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Beyond the Iron Triangle of Time, Cost and Quality:
Redefining Project Success in the Second Transformation of the UK Construction Industry

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1.0 – Abstract

The construction industry has relied traditionally on the “Iron Triangle” as a primary measure of project success or failure (Atkinson, 1999). Yet in the more contemporary environment, emerging pressures including sustainability, digitalisation, regulatory reform, whole-life performance, safety, risk management, and social value are redefining how a successful project is delivered and evaluated (Cabinet Office, 2020) (Infrastructure and Projects Authority, 2021). This dissertation aims to examine whether there is an emerging shift within these success metrics that indicate an emerging “Second Transformation” comparable to the reforms of Latham (1994) and Egan (1998).

A mixed methods approach was used, combining questionnaire responses from 33 industry professionals, with analysis of publicly available infrastructure project evidence. Quantitative survey data was also analysed using means scores, rankings, counts and percentages, while qualitative data was drawn from open-ended responses to gain an overview of industry thought. Case study evidence was also used from HS2, Crossrail, and Hinkley Point C to compare tender-stage assumptions with reported cost and programme outcomes.

The results definitively show that time, cost and quality remain significant baseline measures for performance metrics. However, respondents from the survey results also placed strong importance on emerging metrics, especially safety, risk management, whole-life value and sustainability. Out of these placeholders, Safety ranked as being the most important factor.
Further findings show that tender stage cost and programme assumptions are often perceived as being disconnected from the actual outcomes, with variations being viewed as a regular part of construction delivery.

This study concludes that there is an emerging change in how project success is defined within the industry, not through the replacement of the Iron Triangle, but as an emergence of traditional and contemporary performance metrics. This dissertation therefore contributes a multi-dimensional framework for evaluating project success.

2.0 – Acknowledgements

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Chapter 1 – Introduction

1.1 - Background

The UK construction industry has, for decades, measured project success through the "Iron Triangle" of time, cost, and quality (Atkinson, 1999) (Turner, 2009). This framework has shaped project management practice across the industry, providing a clear and measurable basis for assessing delivery performance. Projects have traditionally, and up until recently, been considered a success or failure on the basis that it is delivered within the structure of the programme, within budget, and to the specified quality standards. These measures have, and continue to run deeply within our procurement structures, contractual systems and reporting mechanisms (Shenhar, et al., 2001), yet the contemporary construction environment has become increasingly complex.

Previously, the industry was exposed to a significant reform in response to systemic challenges in earlier years, documented through the reports of Latham (1994) and Egan (1998). These reports were designed to improve collaboration, efficiency, and procurement practices, reshaping how projects were to be delivered.

Projects are now being funneled by growing societal expectations, technological advancements and heightened regulatory controls. Such commitments as the UK's Net Zero 2050 target (HM Government, 2021) and the legislative reform of the Building Safety Act 2022 (Parliament, 2022) have expanded responsibilities of construction organisations beyond these traditional delivery metrics. In addition to this, adoption and integration of digital changes such as Building Information Modelling (BIM) have also altered how projects are planned, monitored and evaluated (Infrastructure and Projects Authority, 2021).

Despite these advances, industry organisations continue to measure project performance in terms of cost, time and quality accountability (Flyvbjerg, 2014). This is where a gap between the growing industry expectations and historical measures of success become clear. This begins to show that while the three components of delivery continue to play a fundamental role, they don't full capture the emerging delivery metrics (Cabinet Office, 2020) (HM Treasury, 2022).

1.2 - Problem Statement

Despite the unwritten rule of following the Iron Triangle, there is evidence to suggest that the traditional performance metrics alone are no longer an accurate measure of project success (Atkinson, 1999) (Shenhar, et al., 2001). While projects can perform well within the programme and budget, they can still underperform in area like sustainability, safety, whole-life value, digital integration, and stakeholder outcomes (Cabinet Office, 2020) (HM Treasury, 2022). Projects can also exceed original time and cost factors and yet generate huge long-term benefits that are not captured in traditional metrics for success. This highlights the crack that is emerging between how success is measured and how value is delivered.

This gap is particularly prevalent when comparing tender-stage assumptions with actual project outcomes. It is common to see, not just in infrastructure, but across the industry that cost overruns, programme delays, and frequent variations continue to play almost a natural part of the process, which raises thoughts about the adequacy of baseline forecasting, risk allocation, and performance evaluation mechanisms (Flyvbjerg, 2014). Flyvbjerg suggests that optimism bias and systemic underestimation at the planning stage contribute to recurring deviations between planned and actual outcomes. Therefore, if projects commonly deviate from initial targets, yet still achieve greater strategic, performance or societal outcomes, then the traditional performance metrics of the Iron Triangle begins to shine its limitations within the contemporary environment (Infrastructure and Projects Authority, 2021) (Cabinet Office, 2020).

It is also worth mentioning that industry reforms, policy initiatives and contemporary regulatory control, emphasise value-based outcomes, sustainability, and long-term performance to meet industry standards, yet it remains unclear whether these changes identify an emerging transformation or whether they are fragmented adaptations within the existing delivery frameworks. It is therefore important to recognise how project success is being defined within the modern industry, examining whether emerging performance metrics represent a fundamental “Second Transformation” or whether traditional metrics remain as the primary indicators, despite the expanding industry expectations.

1.3 - Research Aim

To evaluate how project success is being redefined in the UK construction infrastructure sector by comparing traditional performance metrics with real project outcomes and emerging success criteria, and to assess whether this evolution reflects a “Second Transformation” comparable to the reforms initiated by Latham and Egan.

1.4 - Research Objectives

1.4.1 - Objective 1

To critically review how project success has been defined in UK construction, focusing on the strengths and limitations of the Iron Triangle.

1.4.2 - Objective 2

To examine how the Latham (1994) and Egan (1998) reforms reshaped industry perceptions of project delivery and project success within the UK construction sector.

1.4.3 - Objective 3

To identify modern drivers, including sustainability, digital integration, regulatory reform, social value, and whole-life performance, that are influencing a redefinition of project success.

1.4.4 - Objective 4

To compare tender-stage assumptions with actual project outcomes, analysing deviations, variations, and the contributing factors influencing project performance.

1.4.5 - Objective 5

To evaluate whether contemporary industry reforms and empirical project evidence indicate the emergence of a “Second Transformation” in UK construction practice.

1.4.6 - Objective 6

To develop a conceptual framework for modern project success that integrates traditional delivery metrics with the broader dimensions identified in this study.

1.5 - Scope and Limitations

This research project focuses primarily on UK construction infrastructure projects, focusing on how project success is currently defined in relation to traditional delivery metrics, and whether it is being redefined with emerging performance metrics. To gain this information, the study adopts a mixed methods approach, incorporating questionnaire responses from industry professionals, with analysis of publicly available infrastructure case studies, and current infrastructure industry-based assumptions.

The scope is limited to 4 factors that must be considered. Firstly, the survey is based on a sample of 33 respondents and should therefore be treated as exploratory research rather than representative of the whole industry. It must also be considered that survey responses may be influenced by experience, role, or perspective which introduces subjectivity. Secondly, the case study analysis is limited to 3 publicly documented infrastructure projects, which largely restricts general overview of findings across the whole industry. Thirdly, publicly available project data is limited and does not provide in depth access to internal decision-making, cost breakdowns or management processes.

Despite these limiting factors, the research still provides a useful insight into the emerging metrics of project success and supports a deeper understanding of how it is being redefined.

1.6 - Dissertation Structure

The structure of this dissertation is compiled into six chapters. Chapter 1 introduces the background context of the research, outlines research problems, and identifies the research aim, objectives and scope. Chapter 2 outlines the literature review, focusing on project success, the Iron Triangle, Historical Industry Reforms, and emerging drivers that may be influencing contemporary measures of success, with a conceptual framework that merges these drivers. Chapter 3 details the research methodology, identifying the mixed methods approach, data sources, analytical techniques, ethical considerations, and methodological limitations. Chapter 4 presents the research findings from an industry questionnaire and public infrastructure project performance analysis. Chapter 5 then discusses and analyses these findings in relation to the literature, evaluating the evidence of potential “Second Transformation.” Chapter 6 looks to conclude the research study by presenting the overall conclusions, further recommendations, limitations and directions for future research.

Chapter 2 – Literature Review

2.1 – Project Success and the Iron Triangle

The Iron Tariangle, a framework that has long had dominance over project management theory and practice for several decades, has remained central to the construction industry (Baccarini, 1999) (Turner, 2009). Its value lies in its simplicity, measurability and clear alignment with contractual and client objectives, specifically in terms of programme certainty and cost control.

It has historically provided a steady foundation for performance evaluation, with success measured in terms of whether a project is delivered on time, within budget and the best quality standards (Turner, 2009). This approach has been deeply embedded in the UK's traditional procurement routes and contract conditions, where deviations from the planned cost or programme are measured as successes or failures.

However, academic literature has increasingly questioned the limitations of this framework. Atkinson argues that time, cost and quality only represent a partial measure of success and fail to incorporate longer-term outcomes, stakeholder satisfaction and strategic value (Atkinson, 1999). Similar evaluations made by Shenhar suggest that a project may meet its initial and immediate delivery targets but continue to underperform in other areas like operational efficiency, sustainability, or social impact (Shenhar, et al., 2001).

There has been a push from researchers to propose broader interpretations of project success as a response to remove these limitations, identified both by Shenhar and Baccarini. These perspectives acknowledge the construction projects operate in complex, social, economic, and environmental systems and cannot be fully understood by traditional delivery metrics alone. While the Iron Triangle continues to play a significant role in contemporary project control, its indication of project success is becoming increasingly challenged within project management literature (Atkinson, 1999).

This growing debate provides the theoretical foundation for this dissertation to examine whether temporary pressures facing the industry is seeing an emerging transformation of project success. It is essential to look at both the strengths and limitations of the Iron Triangle before making judgement on the impact of contemporary reforms and emerging success metrics. These are further discussed in Sections 2.2 and 2.3.

2.2 – Latham, Egan, and the First Transformation

The limitations of traditional construction delivery were identified during the late twentieth century, as the industry became widely criticised for adversarial practices, poor value for money and inconsistent project performance. In response to these growing issues, two revolutionary reviews, led by Sir Michael Latham and Sir John Egan, initiated what is now referred to as the construction industry's first major reform.

Latham's Constructing the Team 1994 report critically examined the traditional procurement and contractual system. He identified adversarial relationships between clients, contractors and consultants which he saw as a fundamental barrier to the success of a project. Latham used this to highlight the importance of collaboration, trust and fair risk allocation, recommending the ideas of partnering approached, improved dispute resolution systems and significantly, the adoption of standard forms of contracts that forced the encouragement of cooperative behaviours (Latham, 1994). Collaborative forms of contract like the NEC contracts were put forward to place this emphasis on proactive management, risk allocation and collaborative working (Gould, 2013).

Four years after this reform, Egan's Rethinking Construction 1998 report was established to apply principles that were drawn from manufacturing and other high performing professional sectors. Although maintaining the traditional performance metrics as the industry's core, Egan reframed success around improvement, efficiency and customer satisfaction. This led to the introduction of performance targets based on cost, time, quality, safety, and productivity, and therefore encouraged long-term relationships between the client and contractor as way of driving sustained improvement (Egan, 1998).

These reports marked a revolutionary shift in how project success was conceptualised in the industry. While the Iron triangle remained and still does remain dominant in terms of project success, there was a lean towards collaboration, integration and improved delivery performance over purely contractual compliance. This shift can be seen as the industry's "First Transformation" (Winch, 2010).

2.3 – Modern Drivers Redefining Success

Since the publication of the Latham and Egan reports, conditions of construction delivery and success have continued to evolve. Earlier reforms focused on improving the idea of collaboration and delivery efficiency, but contemporary pressures have driven new expectations that extend well beyond traditional measures.

One of the most significant pressures emerging today is drive towards sustainability and environmental performance. Net zero carbon targets and climate change have placed growing responsibility on construction businesses and projects to consider long-term environmental impacts alongside delivery outcomes (HM Government, 2021) (UK Parliament, 2008). As a result of this, success has arguably broadened its association with whole-life performance, carbon reduction, and resource efficiency (HM Treasury, 2022) (UK Green Building Council, 2019).

Digitalisation has also partaken in reshaping the measurement of project delivery and performance. The introduction of Building Information Modelling (BIM), data driven decision making, and digital reporting systems has largely altered how projects are planned, coordinated, and monitored (UK Government, 2011) (Infrastructure and Projects Authority, 2021). These technological advancements have encouraged greater transparency, coordination and accountability, allowing performance to be evaluated across multiple dimensions rather than through isolated delivery metrics.

A further pressure that requires constant attention and change is regulatory reform, which continues to introduce stricter requirements relating to safety, accountability and governance. Legislative changes and updated industry guidance have reinforced the significance of compliance, risk control and long-term asset performance (Parliament, 2022). Because of this, project success is now largely linked to the ability to

demonstrate robust management processes, regulatory alignment and the assurance of safe outcomes.

Social value has also emerged, with public and private sector clients placing greater importance on local employment, skills development, community engagement and other societal benefits mentioned in the Public Services Act 2012. These emerging expectations challenge traditional frameworks as it looks to prioritise long-term and social impacts that may not have been captured through traditional project control measures.

These emerging modern drivers indicate that there is a clear evolution of project success metrics. While time, cost and quality are fundamental to project delivery, they can no longer be identified as the only drivers of contemporary success metrics in construction projects. This signifies a shift towards more value based and outcome focused frameworks within infrastructure policy than the traditional performance metrics and disputes whether such changes signal the emergence of a "Second Transformation" (Infrastructure and Projects Authority, 2021).

2.4 – Variations, Tender Accuracy, and Risk Allocation

Further disconnect between traditional and emerging success metrics can be seen through variations, tender accuracy and risk allocation. Although refined through the Latham and Egan reports, a gap between tender stage assumptions and actual project outcomes continues to show.

There is research to suggest that projects consistently suffer from cost overruns and delays due to this gap between the tender stage and the project outcome. Initial project baselines fail to reflect the projects reality because of intense commercial pressure and incomplete data at the tender stage (Morris, 2013).

Further research from Kahnamen and Tverky identifies that optimism bias and strategic misrepresentation tend to influence tender stage decision making, which can lead to an underestimation of costs, durations, and risks (Kahneman & Tversky, 1979). Flyvbjerg argues that these biases are systemic rather than project specific, which means this gap is embedded within industry culture and procurement practices

and thus need a reform within the industry to change (Flyvbjerg, 2014). As a result of this, project can enter the delivery phase with targets that too difficult to achieve, increasing the chance of variations and performance deviations.

Variations are commonly treated as discrete contractual events, but Peter Love, an engineering professional, and journalist suggests that they are indicative of earlier planning and risk allocation decisions made at the tender stage (Love, et al., 2012). This reveals that variations not only change the scope, but indicates underlying inefficiencies in information quality, risk and stakeholder coordination.

The type of contract used for a project also factors in massively when looking at how risk is managed. Contracts usually allocate responsibility for cost, time, and risk, which influence decision making, behaviour and the overall attitude to change. If allocated or transferred without mitigation or shared understanding, projects would see adversarial responses to variations and undermine the first reform improvements of collaboration and performance outcomes.

It is important to understand the relationship between tender stage assumptions, variations, and risk allocation as it provides the foundation for being able to assess traditional versus contemporary definitions of project success and whether it correlates to the idea of an emerging “Second Transformation.”

2.5 – Project Controls and Performance Measurement

Project Controls and Performance Measurement are arguably the basis of the Iron Triangle; this is because they are embedded into the contracts and traditionally define project success as a metric (Neely, et al., 2005) (Kaplan & Norton, 1996).

Traditional controls focus on short term project outputs rather than long-term values. Although good for effective on-site stage processes, this can quickly be seen as a failure if the project exceeds budgets or deadlines (Project Management Institute (PMI), 2021). This again, shows the gap in traditional systems as the don’t capture the full picture of the project beyond the immediate delivery phase.

Modern performance frameworks have expanded to include Key Performance Indicators (KPI’s) for health and safety, environmental impacts, and stakeholder

satisfactions within projects. This helps to identify not only what is delivered, but how the project is delivered within those expanding metrics (Infrastructure and Projects Authority, 2021). It is clear however, that these broader metrics are treated as secondary tick box requirements rather than as core success indicators.

Parallel to this, is the increasing push on whole-life performance, prioritising operational efficiency and long-term assets over capital costs and construction speed. This directly challenges the traditional success metrics of short-term efficiency and project control (HM Treasury, 2022). Despite this shift, the long-term performance is still assessed towards the end or after completion as opposed to being embedded in the project's whole success criteria.

When comparing emerging indicators with traditional metrics, it is clear that there is a tension that remains between traditional contractual accountability and emerging performance indicators. Although there is literature to support the idea of expanding success, the industry still relies heavily on the Iron Triangle (Kaplan & Norton, 1996) (Neely, et al., 2005).This misalignment shows that current measurement metrics may no longer be adequate for the more complex contemporary construction environments.

2.6 – Conceptual Framework

Industry pressures on projects mentioned in section 2.6, amongst others, clearly define, in literature, that contemporary environments are too complex for traditional metrics alone. More recent industry pressures have gone further by challenging the traditional success metrics themselves. These developments therefore support the need for a framework that integrates time, cost, quality, with the broader value-based measures.

This research projects implements a conceptual framework that places project success as an integration of both traditional and emerging success metrics. In this framework, time, cost and quality remain as the essential indicators of delivery performance, but they complemented by measures from both the first Transformation and the emerging contemporary measures.

This framework will provide a good foundation for interpreting the empirical data gather in Chapter 4 of this study. It allows for comparison between planned and actual project outcomes, stakeholders perceptions, and evaluation of whether modern practices actually reflect broader transformation in how success is defined. By incorporating traditional measures with emerging industry drivers, the framework can help to assess whether these finding are indicative of an emerging "Second Transformation."

To illustrate this theory of progression visually, Figures 2.6.1, 2.6.2, 2.6.3 present the 3 conceptual developments of project success from the Iron Triangle to the emergence of the "First Transformation, to a modern multi-dimensional framework of all modern industry drivers.

Figure 2.6.1 illustrates the traditional Iron Triangle, showing the three core success indicators.

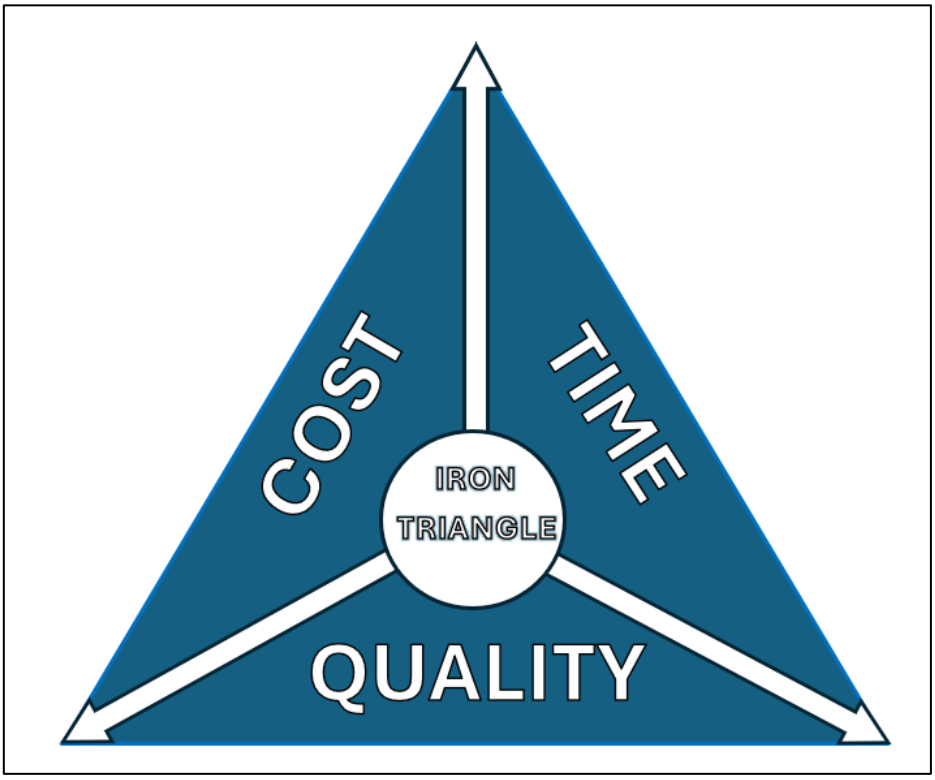

Figure 2.6.1: Iron Triangle of Time, Cost and Quality (Author's own diagram)

Figure 2.6.2 shows the First Transformation, in which time, cost and quality remain as the core indicators, with collaboration, procurement form, integrated teams and performance benchmarking layered around, indicating the integration of industry evolution.

Figure 2.6.2: First Transformation – Expansion of Project Success (Author's own diagram)

Figure 2.6.3 presents the contemporary framework, showing project success as a multi-dimensional construct that included sustainability and Net Zero, whole-life value, risk management, social value, digital integration and delivery performance.

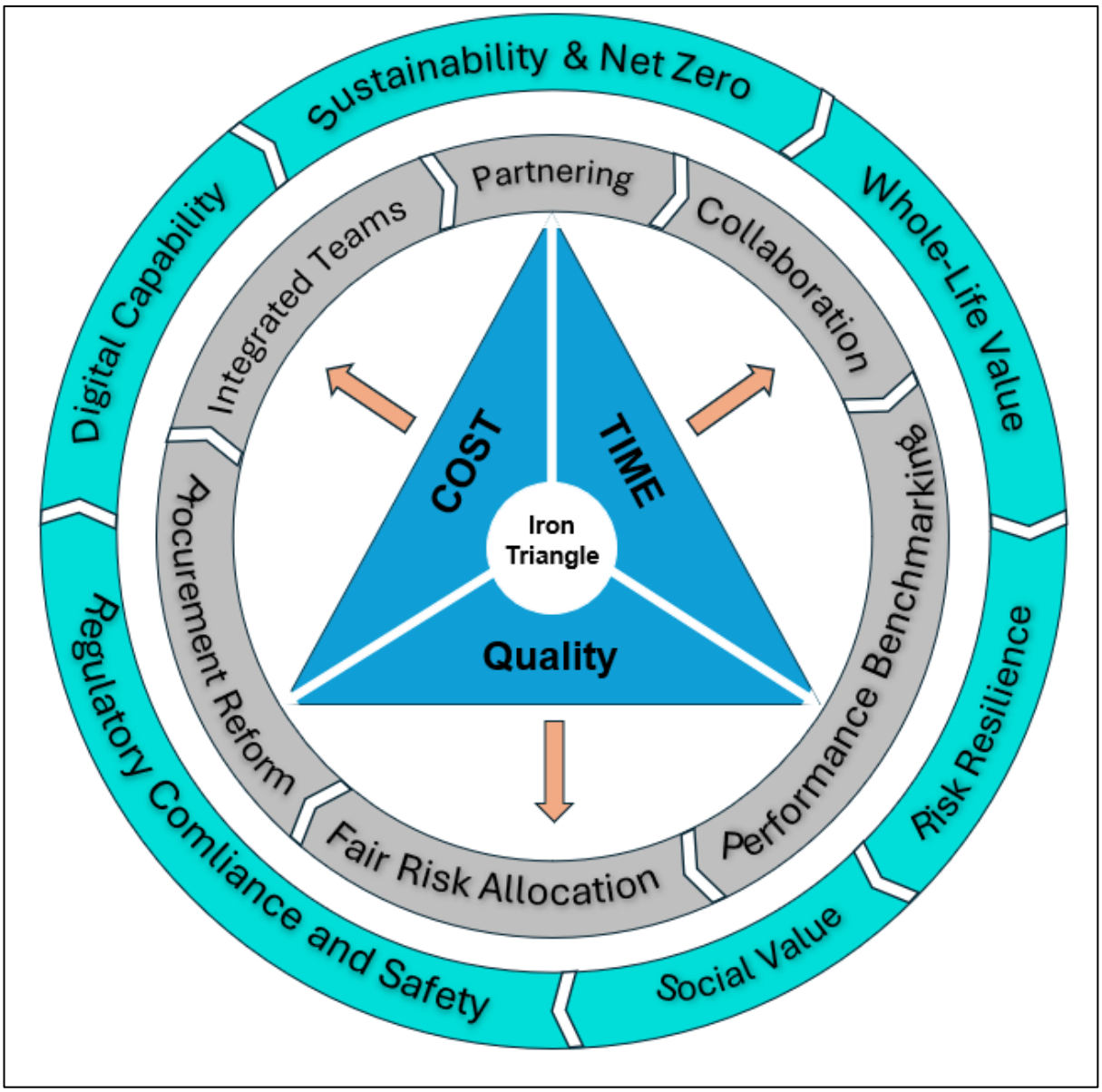

Figure 2.6.3: Second Transformation – Multi-Dimensional Project Success Framework (Author's own diagram)

Chapter 3 – Methodology

3.1 – Research Method

This study adopts a pragmatic research philosophy, recognising that understanding project success requires both objective data and subjective interpretation. Project performance can be measured through cost, time, and documented outcomes, but it it also shaped by how industry professionals perceive and evaluate success in practice. A pragmatic approach is therefore appropriate, as it allows the research to combine quantitative and qualitative methods in order to gain a balanced and practical understanding of how success is defined (Saunders, et al., 2019).

This research takes a mixed-methods approach, combining quantitative and qualitative data. A mixed-methods strategy is appropriate given the exploratory and evaluative nature of the research aim and objectives outlined in Sections 1.3 and 1.4 which aim to understand perceptions of project success and to analyse empirical project performance data (Creswell & Creswell, 2018).

The quantitative element enables the comparison of traditional and emerging success criteria through a structured questionnaire distributed to construction industry professionals. This approach allows patterns and trends in perceptions of project success to be identified and compared across different roles and experience levels. In parallel, quantitative analysis of project data supports a structured comparison between tender stage assumptions and actual project outcomes, particularly in relation to cost, time, and variations (Bryman, 2016).

The qualitative element complements this by providing contextual understanding of why such differences occur and how success is interpreted in practice. Qualitative insights are derived from open-ended survey responses and project evidence. This combination strengthens the study by enabling triangulation between perceptions, documented performance, and observed outcomes (Creswell & Creswell, 2018).

3.2 – Data Sources

The study draws upon multiple sources of data to explore how project success is defined and evaluated. The primary data source consists of questionnaire responses gathered from industry professionals. These responses provide insight into how different respondents perceive traditional and emerging measures, allowing patterns and trends in industry opinion to be identified (Bryman, 2016).

In addition to survey responses, the study uses publicly available UK infrastructure project sources that includes project reports, parliamentary publications, National Audit Office reports, and industry commentary documenting examples of cost variation, programme deviation, and governance challenges. These sources support the comparison between tender stage assumptions and actual project outcomes.

Public infrastructure projects such as HS2, Crossrail, and Hinkley Point C were selected because they are large-scale, well-documented, and provide accessible evidence of cost increases, programme delay, and delivery complexities. These projects therefore provide a useful basis for examining whether the patterns identified in the survey findings also appear in publicly documented infrastructure project evidence as presented in Section 4.5. (HM Government, 2021).

3.3 – Survey Design and Implementation

The questionnaire was designed to align with the research objectives outlined in Section 1.4 and the conceptual framework developed in Section 2.6, to ensure that each question contributed to the investigation of traditional and emerging success criteria and could therefore be used in the results (Saunders, et al., 2019).

Likert-scale questions were primarily used to compare the perceived importance of time, cost, and quality against emerging performance measures such as safety, sustainability, whole-life value, risk management, digitalisation, innovation, and social value (Bryman, 2016). Additional statements were included to explore the perceptions of tender stage accuracy, frequency of variations, risk assessment, contractual

influence, and whether current industry changes represent a “Second Transformation.”

The questionnaire was then distributed to respondents with construction-related experience using a non-probability sampling approach and was shared through QR Code and email allowing everyone to access the survey digitally. It generated 33 responses, which were analysed using thematic coding of open-ended responses. This approach supports the mixed methods design by providing measurable data on respondent perceptions while also allowing qualitative insight into how project success is understood in practice (Creswell & Creswell, 2018).

3.4 – Analytical Methods

Quantitative survey data is analysed using statistical techniques, including mean scores, frequency distributions, rankings, counts, and percentages. Likert-scale responses are also used to assess the relative importance assigned to traditional and emerging project success criteria. This enables comparison between the continued relevance of time, cost, and quality and the growing importance of broader criteria such as safety, sustainability, risk management, whole-life value, digital capability, and social value.

Project performance data is analysed through a tender stage versus actual outcome comparison, focusing on cost, programme deviation, and reported causes of variation. This enables identification of differences between early-stage baseline estimates and later reported project outcomes, highlighting the limitations of traditional success measures when applied in isolation (Flyvbjerg, 2014). The case study analysis is presented in Section 4.5.

To examine the factors contributing to deviations, a structured cause analysis is applied using a fishbone (Ishikawa) diagram. This approach is used to categorise recurring factors such as planning assumptions, design development, risk allocation, regulatory change, supply chain constraints, and client-driven scope change. The analysis is used to identify contributing factors rather than prove definitive causal relationships.

Qualitative data from open-ended survey responses and documentary evidence is analysed using thematic analysis. Data is coded to identify recurring themes relating to project success, risk, sustainability, whole-life value, digital performance, and organisational behaviour. These themes are then compared with the quantitative survey findings and case study evidence to support and strengthen the overall findings (Braun & Clarke, 2006).

3.5 – Ethical Considerations

Ethical considerations are central to the research survey. The participants were informed of the purpose of the study before completing the survey, and participation was voluntary. Informed consent was obtained prior to data collection through the survey software, providing a survey information sheet that had to be read before the survey could be completed.

Survey responses were treated anonymously, and no personally identifiable information is presented within the dissertation. Data was stored securely and used solely for academic purposes in accordance with university ethical guidelines and data protection requirements.

The project evidence used within the case study analysis was drawn from publicly available sources, including published reports and industry documentation. No confidential client names, contractor identities, internal commercial data, or commercially sensitive values are disclosed.

3.6 – Methodological Limitations

Several methodological limitations must be considered. First and foremost, the questionnaire was based on a sample of 33 respondents, meaning the findings should be interpreted as exploratory rather than statistically representative of the wider UK construction industry. The use of non-probability sampling may also have influenced the composition of the sample, as responses may reflect the experiences, roles, and professional perspectives of those who chose to participate (Bryman, 2016).

The case study analysis is limited to a small number of publicly documented UK infrastructure projects. While projects such as HS2, Crossrail, and Hinkley Point C provide useful examples of cost escalation, programme deviation, and delivery complexity, they are major infrastructure projects and are not representative of all construction projects. This limits the extent to which findings can be generalised across smaller projects, different sectors, or international contexts (Yin, 2018).

The reliance on publicly available project data limits the depth of analysis that can be undertaken. Public reports provide valuable evidence of reported outcomes and governance issues, but they do not provide full access to internal project decision-making, detailed commercial information, or complete risk records. As a result, the analysis identifies patterns and contributing factors rather than proving definitive causal relationships.

Despite these limitations, the chosen methodology is appropriate for addressing the research aim. The combination of survey responses, open-ended qualitative insight, and documentary case study evidence provides a balanced foundation for evaluating how definitions of project success are evolving within the UK construction and infrastructure sector (Saunders, et al., 2019).

Chapter 4 – Results/Findings

4.1 – Responses and Survey Overview

The survey collected a total of 33 responses from construction industry professionals, representing a range of roles including, project managers, quantity surveyors, planners, construction managers, and other technical disciplines. The respondents also identified different levels of industry experience and were primarily part of infrastructure and building sectors. This diversity gives the study a range of industry perspectives, which provides a greater understanding of how project success is currently being perceived.

The following sections show the key findings that developed from the questionnaire, focusing on project success criteria and tender-stage-accuracy. A full breakdown of respondent demographic is provided in Appendix D.

Table 4.1.1 – Summary of Responses and Survey Overview

Category	Response Group	Number of Respondents	Percentage
Professional Role	Project Manager	5	15.2%
Professional Role	Quantity Surveyor	5	15.2%
Professional Role	Planner	4	12.1%
Professional Role	Construction Manager	3	9.1%
Professional Role	Contracts Manager	2	6.1%
Professional Role	Senior Management	3	9.1%
Professional Role	Design/Technical Role	2	6.1%
Professional Role	Sustainability/Environmental	3	9.1%
Professional Role	Health and Safety Advisor	4	12.1%
Professional Role	Digital/BIM/Information Management	2	6.1%
Experience Level	0-2 years	1	3.0%
Experience Level	3-5 years	6	18.2%
Experience Level	6 -10 years	8	24.2%
Experience Level	11-20 years	9	27.3%
Experience Level	20+ years	9	27.3%
Sector	Infrastructure	16	48.5%
Sector	Building	8	24.2%
Sector	Utilities/Energy	2	6.1%
Sector	Mixed	7	21.2%

Table 4.1.1 shows that the survey sample included a range of professional roles, with project managers and quantity surveyors each representing 15.2% of responses, followed by planners and health and safety advisors at 12.1%. The experience level leaned towards more experienced respondents, with 54.6% reporting more than 10 years of industry experience. Sector involvement was mainly infrastructure-based, representing 48.5% of responses, followed by building at 24.2%.

This table indicates a broad pool of respondents with varied construction-related experience, particularly within infrastructure and project delivery. However, due to the sample size of 33 respondents and the non-probability nature of the survey, it is important to understand that the results are to be interpreted as exploratory rather than fully representative of the wider UK construction industry.

4.2 – Project Success Findings

Section 4.2 identifies the perceptions of importance of different project success metrics. They were asked to rate traditional measures, including time, cost, and quality, alongside emerging drivers such as safety, sustainability, risk management, social value, digital capability, innovation, and whole-life value. Responses were then measured using a Likert scale, with higher mean scores indicating greater perceived importance.

As shown in Figure 4.2.1 and Table 4.2.1, the results provide insight into whether project success continues to be understood primarily through the Iron Triangle, or whether respondents perceive success through a broader set of performance measures.

Figure 4.2.1 presents the mean score for each success Indicators

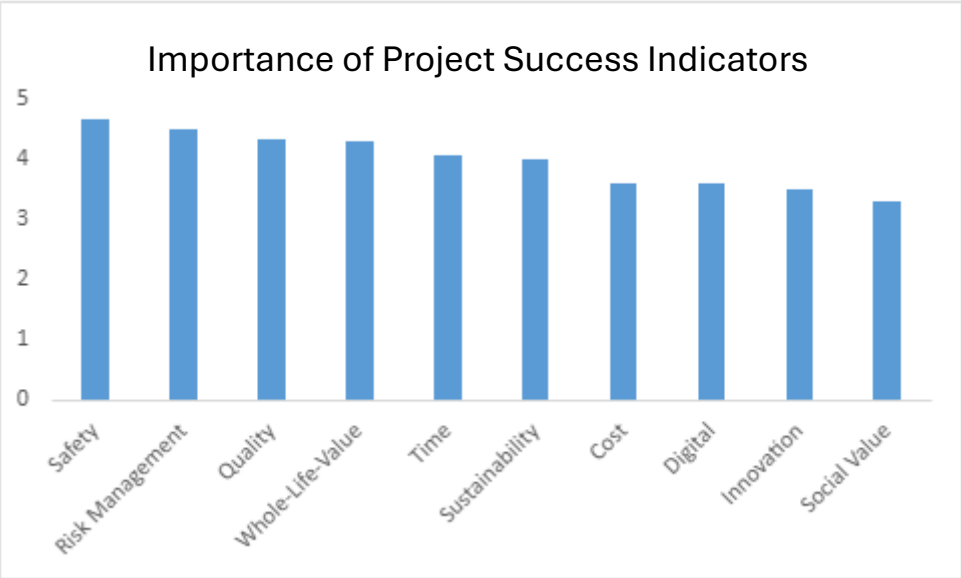

Figure 4.2.1 - Importance of Project Success Indicators

Table 4.2.1 – Average mean score of Project Success Importance

Rank	Success Indicators	Mean Score
1	Safety	4.7
2	Risk Management	4.5
3	Quality	4.3
4	Whole-Life Value	4.3
5	Time	4.0
6	Sustainability	4.0
7	Cost	3.6
8	Digital Integration	3.6
9	Innovation	3.5
10	Social Value	3.3

The results show that safety ranked as the most important emerging indicator of success, with the highest mean score of 4.7. Risk management also ranked second, followed by quality and whole-life value. This indicates that the respondents placed strong importance on both traditional delivery outcomes and emerging performance considerations.

Evidently, the Iron triangle metrics remained significantly important. However, cost ranked lower than safety, risk management quality, whole-life value, time, and sustainability which suggests than within this sample, project success is not perceived primarily through cost performance or short-term delivery efficiency.

Digital capability, innovation, and social value scored lower which indicates that these metrics are recognised but are viewed less central to project success as safety, quality, risk, and whole-life value. Overall, success is clearly understood as a more multi-dimensional concept than just the traditional indicators, yet they remain significant when measuring success.

4.3 –Tender Accuracy and Project Delivery Findings

These results look at the perceptions of tender stage accuracy, variation frequency and risk assessment during project planning and tender stages. Figures 4.3.1, 4.3.2, 4.3.3, looked to examine whether initial cost, programme and risk assumptions are viewed as reliable indicators of actual project outcomes.

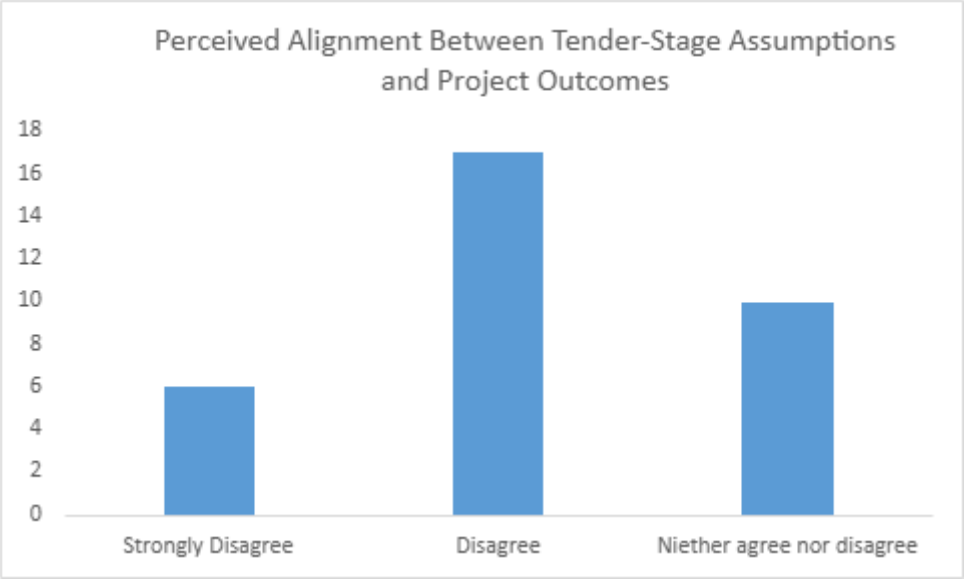

Figure 4.3.1 – Perceived alignment between tender-stage cost and programme assumptions and actual project outcomes

Figure 4.3.1 shares the views on whether tender-stage cost and programme assumptions align with actual project outcomes. The results show a clear that there is a clear trend towards disagreement. A total of 23 out of 33 respondents selected either disagree or strongly disagree, while 10 respondents selected neither agree nor disagree. With no respondents selecting agree or strongly agree.

This clearly shows that, within this sample, tender stage assumptions are considered to be unreliable reflections of actual project outcomes. As no one agreed, is indicates that all respondents were either doubtful or uncertain about the accuracy of tender stage processes.

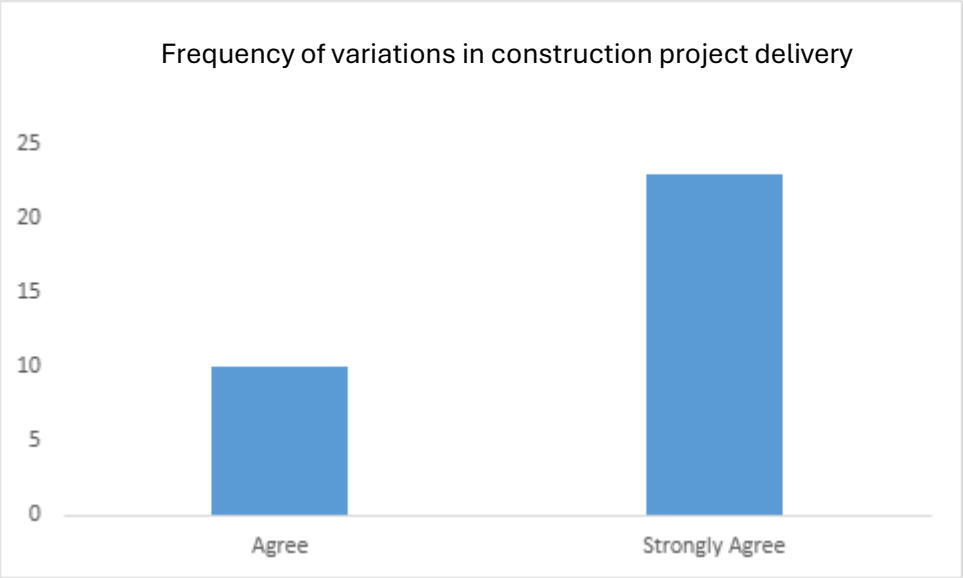

Figure 4.3.2 – Frequency of variations in construction project delivery

Figure 4.3.2 identifies whether variations are a considered a regular feature of construction project delivery. The results show that all respondents agreed, with 23 out of 33 respondents selecting strongly agree and 10 respondents selecting agree. This indicates a strong overall agreement that variations are common within construction projects.

It shows that variations are viewed as a normal part of project delivery rather than outstanding events, showing that the project delivery phase often changes after initial baselines have been established.

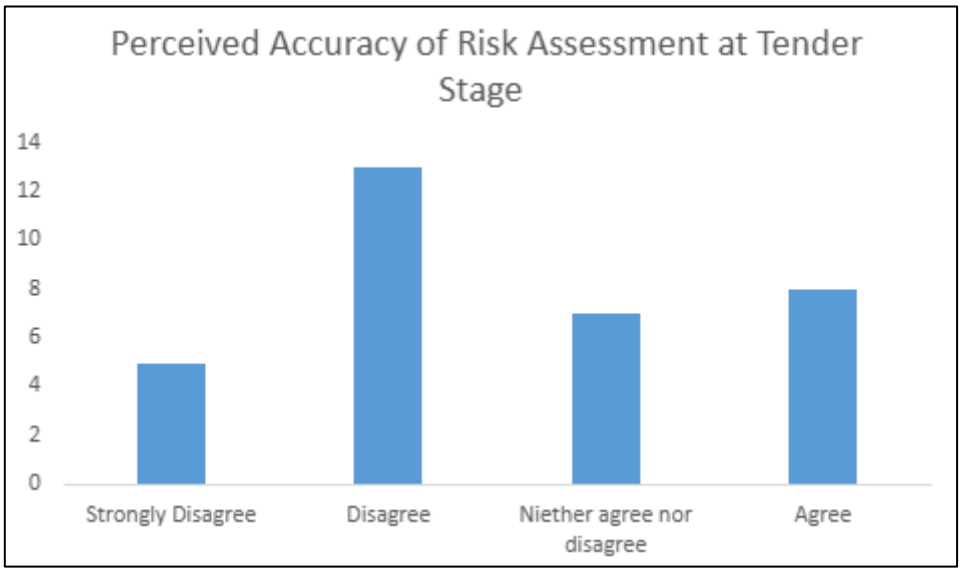

Figure 4.3.3 – Perceived accuracy of risk assessment at tender stage

Figure 4.3.3 shows the perceptions of risk assessment accuracy at the tender stage. 18 out of 33 respondents selected either disagree or strongly disagree, which means that most viewed tender-stage risk assessment as limited or incomplete. However, 8 respondents selected agree, and another 7 respondents selected neither agree nor disagree.

This shows a mixture of responses which indicates that although concerns about risk assessment accuracy are common within the sample, the sample views are not the same. Neutral and agree responses suggests that risk assessment practices may vary between organisations, project types, or levels of project complexity.

The responses from these questions regarding tender accuracy show that tender-stage cost, programme, and risk assumptions are all subject to a form of uncertainty. Equally, agreement that variations are a regular feature of project delivery shows that a change in risk and adaptability at the tender stage should be assessed rather than placing them against fixed initial assumption baselines.

4.4 – Project Success and Industry Transformation Change Perception

Section 4.4 goes into detail on the survey responses that have been collected, identifying the potential patterns for further data analysis and overall conclusion.

Q15 asked respondents to rank project success factors in order of importance, where 1 represented the most important factor and 7 represented the least important. Lower average rank scores therefore indicate higher importance. Table 4.4.1 below shows the overall ranking, average score, and percentage in terms of importance.

Table 4.4.1 – Ranked Project Success Factors by Average Position

Overall Ranking	Project Success Indicator	Average Rank Score	Number Ranked most to least important	Percentage
1	Safety	2.2	15	45.50%
2	Quality	2.8	3	9.10%
3	Time	4	5	15.20%
4	Cost	4	4	12.10%
5	Whole-life Value	4.2	2	6.10%
6	Sustainability	4.4	3	9.10%
7	Social Value	6.5	1	3%

The ranking of the results above reinforces the findings shown in Section 4.2. Safety achieved the lowest average score of 2.2 and was ranked first by 15 out of 33 respondents, making it the highest-ranked success factor overall. Quality ranked second, with time and cost ranking third and fourth, both with an average rank score of 4.0. These results alone identify that traditional Iron Triangle measures remain important, but they are not the only factors to define project success.

Question 16 is an open-ended question that aimed to gather the respondent's opinion on what defines project success the most. These answers were then reviewed thematically, grouping together recurring themes that could then be identified as core

themes. Table 4.4.2 shows the final themes, with sub themes and the frequency of each code mentioned. For the full thematic mapping table, see Appendix 8.3.

Table 4.4.2 – Thematic Map – Final Theme

Final Theme	Sub-Theme (Initial Codes)	Frequency
Outcome Oriented Success	• Sustainability and carbon • Long-term Value • Quality and Standards • Client and User Satisfaction	17
Process Integrity	• Realistic Programming • Risk Management • Information Management	12
Human and Social Foundation	• Health and Safety • Financial and profit	14

The sub themes shown the table above show what the initial answers we broken down into. These initial codes show the emergence of contemporary performance indicators, and a more value-based outcomes rather than just the traditional metrics alone. The final themes, Outcome Oriented Success, Process Integrity, and Human and social Foundations are all interlinked with the emerging performance indicators. It is clear that the focus on longevity of the project, greater detail in the tender stage, and social and human impact awareness appears to be just as important as the traditional metrics at the core of project success.

4.5 – Infrastructure Project Case Study Analysis

Section 4.3 looked at tender stage cost, programme and risk assumptions, and formed the conclusion that it was uncertain. To examine whether this pattern is shown in publicly documented infrastructure projects, section 4.5 considers three major UK projects including HS2, Crossrail, and Hinkley Point C.

These projects were selected because they are large scale infrastructure projects that are provide some evidence that relates to cost changes, programme delay and delivery complexities. Although good case study examples of tender stage versus actual outcomes, they are not representative of the industry as a whole.

Table 4.5.1 provides a comparison summary of these projects showing planned cost, lasted reported cost, planned completion date, revised completion date, and the key causes of deviation.

Table 4.5.1 – Comparison of Publicly available documented of infrastructure projects

Project	Planned Cost	Last Reported Cost	Planned Completion Date	Revised Completion Date	Key Causes
HS2	£55.7 billion (2015 price)	£80 billion (current prices)	2026 (Phase 1) – 2033 (Full Scheme)	2029 -2033	• Governance Issues • Cost Inflation • Supply Chain Disruption • COVID-19 Impacts
Crossrail	£14.8 billion	£18.8 billion	December 2018	May 2022	• Testing Challenges • Unrealistic scheduling • Programme Management Issues
Hinkley Point C	£18 billion (2016 price)	£31 billion - £35 billion	2025	2030	• Engineering cost Increases • Extended Programme Duration • Supply Chain and Delivery Complexity

(Sources: (Department for Transport (DfT), 2015), (Public Accounts Committee (House of Commons), 2023), (Department for Transport (DfT), 2023), (Reuters, 2022), (Transport for London (TfL), 2022), (National Audit Office (NAO), 2019), (National Audit Office (NAO), 2017), (EDF (Électricité de France), 2026)

The figures presented in this table are from publicly documented sources and are used to demonstrate the patterns of cost and programme deviation, and do not reflect correctly inflated adjustments.

The table shows a consistent deviation between the tender stage and the later reported project outcomes. All three projects have had either major cost overruns,

delays, design issues, supply chain issues and complexities in delivery. This does show that deviations are not caused by one issue, but are caused by technical, commercial, regulatory and programme related problems. It correlates clearly back to the findings in the survey results in section 4.3, where tender stage assumptions did not align with actual project outcomes. This supports the view then, that cost and programme deviations are normal features of complex infrastructure projects, and other projects within the industry.

4.6 – Structured Cause Analysis of Deviations

This section examines the contributing causes of deviations between early-stage baseline assumptions and actual project outcomes, building on the findings presented in Sections 4.3 and 4.4. Although cost overruns, programme delays and variations are commonly seen within construction projects, it is crucial to understand the factors that contribute to these deviations when evaluating whether they actually reflect isolated problems or whole system issues.

A structured cause analysis was done using a fishbone (Ishikawa) diagram in order to categorise the main factors that are contributing to project deviation. Several key themes are identified including, planning assumptions, design development, risk allocation, regulatory change, supply chain constraints, and client driven scope change. These are all reflected in the case studies in Section 4.4.

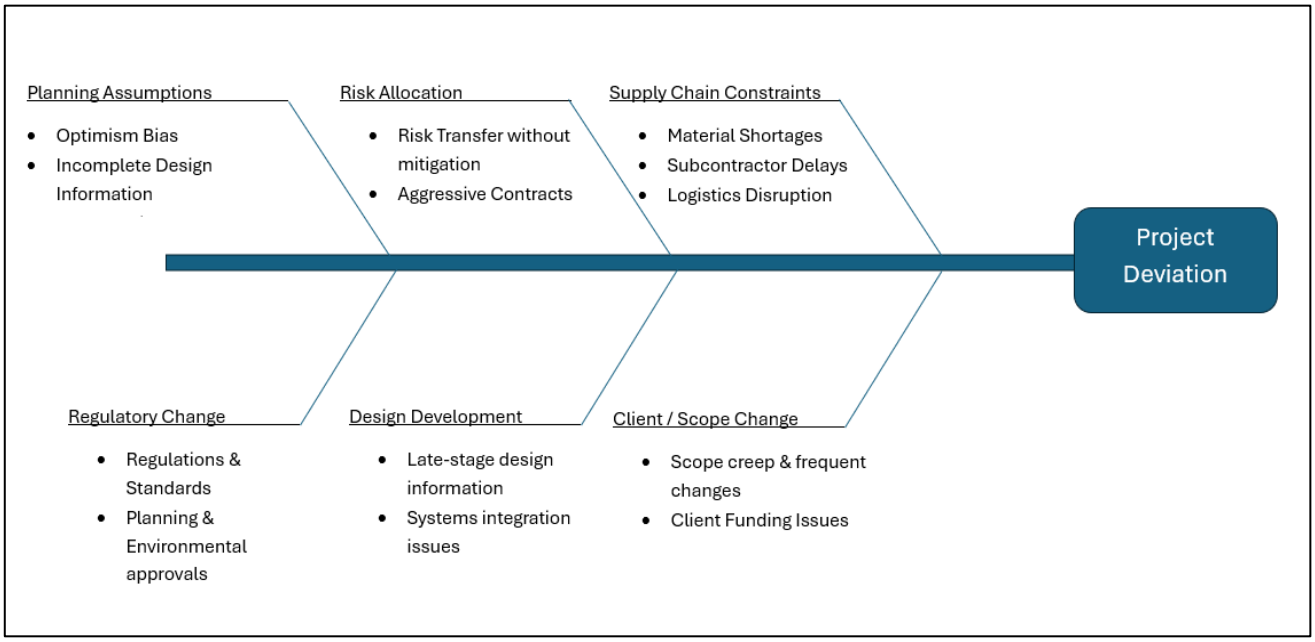

Figure 4.6.1 – Fishbone diagram illustrating the causes of project deviation in UK construction projects

Figure 4.6.1 identifies the primary factors that affect performance deviations created from the survey findings in 4.3 and project evidence in 4.4. This indicates well that deviations do not occur from one sole cause but come from a combination of interrelated factors. It helps to reinforce the view that project delivery operates in an uncertain environment where change an absolute certainty rather than an exception.

One of the most significant factors that has become acknowledged here is the inaccuracy of tender stage assumptions. Tender stages are developed under high-risk uncertainty with limited data and knowledge on things like design maturity and site conditions which creates the model for unrealistic baselines, to an extent. This only unfolds and becomes more problematic as the project evolves in the construction phase and changes in the scope occur. In addition to this, if contractual risk is transferred without sufficient mitigation or a shared understanding, it can lead to adversarial behaviours and reactive decision making that will only increase the damage to the project performance.

There are also external pressures that introduce complexity to a project, like regulatory change or supply chain constraints. Infrastructure projects are particularly sensitive to evolving safety and environmental standards, which can initiate design revision and further delays. It is also important to recognise the market volatility. Material price fluctuations and labour shortages quickly impacts both project cost and programme, linking straight back to project controls and core indicators that can affect the whole project. All of this is intensified by the potential for client scope changes, where shifts in requirements or new expectations prioritise complete re writes to the original project scope.

It is evident then, that deviations should not be viewed as failures automatically. They are an inherent part of a whole project and allow for fluidity throughout. They highlight the limitations of evaluating project performance purely against initial cost and time targets. In modern construction, a projects ability to manage change, respond to uncertainty, and adapt to evolving conditions may represent realistic and appropriate measure of success than a strict adherence to a flawed preconstruction plan.

4.7 – Summary of Findings

This section summarises all the key findings discussed in chapter 4, including the questionnaire results, case study analysis, and structured cause analysis. The purpose of this section is to consolidate the main outcomes and identify the key themes that will help aid in answering the Aim of this project.

Firstly, and most importantly, they evidently show that traditional project success indicators remain crucial within the construction system. All three factors continue to show dominance in how project performance is assessed, as they are all embedded into the contractual obligations, project controls, and the overall outcomes.

Further findings suggest that project success is being perceived as more than just an outcome of traditional metrics. Emerging indicators are not only evident in how a contemporary projects are being run, but also in the survey where respondents recognised that there were a wider range of performance measures, and that some were considered more important that traditional measures.

Tender stage assumptions were shown in the survey results transparently as an uncertainty. Although projects must have some form of baseline to work from, these assumptions, whether in the programme, design or budget, do not and will not ever align with actual project outcomes. There are too many fluid variables that prevent the actual project outcome from sticking to the initial tender stage assumptions. This pattern was also found within the case studies provided. All three projects demonstrate some kind of deviation from the initial programme or budget. This displays the complexity of contemporary construction environments and indicates that there will always be a level of uncertainty.

Running parallel to this is structured cause analysis of deviations. It is the contributing factors to project deviation, that are almost inevitable, that prove that project performance is shaped by various interacting factors, not just one individual failure. It is not therefore the deviations themselves that create failure, but how the project, team and environment react to those deviations and whether the initial project assumptions, programmes and designs incorporated the emerging performance metrics.

The results to this research have become very transparent throughout this section and have proven that traditional performance measures remain the centre for which projects are built on and are the core indicators for project success. However, with complexity of contemporary project environments, using solely the traditional metrics would not fully capture the emerging performance metrics, and therefore contribute to whether contemporary project a considered a success or failure.

Chapter 5 – Discussion

5.1 - Does the Iron Triangle Still Matter

The results from Chapter 4 findings show that the Iron Triangle continues matter significantly within the UK construction and infrastructure sector. Time, cost and quality continue to display importance because they still closely linked to contract, project controls and client expectations. This very much supports the literature discussed in Section 2.1, where the Iron Triangle is identified as a long-standing framework for measuring project success (Atkinson, 1999) (Turner, 2009).

However, they also show that the Iron Triangle is no longer sufficient on its own. In Section 4.2, quality remained highly ranked, while time also continued to be viewed as important. Conversely, cost ranked lower than several emerging indicators, including safety, risk management, whole-life value, and sustainability which suggests that although traditional metrics remain relevant, they no longer fully capture the broader contemporary project success measures.

This finding is reinforced by the ranking results in Section 4.4, where safety was ranked as the most important project success factor overall. Safety achieved the lowest average ranking score and was ranked first by 15 out of 33 respondents. Time and cost remained important, but they did not dominate the results which again, indicates that project success is increasingly being judged through a wider performance indicator.

It is therefore sufficient to support Atkinson's argument that time, cost, and quality provide only a partial measure of success. They also align with Shenhar, who argues that project success should include wider considerations such as long-term value and stakeholder outcomes. The evidence from this study does not suggest that the Iron Triangle is replaced. Instead, it suggests that it remains necessary, but incomplete.

5.2 - Is project success more than just the Iron Triangle

A key finding of this study is that project success is clearly being understood as more than just time, cost, and quality. In Section 4.4, all respondents agreed or strongly agreed that project success is now defined more broadly than the Iron Triangle. This is one of the strongest findings in the research because it directly supports the central argument of the dissertation.

The results from Section 4.2 also support this position. Safety ranked as the most important success indicator, followed by risk management, quality, whole-life value, time, and sustainability. This shows that respondents are not rejecting traditional indicators but are placing them alongside broader measures that reflect modern construction priorities.

The qualitative responses from Q16 provide this further support. The thematic coding identified three key themes, outcome-oriented success, process integrity, and human and social foundation. These themes show that respondents define success through long-term value, sustainability, safety, realistic planning, risk management, information management, and client or user satisfaction. Success is evidently becoming increasingly linked to the quality and value of the final outcome, rather than simply whether a project meets its original cost or programme target.

These align with the modern drivers discussed in Section 2.3, including sustainability, digitalisation, regulatory reform, whole-life performance, and social value. They also reflect wider policy developments such as the Construction Playbook and Transforming Infrastructure Performance, which place greater emphasis on long-term value and outcome-based delivery.

It is evident then, that project success is becoming a multi-dimensional concept. Time, cost, and quality remain important, but they are increasingly being complemented by broader success indicators such as safety, sustainability, risk management, whole-life value, and social impact.

5.3 - Tender-Stage Assumptions and Deviations

Important questions arise about the reliability of tender-stage assumptions as measures of project success. In Section 4.3, 23 out of 33 respondents disagreed or strongly disagreed that tender-stage cost and programme assumptions align with actual project outcomes. No respondents agreed with the statement. This suggests that, within the sample, tender-stage assumptions are widely viewed as unreliable or uncertain.

This is further reinforced by the results on variations. All respondents agreed or strongly agreed that variations are a regular feature of construction project delivery. Change is therefore not viewed as unusual, but as a normal part of construction projects. Consequently, judging project success only against original tender baselines may be too narrow, particularly in complex infrastructure projects where design, scope, regulation, supply chain conditions, and stakeholder expectations can change over time.

The case study analysis in Section 4.5 also supports this pattern. HS2, Crossrail, and Hinkley Point C all show divergence between planned cost or programme assumptions and later reported outcomes. Although these are major infrastructure projects and are not representative of all construction projects, they demonstrate how complex projects can move significantly away from their original baseline assumptions.

Flyvbjerg's argument that cost and programme underestimation are recurring issues within major projects further align with this theory. They also connect with the literature discussed in Section 2.4, where tender accuracy, variations, and risk allocation are shown to influence project performance.

The structured cause analysis in Section 4.6 identified several factors contributing to project deviation, including planning assumptions, design development, risk allocation, regulatory change, supply chain constraints, and client-driven scope change. This shows that deviations are rarely caused by one issue alone. Instead, they are often the result of several interacting factors across the project lifecycle.

This has important implications for how project success is judged. If tender-stage baselines are often uncertain, then exceeding cost or time targets should not

automatically be viewed as a project failure. A more balanced assessment should also consider whether the project managed change effectively, maintained safety and quality, responded to risk, and delivered long-term value.

5.4 - Is this really a “Second Transformation?”

The results gathered in this study the UK construction industry is experiencing an emerging shift in how project success is understood. However, they do not prove that a fully established industry wide “Second Transformation” has already occurred. This distinction is important to recognise.

The Latham and Egan reforms discussed in Section 2.2 focused mainly on improving how projects were delivered. Their emphasis was on collaboration, procurement reform, integration, efficiency, performance improvement, and reducing adversarial behaviour. In contrast, the current shift identified in this study appears to focus more directly on how project success itself is defined and evaluated.

The survey findings provide strong evidence that respondents recognise significant industry change. In Section 4.4, 32 out of 33 respondents agreed or strongly agreed that the UK construction industry is currently undergoing a major transformation. In addition, all respondents agreed or strongly agreed that project success is now defined more broadly than time, cost, and quality.

However, responses to the comparison with Latham and Egan were more cautious. Only 13 out of 33 respondents agreed or strongly agreed that current changes are comparable in scale to the reforms introduced by Latham and Egan. A further 15 respondents selected a neutral response, while 5 disagreed. This suggests that respondents recognise change but are less certain that it matches the scale or impact of the 1990s reform movement.

The strongest interpretation from these results is therefore that the industry is not abandoning the Iron Triangle but moving towards a more layered understanding of project success. Traditional measures remain central to project control, but they are increasingly complemented by wider value-based criteria. The “Second

Transformation" should therefore be understood as emerging yet incomplete, rather than fully established.

5.5 - Implications for Project Controls and KPI's

As discussed in Section 2.5, traditional project controls often focus on cost, time, and quality baselines. These measures remain important because they provide structure, accountability, and visibility over delivery performance. However, the findings suggest that relying on these measures alone may produce an incomplete assessment of project success.

The table below proposes a set new, multi-dimensional set of project success indicators to be followed. These indicators combine both the traditional delivery measures with emerging value-based measures identified through the literature review and empirical findings.

Table 5.5.1 – Multi-dimensional Performance Indicators of project success

Success Area	Possible Measure	Reason for Inclusion
Time	Programme performance against baseline and approved changes	Maintains delivery accountability
Cost	Cost performance against baseline and approved changes	Supports financial control
Quality	Defects, compliance, and client acceptance	Ensures requirements are met
Safety	Incidents, safety culture, and risk prevention	Reflects the highest-ranked success factor
Risk Management	Risk identification, allocation, and response	Addresses uncertainty and deviation
Sustainability	Carbon, waste, and environmental performance	Reflects environmental expectations
Whole-Life value	Operational performance and lifecycle cost	Captures value beyond completion
Social Value	Local employment, community benefit, and skills	Reflects wider public value
Digital Performance	BIM use, data quality, and information reliability	Supports planning and asset management

This framework places time, cost, and quality within a broader set of indicators that reflect the complexity of modern construction projects. This is particularly important for infrastructure projects, where long-term value, asset performance, sustainability, and public benefit may be more significant than short-term delivery variance alone.

In addition to this, project controls should become more adaptive. Since variations and deviations are viewed as regular features of construction delivery, performance measurement systems should distinguish between poor control and justified change. A project that exceeds its original cost or programme baseline may still deliver value if change is managed effectively and wider objectives are achieved.

To conclude, the discussion shows that project success in UK construction is best understood as a multi-dimensional concept. The Iron Triangle remains crucial, but it is no longer sufficient on its own. The evidence points towards an emerging yet incomplete “Second Transformation,” where success is increasingly judged through safety, risk management, sustainability, whole-life value, adaptability, and broader value creation, alongside traditional measures of time, cost, and quality.

Chapter 6 – Conclusion

6.1 – Overall Conclusion

This study set out to examine how project success is being redefined within the UK construction and infrastructure sector, with particular focus on the adequacy of the traditional Iron Triangle and the relationship between tender stage assumptions and actual project outcomes. The findings demonstrate that while time, cost, and quality remain fundamental components of project evaluation, they are no longer sufficient in standing alone to define project success in contemporary construction practice.

The analysis of the survey data revealed that respondents continue to place highly rated importance on traditional delivery metrics, particularly in relation to contractual performance, reporting, and project control. However, the findings also identified a clear perception that tender stage cost and programme assumptions are frequently misaligned with actual delivery outcomes. This was supported by the case study analysis of major infrastructure projects, which demonstrated consistent patterns of cost increase, programme delay, and variation. These results indicate that deviation from initial assumptions is not an exception, but a recurring feature of complex project delivery.

The study also identified an increasing emphasis on emerging success criteria, including safety, sustainability, risk management, whole-life value, and wider stakeholder outcomes. These factors were consistently recognised by respondents, reflecting a shift towards a more comprehensive and multi-dimensional understanding of project performance. This supports the argument that modern construction projects operate within complex and evolving environments that cannot be fully assessed through traditional delivery measures alone.

The structured cause analysis in this study further demonstrated that deviations between planned and reported outcomes arise from a combination of interrelated factors, including planning assumptions, design development, risk allocation, regulatory change, supply chain constraints, and client-driven scope change. This reinforces the view that project performance is shaped by dynamic project conditions

rather than planned baselines, highlighting the limitations of relying solely on fixed cost and programme targets as indicators of success.

In response to the central research aim, this study concludes that project success is being redefined within the UK construction and infrastructure sector. However, this does not mean that the Iron Triangle is outdated. Instead, the evidence suggests that time, cost, and quality remain necessary baseline measures, but are increasingly complemented by broader value-based criteria. The findings therefore support the idea of an emerging yet incomplete “Second Transformation,” where project success is becoming more multi-dimensional, but traditional performance measures continue to dominate formal project control.

Overall, this dissertation demonstrates that successful project delivery in modern UK construction should not be judged solely by whether a project is completed on time, within budget, and to specification standards. It should also consider whether the project is safe, sustainable, adaptable, valuable over its lifecycle, and capable of delivering wider benefits to clients, users, and society.

6.2 – Recommendations

Based on the results and findings of this research project, several recommendations can be made to improve how project success is defined and evaluated within the UK construction and infrastructure sector.

Clients and project sponsors should adopt broader project success frameworks that combine traditional delivery measures with wider value-based indicators, including safety, sustainability, risk management, whole-life value, social value, and stakeholder outcomes.

Furthermore, project teams should place greater importance on developing realistic tender stage assumptions. The study results show that initial cost and programme assumptions are frequently perceived as misaligned with actual outcomes. Therefore, more robust allowance for design maturity, risk, uncertainty, and project complexity would largely improve the reliability of baseline forecasting.

Additionally, contractors and project managers should strengthen risk management processes throughout both planning and delivery. The study identified risk allocation, design development, supply chain constraints, and regulatory change as key factors contributing to deviation. Earlier identification of these risks and clearer allocation of responsibility would therefore support more effective project delivery.

Moreover, project control systems should become more adaptive. Since variations are viewed as a regular feature of construction delivery, performance measurement should distinguish between poor control and justified change. Projects should therefore be assessed not only against original baselines, but also against how effectively they respond to change and continue to deliver value.

Lastly, policy makers and industry bodies should support the integration of broader success criteria into formal project reporting and evaluation frameworks. This would help ensure that emerging priorities such as whole-life value, safety, sustainability, and social value are not treated as secondary measures, but as core components of project success.

6.3 – Limitations

This study is subject to several limitations which should be considered when interpreting the findings. The survey was based on a non-probability sample of 33 respondents, meaning the findings should be interpreted as exploratory rather than statistically representative of the wider UK construction industry. Responses may also have been influenced by participant experience, role, and professional perspective.

The case study analysis relied on publicly available data projects such as HS2, Crossrail, and Hinkley Point C, which provide useful examples of cost and programme deviation, however, the analysis was limited to reported outcomes and publicly documented evidence. This restricts the ability to examine detailed internal decision-making, commercial information, and project-specific governance processes.

A further limitation is that the selected case studies are major infrastructure projects and are not representative of all construction projects. Their scale, complexity, and

public visibility mean that the findings may not fully apply to smaller projects, private sector developments, or different construction contexts.

A final limitation would be that the study focuses on the UK construction and infrastructure sector. While this provides a clear and relevant research context, it may not be directly applicable to international construction industries with different regulatory, procurement, and project delivery environments.

6.4 – Future Research

Future research is plausible for this study and could be built on by using a larger and more diverse survey sample. Doing this would allow stronger comparisons between different professional groups, sectors, and levels of experience, which would improve the generalisability of the findings.

Future research could also look into more detailed project level data from live and completed projects to gain a better comparison of how success is defined. Access to internally cost records, risk registers, programme updates and change control documents would all allow for deeper analysis of the gap between tender stage assumptions and actual project outcomes.

Further investigation is also needed to show how multi-dimensional success criteria can be practically embedded into project control systems and performance reporting. Future studies could explore, in particular how the emerging performance metrics can be measured consistently across different types of construction projects.

Finally, looking at completing longitudinal research would be valuable in order to assess how project success evolved after the completion of a project. This would be considerably useful in understanding whole-life value, operational performance, asset resilience and wider social and environmental benefits, which cannot be fully assessed at the point of project handover.

Chapter 7 – References

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Chapter 8 – Appendices

8.1 – Appendix A – Questionnaire

Dissertation Questionnaire

Section A — Background Information

Q1. What is your primary role?
☐ Project Manager
☐ Construction Manager
☐ Quantity Surveyor / Commercial Manager
☐ Contract Manager
☐ Design / Technical Role
☐ Senior Management
☐ Other (please specify): _____

Q2. Years of experience in construction (if applicable):
☐ 0–2
☐ 3–5
☐ 6–10
☐ 11–20
☐ 20+

☐ Not Applicable (student)

Q3. Sector primarily worked in:
☐ Building
☐ Infrastructure
☐ Utilities / Energy
☐ Mixed
☐ Other

Section B — Traditional Measures of Project Success

(Likert scale: 1 = Not Important, 5 = Extremely Important)

Q4. How important do you consider the following factors when assessing project success?

Factor	1	2	3	4	5
Completing the project on time	☐	☐	☐	☐	☐
Delivering within the agreed budget	☐	☐	☐	☐	☐
Achieving the specified quality standards	☐	☐	☐	☐	☐

Section C — Emerging Measures of Project Success

(Likert scale: 1 = Not Important, 5 = Extremely Important)

Q5. How important do you consider the following factors in defining project success today?

Factor	1	2	3	4	5
Sustainability and environmental performance	☐	☐	☐	☐	☐
Health and safety performance	☐	☐	☐	☐	☐
Whole-life value (operation & maintenance)	☐	☐	☐	☐	☐
Digital capability (e.g. BIM, data use)	☐	☐	☐	☐	☐
Social value and community impact	☐	☐	☐	☐	☐
Innovation in design and delivery methods	☐	☐	☐	☐	☐
Effective risk management	☐	☐	☐	☐	☐

Section D — Tendering, Risk, and Reality

(Likert scale: 1 = Strongly Disagree, 5 = Strongly Agree)

Q6. Tender-stage cost and programme assumptions are generally aligned with actual project outcomes.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q7. Variations are a regular feature of construction project delivery.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q8. Risk is accurately assessed during the tender stage.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q9. Contract type influences project outcomes.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q10. A project can still be considered successful even if it exceeds its original cost or time targets.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section E — Industry Change and Transformation

(Likert scale: 1 = Strongly Disagree, 5 = Strongly Agree)

Q11. The UK construction industry is currently undergoing a major transformation.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q12. Project success is now defined more broadly than time, cost, and quality.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Q13. Industry initiatives (e.g. value-based procurement, sustainability targets) represent a shift in how projects are delivered.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

(The Latham Report (1994) and Egan Report (1998) were landmark UK construction industry reviews that aimed to improve performance and reduce conflict. Latham promoted collaboration, fair payment, and partnering to replace adversarial practices, while Egan focused on efficiency, quality, safety, and continuous improvement by applying principles from manufacturing. Together, they laid the foundation for modern collaborative and performance-driven construction practices in the UK.)

Q14. The changes occurring today are comparable in scale to those introduced by Latham (1994) and Egan (1998).
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section F — Ranking and Reflection

Q15. Please rank the following project success factors in order of importance (1 = most important):

☐ Time
☐ Cost
☐ Quality
☐ Sustainability
☐ Safety
☐ Whole-life value
☐ Social value

Background Information for Question 14 - (The Latham Report (1994) and Egan Report (1998) were landmark UK construction industry reviews that aimed to improve performance and reduce conflict. Latham promoted collaboration, fair payment, and partnering to replace adversarial practices, while Egan focused on efficiency, quality, safety, and continuous improvement by applying principles from manufacturing. Together, they laid the foundation for modern collaborative and performance-driven construction practices in the UK.)

Q16. In your opinion, what single factor most strongly defines project success today?

_____

_____

8.2 – Appendix B – Survey Information Sheet

Survey Information Sheet

Study Title
Redefining Project Success in the UK Construction Industry

Participant Information
We respect your privacy and are committed to protecting your data. This notice explains how your information will be used as part of an academic research study.

This survey forms part of a final year dissertation in Project Management examining how project success is defined and measured in the UK construction and infrastructure industry.

Purpose of the Study
The construction industry is undergoing significant change due to increasing focus on sustainability, regulation, and long-term value. However, projects are still often assessed primarily on time, cost, and quality.

This research aims to explore how project success is currently defined by construction professionals and whether emerging industry drivers are influencing traditional success measures.

How Your Data Will Be Used
Your responses will be used solely for academic research purposes as part of a university dissertation.

All responses will remain anonymous and will only be analysed in aggregate form. Individual participants will not be identifiable in any published results.

The research findings may be included within the final dissertation and may be referenced in academic work related to construction management research.

Data Storage and Retention
Survey responses will be stored securely and used only for the purposes of this research.

Anonymous survey data may be retained for future academic research purposes. Any identifiable information will not be collected or stored.

Voluntary Participation
Participation in this survey is entirely voluntary.

You may choose to stop completing the survey at any time before submitting your responses.

By submitting the questionnaire, you are providing consent for your responses to be used within this research study.

Your Rights
Under UK data protection law you have the right to:

• Access your data
• Request correction or deletion of your data (where applicable)
• Withdraw from the study before submitting your responses

We respect your privacy and are committed to keeping your information safe. This notice explains how your data will be used in the Iron Triangle Study.

8.3 – Appendix C - Thematic Coding Results

Initial Results Q16:

No	Name	Responses
1	Anonymous	all project parties and stakeholders making a fair profit margin to invest back into the built environment
2	Anonymous	Whole life value. Delivering projects that perform safely, while acting sustainably and effectively long after construction is complete.
3	Anonymous	User satisfaction
4	Anonymous	Quality of outcome rather than just conformance to budget; was the right thing delivered in the right way?
5	Anonymous	Realistic allocation of risk and delivery of the promised outcome. A project can miss the tender baseline and still succeed if value is protected
6	Anonymous	Safe delivery with no serious incidents, while still handing over an asset that performs as intended
7	Anonymous	Whole life value for the asset and the public it serves, including resilience, carbon and operational performance
8	Anonymous	Project success is delivering a safe, high-quality asset that meets client expectations while maintaining programme control, even if adjustments are needed during delivery
9	Anonymous	Success is achieving value for money through effective cost control and risk management while still delivering a safe and high-performing asset
10	Anonymous	A successful project is one where risk is properly managed through the contract and disputes are minimised while still delivering the required outcomes
11	Anonymous	Delivering a technically robust and sustainable design that performs efficiently over its entire lifecycle
12	Anonymous	Providing long-term value to the client and stakeholders while maintaining safety, reputation, and sustainable outcomes
13	Anonymous	When a realistic programme is set and actually achieved, rather than one that looks good at tender stage but fails in delivery
14	Anonymous	No project can be considered successful unless it is delivered without harm and with a strong safety culture embedded throughout
15	Anonymous	An asset that minimises carbon, enhances environmental performance, and provides long-term sustainable value
16	Anonymous	When well managed information enables efficient delivery and supports effective operation of the asset after completion
17	Anonymous	A project that hits programme and budget targets while maintaining safety, as those are still the primary pressures on delivery teams
18	Anonymous	Successfully delivering a job safely and keeps programme moving despite the realities on site
19	Anonymous	Success is not just staying within budget, but ensuring the client receives long-term value from the investment made
20	Anonymous	When Rio is properly managed and both parties achieve the intended outcomes without major disputes

21	Anonymous	Producing a design that is buildable, efficient, and delivers long-term performance rather than just meeting minimum requirements
22	Anonymous	Delivering projects that enhance the organisations reputation and provide measurable long-term benefits to clients and society
23	Anonymous	Whether the programme was realistic and actually delivered, rather than constantly re worked
24	Anonymous	People going home every day, that is the clearest and most important definition of success on any project
25	Anonymous	One that reduces environmental impact and contributes positively to long term sustainability goals
26	Anonymous	Accurate and coordinated information supports both efficient delivery and effective operation of the asset
27	Anonymous	Making sure the workforce operates safely and the build is completed to the required standard without major disruption
28	Anonymous	Realistic programme commitments are made at tender and consistently achieved during the delivery
29	Anonymous	Ensuring a culture that prioritises safety at every level, rather than treated as a compliance requirement
30	Anonymous	Delivery of measurable environmental and social benefits alongside its physical outputs
31	Anonymous	When safety is proactively managed through design and delivery, ensuring risks are eliminated rather than controlled after the fact
32	Anonymous	The programme should be transparent, achievable and trusted by all parties, rather than being driven by unrealistic tender assumptions
33	Anonymous	It achieves its aims

4 Phases of Thematic Coding for final Analysis:

Response Candidate	Phase 1: Raw Data Sample (All 33 Responses)	Phase 2: Initial Codes	Breakdown of 9 codes with number mentions	Phase 3: Sub-Theme	Phase 4: Final Themes
1	all project parties and stakeholders making a fair profit margin to invest back into the built environment	• Financial and Profit	Health and Safety (12)	Workforce and Commercial Wellbeing	The Human and Social Foundation
2	Whole life value. Delivering projects that perform safely, while acting sustainably and effectively long after construction is complete.	• Health & Safety • Sustainability and carbon			
3	User satisfaction	• Client and User Satisfaction			
4	Quality of outcome rather than just conformance to budget; was the right thing delivered in the right way?	• Quality & Standard			
5	Realistic allocation of risk and delivery of the promised outcome. A project can miss the tender baseline and still succeed if value is protected	• Risk & Contract Management	Financial and Profit (5)		
6	Safe delivery with no serious incidents, while still handing over an asset that performs as intended	• Health & Safety			
7	Whole life value for the asset and the public it serves, including resilience, carbon and operational performance	• Long-term Value • Sustainability and Carbon			
8	Project success is delivering a safe, high-quality asset that meets client expectations while maintaining programme control, even if adjustments are needed during delivery	• Quality and standards • Client and User Satisfaction			
9	Success is achieving value for money through effective cost control and risk management while still delivering a safe and high-performing asset	• Financial and Profit • Health and Safety	Information Management (2)		

10	A successful project is one where risk is properly managed through the contract and disputes are minimised while still delivering the required outcomes	• Risk & Contract Management		Operational Integrity	Process Integrity
11	Delivering a technically robust and sustainable design that performs efficiently over its entire lifecycle	• Quality & Standard • Sustainability and Carbon			
12	Providing long-term value to the client and stakeholders while maintaining safety, reputation, and sustainable outcomes	• Long-term Value • Health & Safety			
13	When a realistic programme is set and actually achieved, rather than one that looks good at tender stage but fails in delivery	• Realistic Programming	Risk and Contract Management (4)		
14	No project can be considered successful unless it is delivered without harm and with a strong safety culture embedded throughout	• Health and Safety			
15	An asset that minimises carbon, enhances environmental performance, and provides long-term sustainable value	• Sustainability and Carbon • Long-term Value			
16	When well managed information enables efficient delivery and supports effective operation of the asset after completion	• Information Management			
17	A project that hits programme and budget targets while maintaining safety, as those are still the primary pressures on delivery teams	• Realistic Programming • Financial and Profit • Health and Safety	Realistic Programming (6)		
18	Successfully delivering a job safely and keeps programme moving despite the realities on site	• Health and Safety • Realistic Programming			
19	Success is not just staying within budget, but ensuring the client receives long-term value from the investment made	• Financial and Profit • Long-term Value			
20	When Rio is properly managed and both parties achieve the intended outcomes without major disputes	• Risk and Contract Management			

21	Producing a design that is buildable, efficient, and delivers long-term performance rather than just meeting minimum requirements	• Quality and Standards • Long-term Value	Quality and Standards (5)	Performance and Ethics	Outcome Orientated Success
22	Delivering projects that enhance the organisations reputation and provide measurable long-term benefits to clients and society	• Long-term Value • Client and User Satisfaction			
23	Whether the programme was realistic and actually delivered, rather than constantly re worked	• Realistic Programming			
24	People going home every day, that is the clearest and most important definition of success on any project	• Health and Safety			
25	One that reduces environmental impact and contributes positively to long term sustainability goals	• Sustainability and Carbon	Sustainability and Carbon (7)		
26	Accurate and coordinated information supports both efficient delivery and effective operation of the asset	• Information Management			
27	Making sure the workforce operates safely and the build is completed to the required standard without major disruption	• Health and Safety • Quality and Standards			
28	Realistic programme commitments are made at tender and consistently achieved during the delivery	• Realistic Programming	Long -Term Value (8)		
29	Ensuring a culture that prioritises safety at every level, rather than treated as a compliance requirement	• Health and Safety			
30	Delivery of measurable environmental and social benefits alongside its physical outputs	• Sustainability and Carbon			

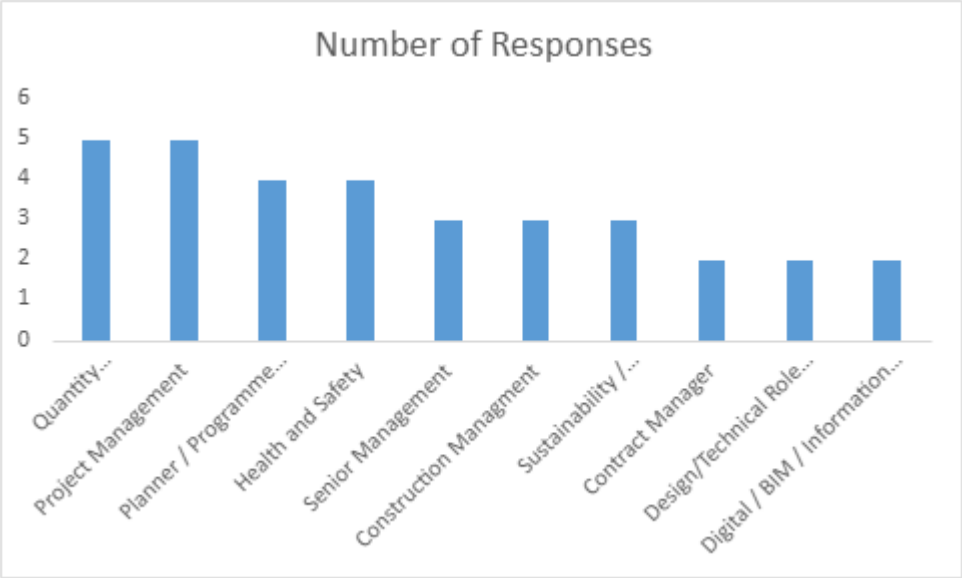
31	When safety is proactively managed through design and delivery, ensuring risks are eliminated rather than controlled after the fact	• Health and Safety	Client and User Satisfaction (4)		
32	The programme should be transparent, achievable and trusted by all parties, rather than being driven by unrealistic tender assumptions	• Realistic Programming			
33	It achieves its aims	• Client and User satisfaction			

8.4 – Appendix D – Raw Survey Results

Question 1 - What is your primary role:

8.4.1.2 – Primary Role

Roles	Number of Responses
Quantity Surveyor/Commercial Manager	5
Project Management	5
Planner / Programme Control	4
Health and Safety	4
Senior Management	3
Construction Management	3
Sustainability / Environmental	3
Contract Manager	2
Design/Technical Role (Engineer)	2
Digital / BIM / Information Management	2



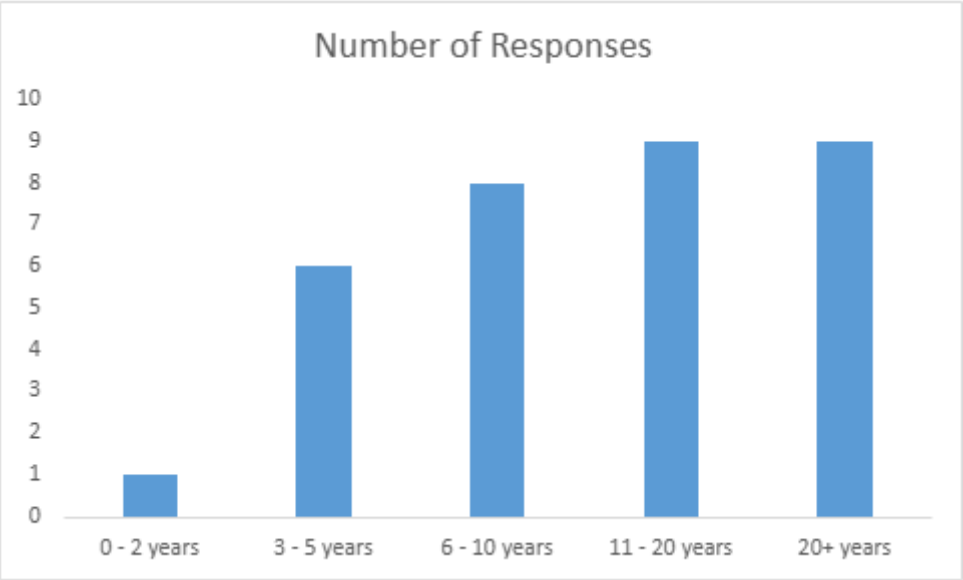
8.4.1.1 – Raw Survey Responses for question 1

Question 2 - Years of experience:

8.4.2.1 – Raw Survey Responses for question 2

Years of Experience	Number of Responses
0 - 2 years	1
3 - 5 years	6
6 - 10 years	8
11 - 20 years	9
20+ years	9

8.4.2.2 – Years of Experience

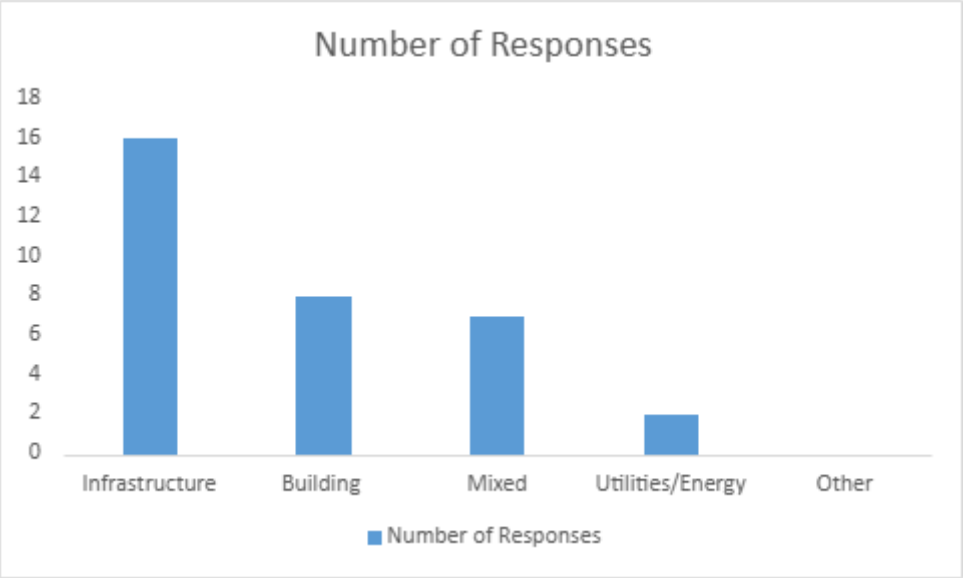


Question 3 - Sector primarily worked in:

8.4.3.1 - Raw Survey Responses for question 3

Sector	Number of Responses
Building	8
Infrastructure	16
Utilities/Energy	2
Mixed	7
Other	0

8.4.3.2 - Sector primarily worked in



Question 4&5 - How important do you consider the following factors when assessing project success? / How important do you consider the following factors in defining project success today:

8.4.4.1 - Raw Survey Responses for question 4 & 5

Factor	Average
Safety	4.696969697
Risk Management	4.515151515
Quality	4.333333333
Whole-Life-Value	4.303030303
Time	4.090909091
Sustainability	4
Cost	3.606060606
Digital	3.606060606
Innovation	3.515151515
Social Value	3.303030303

8.4.4.2 – Importance of Project Success Indicators

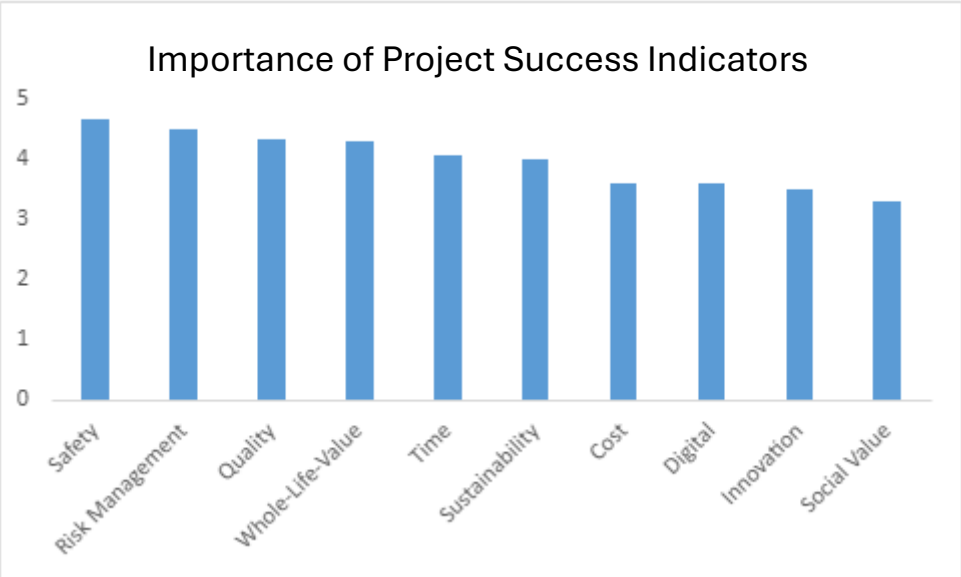


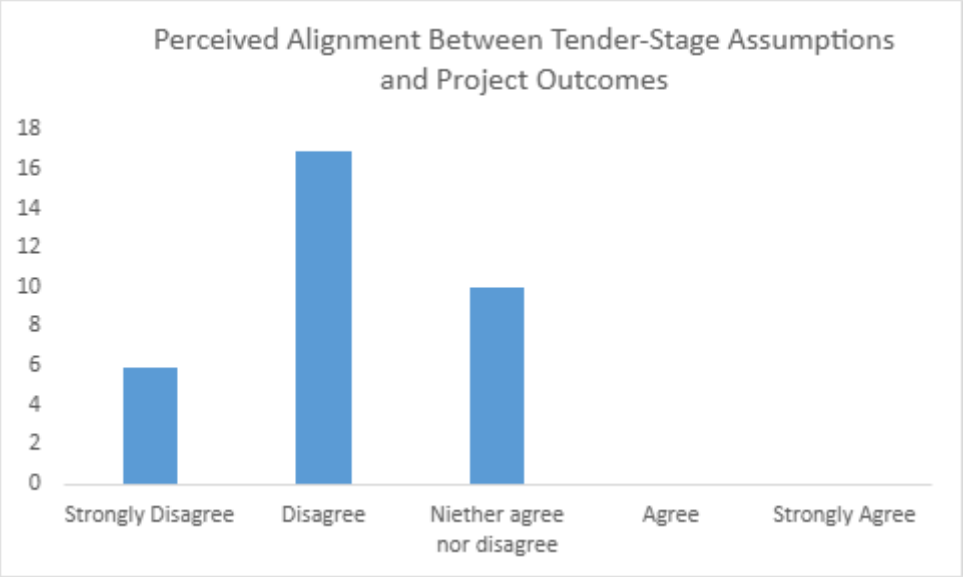
Figure 4.2.1 - Importance of Project Success Indicators

Question 6 - Tender-stage cost and programme assumptions are generally aligned with actual project outcomes:

8.4.6.1 - Raw Survey Responses for question 6

Response	Count
Strongly Disagree	6
Disagree	17
Neither agree nor disagree	10
Agree	0
Strongly Agree	0

8.4.6.2 – Perceived Alignment between Tender-stage Assumptions and Project Outcome

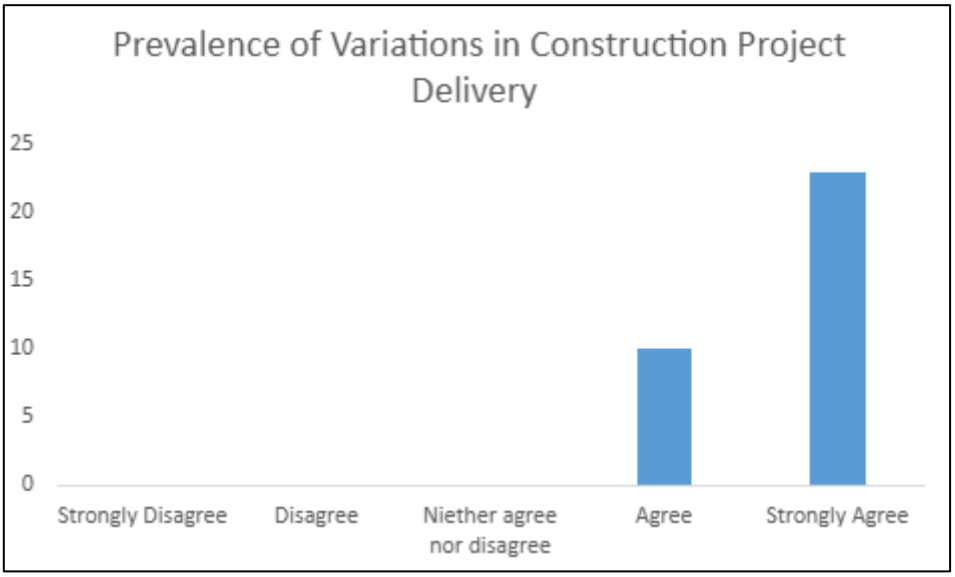


Question 7 - Variations are a regular feature of construction project delivery:

8.4.7.1 - Raw Survey Responses for question 7

Response	Count
Strongly Disagree	0
Disagree	0
Neither agree nor disagree	0
Agree	10
Strongly Agree	23

8.4.7.2 – Prevalence of Variations in Construction Project Delivery

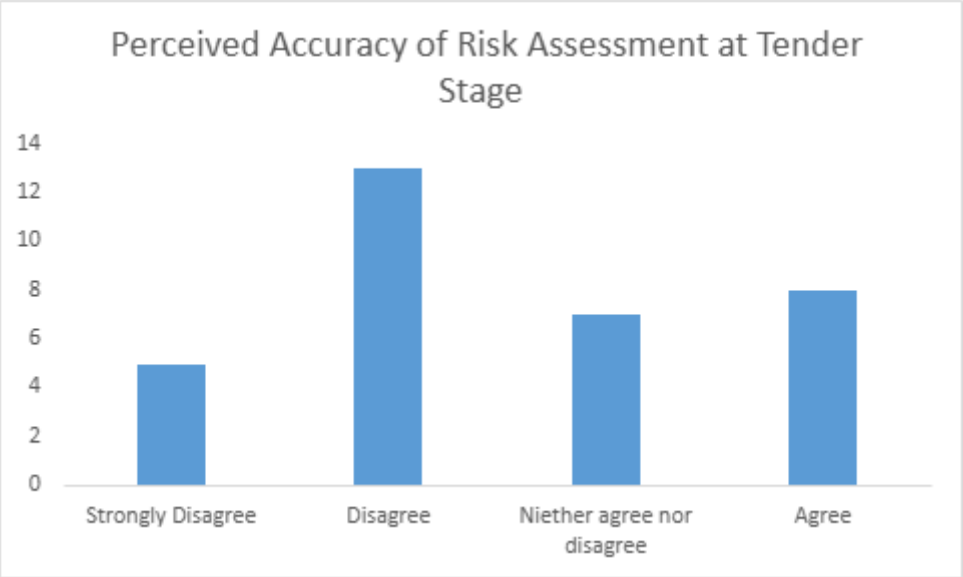


Question 8 - Risk is accurately assessed during the tender stage:

8.4.8.1 - Raw Survey Responses for question 8

Response	Count
Strongly Disagree	5
Disagree	13
Neither agree nor disagree	7
Agree	8
Strongly Agree	0

8.4.8.2 – Perceived Accuracy of Risk Assessment at Tender Stage

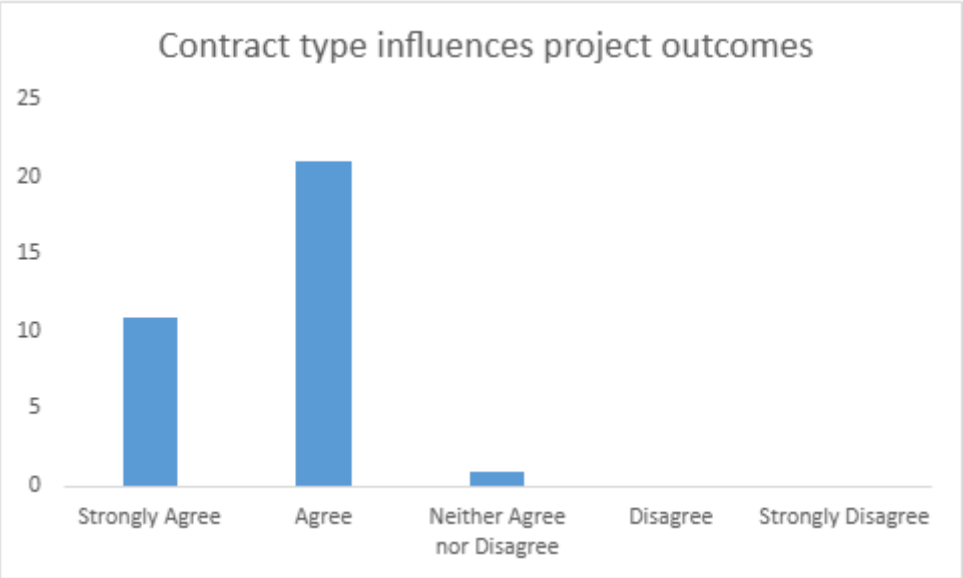


Question 9 - Contract type influences project outcomes:

8.4.9.1 - Raw Survey Responses for question 9

Response	Count
Strongly Agree	11
Agree	21
Neither Agree nor Disagree	1
Disagree	0
Strongly Disagree	0

8.4.9.2 – Contract type influences project outcomes

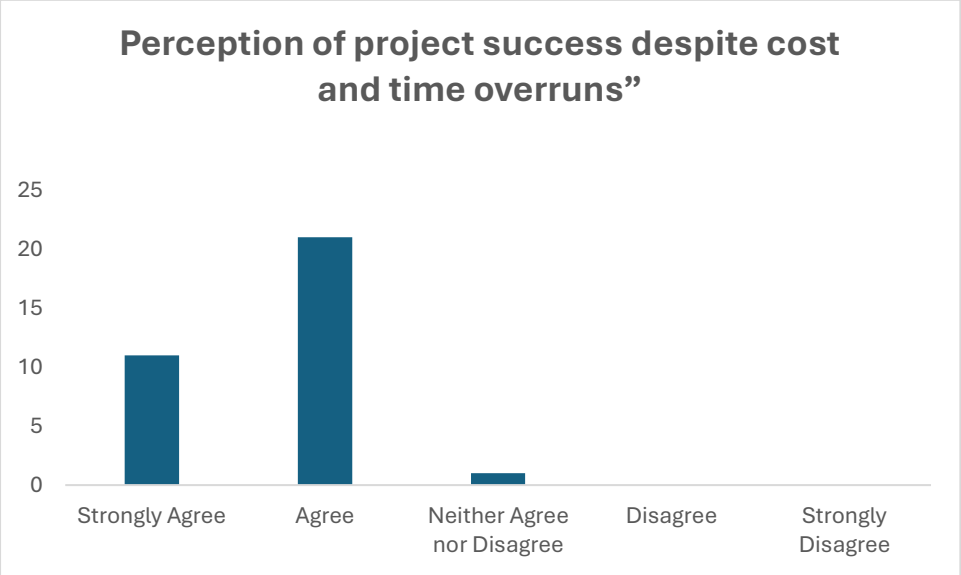


Question 10 - A project can still be considered successful even if it exceeds its original cost or time targets:

8.4.10.1 - Raw Survey Responses for question 10

Response	Count
Strongly Agree	11
Agree	21
Neither Agree nor Disagree	1
Disagree	0
Strongly Disagree	0

8.4.10.2 – Perception of project success despite cost and time overruns

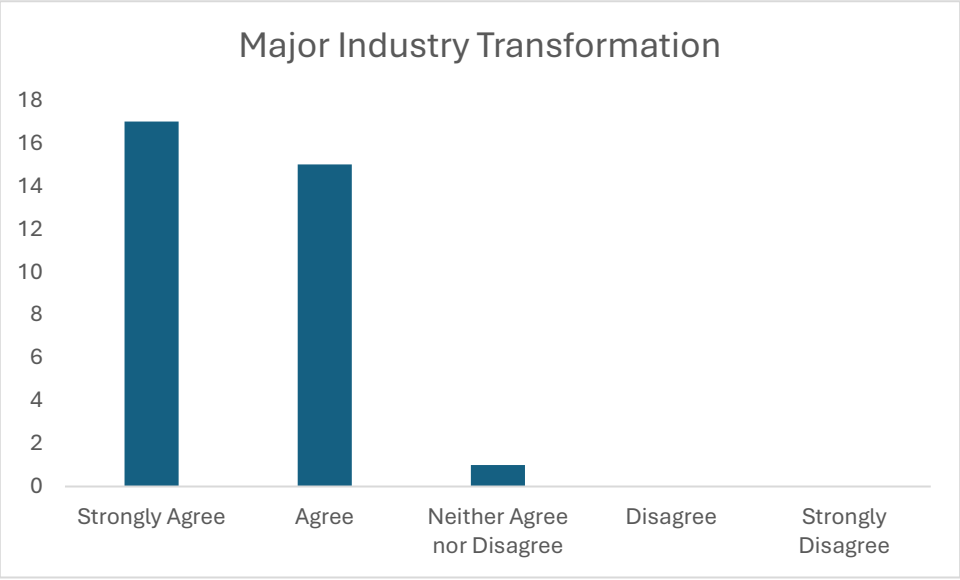


Question 11 - The UK construction industry is currently undergoing a major transformation:

8.4.11.1 - Raw Survey Responses for question 11

Response	Count
Strongly Agree	17
Agree	15
Neither Agree nor Disagree	1
Disagree	0
Strongly Disagree	0

8.4.11.2 – Major Industry Transformation

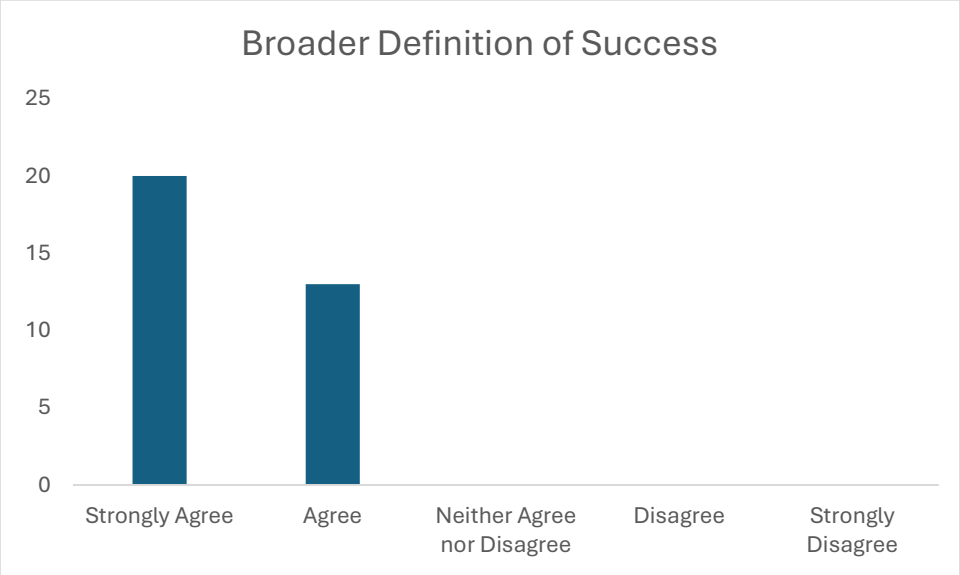


Question 12 - Project success is now defined more broadly than time, cost, and quality:

8.4.12.1 - Raw Survey Responses for question 12

Response	Count
Strongly Agree	20
Agree	13
Neither Agree nor Disagree	0
Disagree	0
Strongly Disagree	0

8.4.12.2 – Broader Definition of Success

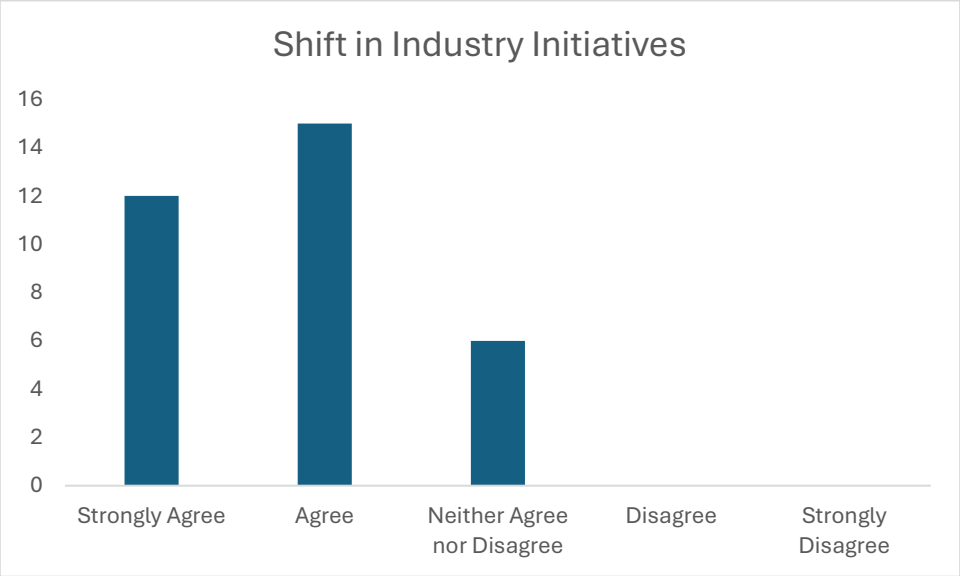


Question 13 - Industry initiatives (e.g. value-based procurement, sustainability targets) represent a shift in how projects are delivered:

8.4.13.1 - Raw Survey Responses for question 13

Response	Count
Strongly Agree	12
Agree	15
Neither Agree nor Disagree	6
Disagree	0
Strongly Disagree	0

8.4.13.2 – Shift in Industry Initiatives

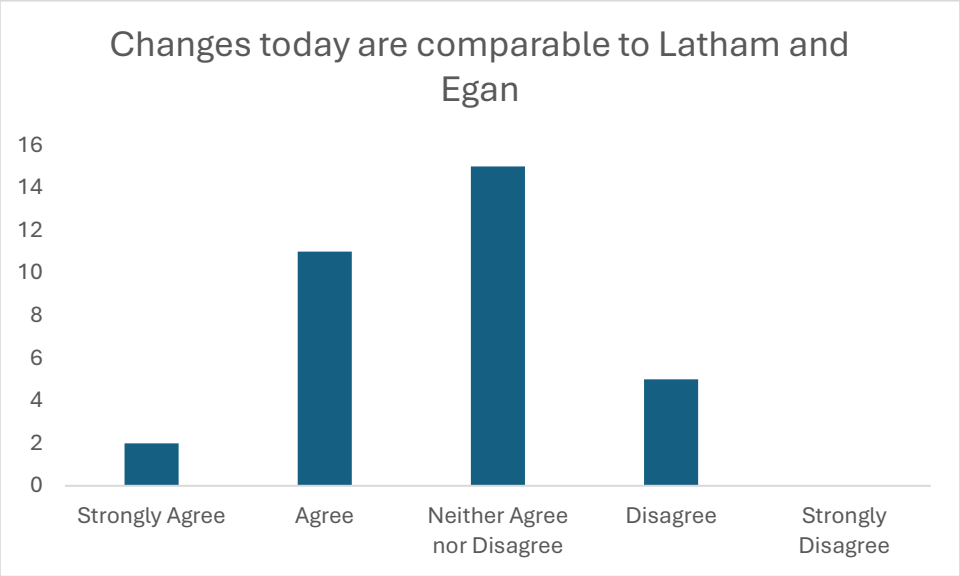


Question 14 - The changes occurring today are comparable in scale to those introduced by Latham (1994) and Egan (1998):

8.4.14.1 - Raw Survey Responses for question 14

Response	Count
Strongly Agree	2
Agree	11
Neither Agree nor Disagree	15
Disagree	5
Strongly Disagree	0

8.4.14.2 – Changes today are comparable to Latham and Egan



Question 15 - Please rank the following project success factors in order of importance (1 = most important):

8.4.15.1 - Raw Survey Responses for question 15

Overall Rank	Project Success Factor	Average Rank Score	Number Ranked most to least important	Percentage
1	Safety	2.2	15	45.50%
2	Quality	2.8	3	9.10%
3	Time	4	5	15.20%
4	Cost	4	4	12.10%
5	Whole-life Value	4.2	2	6.10%
6	Sustainability	4.4	3	9.10%
7	Social Value	6.5	1	3%

Question 16 - In your opinion, what single factor most strongly defines project success today:

8.4.16.1 - Raw Survey Responses for question 16

Q16. In your opinion, what single factor most strongly defines project success today?
all project parties and stakeholders making a fair profit margin to invest back into the built environment
Whole life value. Delivering projects that perform safely, while acting sustainably and effectively long after construction is complete.
User satisfaction
Quality of outcome rather than just conformance to budget; was the right thing delivered in the right way?
Realistic allocation of risk and delivery of the promised outcome. A project can miss the tender baseline and still succeed if value is protected
Safe delivery with no serious incidents, while still handing over an asset that performs as intended
Whole life value for the asset and the public it serves, including resilience, carbon and operational performance
Project success is delivering a safe, high-quality asset that meets client expectations while maintaining programme control, even if adjustments are needed during delivery
Success is achieving value for money through effective cost control and risk management while still delivering a safe and high-performing asset
A successful project is one where risk is properly managed through the contract an disputes are minimised while still delivering the required outcomes
Delivering a technically robust an sustainable design that performs efficiently over its entire lifecycle
Providing long-term value to the client and stakeholders while maintaining safety, reputation, and sustainable outcomes
When a realistic programme is set an actually achieved, rather than one that looks good at tender stage but fails in delivery
No project can be considered successful unless it is delivered without harm and with a strong safety culture embedded throughout
An asset that minimises carbon, enhances environmental performance, and provides long-term sustainable value
When well managed information enables efficient delivery and supports effective operation of the asset after completion
A project that hits programme an budget targets while maintaining safety, as those are still the primary pressures on delivery teams
Successfully delivering a job safely an keeps programme moving despite the realities on site
Success is not just staying within budget, but ensuring the client receives long-term value from the investment made
When Rio is properly managed and both parties achieve the intended outcomes without major disputes
Producing a design that is buildable, efficient, and delivers long-term performance rather than just meeting minimum requirements
Delivering projects that enhance the organisations reputation and provide measurable long-term benefits to clients and society
Whether the programme was realistic and actually delivered, rather than constantly re worked
People going home every day, that is the clearest and most important definition of success on any project
One that reduces environmental impact and contributes positively to long term sustainability goals
Accurate an coordinated information supports both efficient delivery and effective operation of the asset
Making sure the workforce operates safely an the build is completed to the required standard without major disruption
Realistic programme commitments are made at tender and consistently achieved during the delivery
Ensuring a culture that prioritises safety at every level, rather than treated as a compliance requirement
Delivery of measurable environmental and social benefits alongside its physical outputs
When safety is proactively managed through design and delivery, ensuring risks are eliminated rather than controlled after the fact
The programme should be transparent, achievable and trusted by all parties, rather than being driven by unrealistic tender assumptions

8.5 – Appendix E – Fishbone Diagram

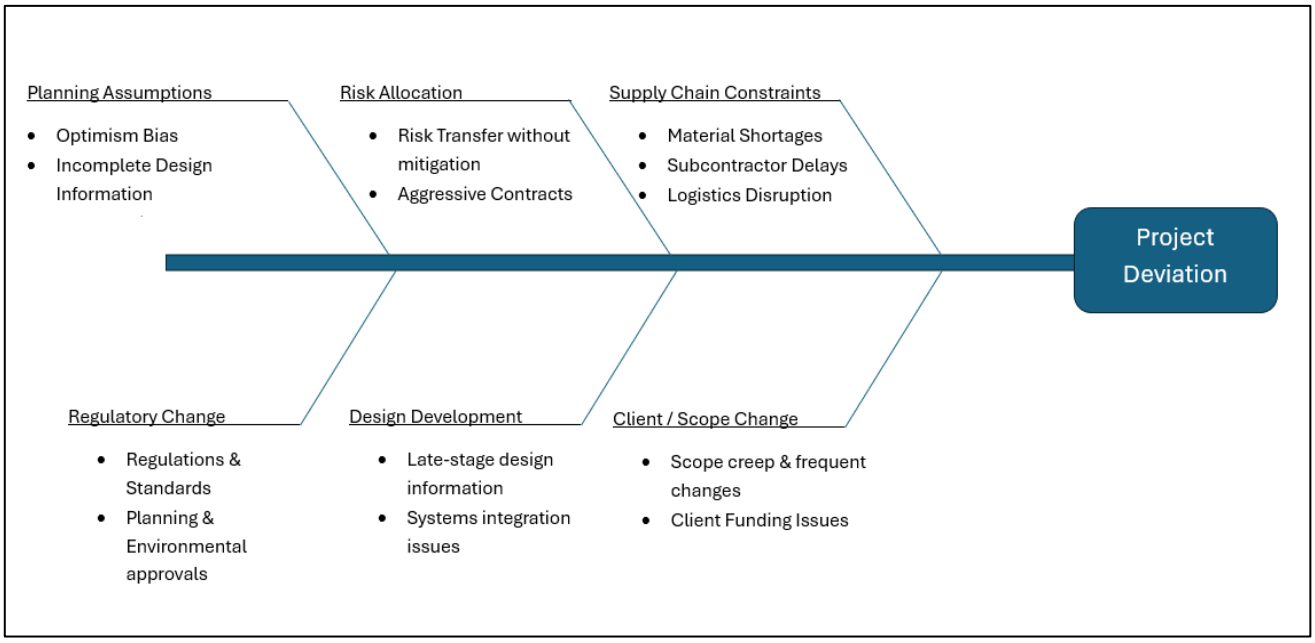


Figure 4.6.1 – Fishbone diagram illustrating the causes of project deviation in UK construction projects

8.6 – Appendix F – Summary of Survey Responses

Table 8.6.1 - Summary

Category	Response Group	Number of Respondents	Percentage
Professional Role	Project Manager	5	15.2%
Professional Role	Quantity Surveyor	5	15.2%
Professional Role	Planner	4	12.1%
Professional Role	Construction Manager	3	9.1%
Professional Role	Contracts Manager	2	6.1%
Professional Role	Senior Management	3	9.1%
Professional Role	Design/Technical Role	2	6.1%
Professional Role	Sustainability/Environmental	3	9.1%
Professional Role	Health and Safety Advisor	4	12.1%
Professional Role	Digital/BIM/Information Management	2	6.1%
Experience Level	0-2 years	1	3.0%
Experience Level	3-5 years	6	18.2%
Experience Level	6 -10 years	8	24.2%
Experience Level	11-20 years	9	27.3%
Experience Level	20+ years	9	27.3%
Sector	Infrastructure	16	48.5%
Sector	Building	8	24.2%
Sector	Utilities/Energy	2	6.1%
Sector	Mixed	7	21.2%