are now being recognised as part of a project's success, challenging the traditional notion that projects end when their deliverables are handed over. The London 2012 Olympics is an illustrative case where legacy benefits became integral to the project's long-term success (Ika and Pinto, 2022). This broader view of success, which encompasses the project's lifecycle beyond its immediate closure, supports the literature's call for more expansive frameworks that account for enduring impacts (Cooke et al., 2012; Shenhar et al., 2001).

6. Conclusion

In this paper, we sought to provide empirical evidence in support of Ika and Pinto's (2022) Tesseract model of project success, illustrating that project success is a complex, multidimensional construct. Our findings demonstrate that traditional performance metrics alone are insufficient to capture the full scope of project success, which increasingly includes broader dimensions such as societal and environmental impacts, customer satisfaction, and internal organisational benefits. These conclusions align with and extend current literature (Shenhar et al., 2001), reinforcing the need for project success frameworks to evolve alongside modern project environments.

We have shown that while traditional frameworks like the Iron Triangle remain valuable, they no longer encompass the complexity required for measuring success in today's dynamic and stakeholder-driven contexts. Our study suggests that agile methodologies, sustainability considerations, and an emphasis on stakeholder satisfaction should be integrated into future project success models to ensure that projects meet the increasingly diverse expectations of both internal and external stakeholders.

6.1 Limitations

Despite the contributions of this study, there are several limitations to consider. First, our dataset focuses primarily on the UK context, potentially limiting the generalisability of our findings to other regions or industries. The rapidly evolving nature of project management practices, especially in relation to technological advances and sustainability efforts, also presents a challenge. Our study captures a specific moment in time, and the dimensions of project success may shift as new practices and technologies emerge. Furthermore, our reliance on self-reported survey data introduces potential bias, as respondents may have varied in their interpretation of success or placed emphasis on different success factors based on their organisational roles and experiences.

6.2 Future research

Future research should address these limitations and explore several key areas. First, more work is needed to understand the role of agile practices in contributing to different dimensions of project success, particularly in industries such as construction, space, and agriculture, where complexity and uncertainty are common. The use of agile methodologies in these sectors has the potential to reshape traditional views of success, but further empirical work is required to validate this.

Additionally, longitudinal studies focusing on the post-project evaluation of societal and environmental impacts are needed. Examining how projects continue to deliver value long after their completion, particularly in terms of sustainability and societal benefits, could help researchers develop more refined criteria for success. These insights could also contribute to the growing call for legacy-focused project evaluations, particularly in large-scale or megaprojects that aim to deliver long-term benefits to society.

Finally, expanding the study across different geographical regions and industries would offer a more nuanced understanding of how project success criteria may differ based on contextual factors. Future research could explore how cultural, regulatory, and economic differences shape the perception and prioritisation of success factors, providing new insights into the global practice of project management.

6.3 Final thoughts

In conclusion, our study highlights the increasing complexity of defining project success in the modern era. We have provided empirical support for the Tesseract model, demonstrating that project success encompasses multiple dimensions beyond traditional performance metrics. As project management practices continue to evolve, frameworks that incorporate agile methodologies, sustainability, and stakeholder satisfaction will become essential for measuring and achieving success. Ultimately, our findings provide a solid foundation for future research to build upon and for practitioners to adopt more holistic approaches to project success in their work.

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