

# A performance-driving model for public-sector construction framework procurement in England

## **Abstract**

**Purpose** – Construction frameworks are recognised by the UK Government as an integrated procurement path to deliver efficiency, collaboration and sustainability. This research develops a performance-driving model for framework procurement to align with the government construction policy objectives.

**Design/methodology/approach** – A quantitative hierarchical regression analysis was conducted to examine the causal relationships between project outcomes and performance drivers. A successive qualitative multiple-case study involving eight typical construction framework projects was examined to further explain casual relationships.

**Findings** – Conclusive results from the quantitative and qualitative analyses validated the performance-driving model, generalising a framework procurement principle that project outcomes of time, cost, quality, sustainability and closer relationships are significantly driven by supplier's task and contextual performance drivers, and client's organisational drivers.

**Research limitations/implications** – The investigation followed two major public-sector organisations in the UK: infrastructure offices of local authorities and estate offices of universities. Further research should be extended to other public-sector situations to enhance the model further.

**Practical implications** – Using this model, framework managers can drive project outcomes by applying task and contextual performance drivers in order to select the best suppliers at the procurement phase, and by adopting the client's organisational factors at both procurement and construction monitoring phases.

**Social/Policy implications** – The empirical evidence supports the use of frameworks by public sector policymakers as a key strategy to develop the performance drivers further and improve efficiency and quality outcomes.

**Originality** – The results will be of value to support the policy of public-sector works organisations contemplating using framework procurement for executing continuing construction activities.

**Keywords** – Construction framework procurement, Buildings and civil engineering infrastructures, Performance-driving model, Regression analysis, Multiple-case study, England

**Paper type** – Research paper

## **1. Introduction**

Procurement, the process of acquiring goods and services, is consistently used in public sector organisations to further policies within a wide range of fields. Procurement can be used to obtain desired outcomes and gain value within society (Grandia and Meehan, 2017). Within the UK, construction frameworks account for billions of pounds of public sector expenditure and this procurement method is recognised by the UK Government's Construction Strategy 2025 (BIS, 2013) as an innovative approach towards improvement in efficiencies in terms of cost, time and quality (Cabinet Office, 2022; ONS, 2021). Such innovations are suggested in conjunction with collaboration to achieve reductions in capital and whole-life costs of built assets.

Public-sector frameworks were formally introduced into European legislation through EU Directive 2004/18/EC of the European Parliament for coordination of procedures for the award of public works contracts, public supply contracts and public service contracts. A prime objective of using a framework is the potential benefits that may occur due to stronger relationships through longer-term arrangements using engagement with fewer suppliers. This is distinctive from 'open tender' arrangements or discrete methods where a supplier is chosen for a single project. Framework arrangements allow relationships to be established that

encourage collaborative initiatives through programmes of work over longer periods as suggested by Latham (1994) and Egan (1998). As such, this procurement approach is particularly suitable for high-risk, high-spend construction and maintenance programmes, often found with civil engineering infrastructures including transportation, roads and bridges, and with housing, education and public buildings (Constructing Excellence, 2019a). East Midlands Centre of Excellence (EMCE) has successfully facilitated the development of a range of construction frameworks for building and highway projects. A research commissioned by EMCE shows that the frameworks can promote collaborative working so deliver time and cost savings. National Health Service (NHS) has also set up a range of construction frameworks for construction and property services. NHS (2023) clearly reiterates that frameworks can ensure collaboration throughout the contract, which is one of the key benefits for construction clients.

Although framework agreements have generally received positive support from the UK government (Business and Enterprise Committee, 2008), they do not have universal acceptance by all parties involved with the construction process. Criticisms have arisen through the incorrect application of a framework, whilst others challenge the economic and competitive effectiveness of this procurement method. Opponents question the framework approach and argue that the costs of using complicated and extensive tendering procedures with mini-competitions outweigh any savings made due to lower initial engagement costs. Preparation of framework agreements using significant tender documentation and extensive submissions of tenders are often criticized as wasteful by detractors. Construction industry analysts report a number of private-sector clients rejecting construction frameworks in favour of traditional competitive procurement practices (Stanford and Molenaar, 2018).

Previous research has suggested that the influence of a chosen procurement and engagement method together with the conditions of contract may have a direct impact on project outcomes. The research into project management of performance outcomes of collaborative and partnering long-term contracts is limited in the extent of what and how quality, time and cost benefits can be achieved (Meng, 2012). Although the Construction Strategy 2025 report found *'clear evidence of the fragmentation of the industry and a real demonstration of the challenge of building integrated supply chains'*, and asserted that there is *'plentiful evidence of effective use of frameworks'* (BIS, 2013), no evidence was specifically cited to explain how the potential benefits can be realised. Almost a decade later the Construction Playbook stated that *'frameworks are an efficient method for government to procure public works, goods and services and can provide an opportunity for contracting authorities to access economies of scale. However, using frameworks inappropriately can have negative consequences for contracting authorities, markets and suppliers, and can unintentionally inflate prices'* (Cabinet Office, 2022). Despite the widespread adoption of construction frameworks, there is scarce empirical evidence about their performance outcomes and implementation procedures of this method of procurement (Patrucco, *et al.*, 2017). Within the context of public sector management, Grandia and Meehan (2017) demonstrate, through theoretical and empirical findings, that public procurement often lacks strategic maturity in how to evaluate its impact and the ways to achieve its success. This research therefore aims to:

- identify the project outcomes of construction frameworks to align with the government construction policy objectives.
- examine the causal relationships between project outcomes and performance drivers.
- develop a performance-driving model for construction framework procurement.

The scope of this study will focus on construction frameworks adopted by two types of public-sector key players – local regional authorities and higher education authorities. To provide a wide scope of projects under investigation, civil engineering and building construction framework projects commonly procured will be examined for local authorities and universities within a geographical location of England. According to the Local Government Association (2020), there are 343 local authorities (Unitary, County and District Councils) in England in 2018/2019. As of August 2019, there were about 111 publicly funded universities and university colleges in England out of a total of around 130 in the UK (Office of Students, 2019).

In Section 2 of this paper, desired project outcomes for public-sector construction frameworks will be examined by referring to the UK Government construction policy objectives and empirical cases. Framework performance drivers will be developed in Section 3 by referring to job performance and organisational behaviour theories. Section 4 identifies the relationships between framework project outcomes and performance drivers drawn from a literature review, along with presentation of the hypothetical performance-driving model for framework procurement. Validated is obtained by hierarchical regression analysis and multiple-case study methods, with the results and discussion presented in Sections 5 and 6. The conclusions of findings, theoretical, practical, policy and research implications will be given in Section 7.

## **2. Government construction policy objectives and desired project outcomes**

Over a decade ago the UK government advised that public-sector clients should concentrate on required performance outcomes to determine project success (Cabinet Office, 2011). Based upon these criteria, Lam and Gale (2014) identified five critical success factors that measured the extent of success of public-sector highways maintenance projects. These factors can be grouped into three project outcomes: Time: start on time (*ratio of days of late starting against contract period*) and finish on time (*ratio of days finished late against contract period*); Cost: accuracy of payment (*interim payments certified to within 5% of contractor's application*); Quality: right first time (*projects completed with minimal remedial works and maximal pass percentage of health and safety inspections*).

More recently the sustainable performance of project outcomes is also a significant objective of the UK Government's construction strategy (Cabinet Office, 2022). Furthermore, the Department of Environment, Food & Rural Affairs (2015) adds that in addition to stimulating economic growth, maximising wellbeing and protecting the environment are also the objectives of the *2010 to 2015 Government Policy: Sustainable Development*, and that all departments should align their own policies and activities to contribute towards these outcomes. Sustainable measures such as reduction of carbon emissions and water consumption, minimisation of waste to landfill, and engagement with stakeholders to improve environmental performance are also targets derived from central government policy (Cabinet Office, 2020a). These outcomes coincide with the sustainability strategies and project indicators suggested by the Local Government Association (2020) for ensuring effective construction frameworks are used in the public sector. Such sustainable project outcomes are recognised by Sonnichsen and Clement (2020) as: reduction of waste to landfill; energy and carbon reduction; environmental impact & wildlife protection; capital, revenue and whole life costs; health, safety, wellbeing and elimination of accidents. In order to provide a measure of the extent of change Sonnichsen and Clement suggested use of key performance indicators (KPI) for performance monitoring.

A greater depth of understanding between all participants requires a higher level of commitment to the client and in so doing can be identified through the following indicative

attributes, as revealed through empirical case studies of construction procurement and performance outcomes in the UK university sector (Lam, 2017; Estate Management Office, 2014): being fair, responsive and courteous with the delivery of quality services; being positive and providing a service which meets customers' requirements; aspiring to 'right first time'; responding effectively to customers' complaints and using customer feedback to identify continuous improvement.

In summary, the UK government's construction policy objectives for improvement, desired project outcomes and operationalised indicators for construction frameworks are shown in **Table I**.

**Table I.** Project outcomes aligning with the construction policy objectives

Project outcome	Operationalised indicator
Time	framework projects keep to agreed programmes
	framework projects start on time
	framework projects complete on time
Cost	framework projects keep to agreed budgets
	framework projects minimise life cycle costs
Quality	framework projects deliver a functional product with minimal defects
Sustainability	framework projects encourage innovations leading to cost and time savings as a proportion of project totals (economic sustainability)
	framework project projects offer higher standards of health and safety (wellbeing and social sustainability)
	framework projects offer environmental improvements in terms of reduction in carbon emission, water consumption and waste (environmental sustainability)
Closer relationships with clients	suppliers within a framework are fair, responsive and courteous
	suppliers are more positive in providing services
	suppliers usually get things right first time
	suppliers respond effectively to client's requests

Source: table by authors

### 3. Performance drivers in the procurement process

#### 3.1 Task performance drivers at the procurement phase

Job performance theory, as proposed by Masa'deh *et al.* (2016), suggests two components for personnel selection, namely, task performance and contextual performance. These performance drivers relate to project staff and their organisation which are critical to driving project outcomes. In line with the job performance theory, Morledge *et al.* (2021) spells out that technical skills, management expertise, and financial resources have long been recognised as critical performance drivers of contractors for project success. In operational practice, these factors are driven through the following selection criteria assessed at the procurement phase:

- project staff
- executive approach
- competence of the firm
- capability and structure of the firm

Project staff refers to the relevant expertise and experience of the personnel directly engaged in the project, particularly the construction team leader and other nominated key staff. It is important that the construction team leader should promote harmonious relationships through mutual respect and trust with sub-contractors and other suppliers. Lam and Gale (2021) confirmed that management commitment, expressed as a percentage of meetings attended by project managers and directors (and thereby showing commitment to the project), is one of the critical factors to aid project success.

Execution approach is about design and management methods employed to meet the client's needs. It is a measure of understanding a client's practical needs in terms of function, operational efficiency, aesthetics, cost and time constraints, and environmental objectives. It is also reflective of the managerial procedures adopted for communicating with clients and the management of programmes and sub-contractors. Atkin and Brook (2021) recognise the positive impact of execution approach for achieving project outcomes of new build with having to work around existing occupiers as a particular example relevant to refurbishment projects. NHS (2023) suggests three critical practice approaches for construction frameworks in the public health sector: quality, which is to maximise innovation and best practice within the industry to maintain a quality-driven agenda through all project stages; social value, which embraces environmental, economic and social aspects of sustainability, particularly the wellbeing of employees and society; value for money, which is to deliver projects on budget and on time, as well as to include social value and long-term operational cost benefits.

Competence refers to the supplier company's past performance in relation to its ability to generate, select and implement or execute projects skilfully through the generation of ideas, resource management and organisation of project implementation. Examples of successful competence are considered to be the best predictor of future behaviour according to the theory of selection psychology, and Kashiwagi (2004) asserts that clients are likely to achieve success if those suppliers can demonstrate previous positive competencies.

Capability refers to the expertise and structure of a supplier. This is measured by the overall experience of firms with projects of a similar function, as well as the structure of a firm in relation to its resources of sufficient staff at senior and operative levels, strength of financial systems, facilities, assets and quality control systems to meet the demands of projects. In addition, Xiao and Proverbs (2002) found that a contractor's quality performance is positively correlated to commitment towards long-term employment, as demonstrated through the investigation of Japanese contractors. A commitment towards long-term employment resulted in stronger allegiance from staff due to investment in training and retention. The result produced a higher skilled workforce and achieved higher productivity levels.

Task performance drivers and their measures which should be assessed at the procurement phase are summarised in **Table II**.

**Table II.** Task and contextual performance drivers derived from job performance theory

<b>Task performance driver</b>	<b>Operationalised measure</b>
Project staff (relevant expertise & experience)	project staff within frameworks commit time and effort towards positive project outcomes
	suppliers provide staff with appropriate qualifications and experience
	project staff within frameworks promote harmonious relationships with sub-contractors
Execution approach (design and management methods)	suppliers within frameworks provides projects that meet the overall standards of client's practical needs in terms of price, quality, time and in accordance with environment considerations.
	frameworks encourage good managerial procedures (communication with clients; managing the programme and sub-contractors; working around existing occupiers; collaboration with other project team members)
Competence of suppliers (past performance)	only suppliers with good past performance are included within frameworks
	only suppliers with a record of good health and safety standards are included within frameworks
Structure of suppliers / capability (overall experience & facilities)	frameworks require that senior managers hold relevant qualifications
	frameworks require that suppliers have the relevant technical abilities
	frameworks only include suppliers who are financially stable
	frameworks require suppliers to operate quality management systems
	inclusion within a framework provides continuity for the employment for staff
<b>Contextual performance driver</b>	<b>Operationalised Measure</b>
Conscientious behaviour and attitude	framework participants are open with peers about strength and weakness
	framework participants self-improve without the need for prompting
	framework participants focus on innovations and added values
	framework participants maintain effective two-way communications
	frameworks encourage consistent communication at all levels of the construction team
	frameworks provide timely responses and quick reaction times
Collaborative culture	frameworks encourage effective management and commitment to programme
	frameworks provide alignment with the client's culture by understanding what they want and delivering what they require
	frameworks provide a shared culture of learning and development amongst all suppliers
Trust and collaboration	frameworks encourage collaborative behaviours through high levels of trust and respect to the client

Source: table by authors

### ***3.2 Contextual performance drivers at the procurement phase***

Semi-structured interviews conducted with some of the largest value construction clients in the UK determined that the following behaviours, attitudes and culture were performance drivers prevalent in the services provided by national contractors (Butcher and Sheehan, 2010):

## Behaviours

- Being open about a company's business strengths and weaknesses set against their peer group.
- Self-improvement without the need for prompting.
- Focusing on innovation and added values with tangible outputs.

## Attitudes

- Maintaining effective two-way communication.
- Exceeding the client's and stakeholder's expectations.
- Providing consistent communications from staff at all levels.

## Collaborative Culture

- Providing senior management support through visibility with meetings and discussions for the programme of works.
- Confirming ownership of the programme through commitment of resources at appropriate times.
- Encouraging mutual levels of trust and respect for all.
- Providing cultural alignment with the client's needs.
- Supporting a shared culture of learning and development amongst all suppliers through regular risk-sharing workshops.
- Understanding what each party's needs and aligning outcomes to deliver these objectives through shared incentives.
- Providing learning and development opportunities shared among all suppliers and stakeholders.

NHS (2023) reaffirms that collaboration is one of the key principles for driving the performance of public-sector frameworks. This requires collaborative partnership between contractors, NHS and participating authorities, which all partner together to improve processes and maximise long-term investment within the public sector.

Contextual performance drivers and their measures which should be assessed at the procurement phase are summarised in **Table II**.

### ***3.3 Client's organisational drivers during the procurement and construction monitoring phases***

The link between organisational culture and productivity/performance is well established, being supported by a substantial number of studies from the field of socio-psychological investigation into teams and groups. Other areas of behavioural research identify progressive stratification of interaction between group culture, group behaviour and group performance (Oyewobi, *et al.*, 2016). An examination of groups involved with construction projects by Walker (2011) concluded that '*research on the impact of culture on organisational performance is mixed*'. Although Walker cited examples from a range across the cultural spectrum, he could not reach any definitive conclusions. On balance, the review of the published literature, whilst not providing conclusive evidence between culture and performance, does support organisational behaviours as a driver for group performance.

Within the construction industry, the use of financial pain/gain monetary payments to encourage increased output set against out-turn productivity targets has historically been a popular method of incentive. Operational financial incentives coupled with advanced contracting methods could improve both commitment and motivation within projects. In a case study of the civil engineering frameworks in a county council in the South East region, Lam and Gale (2015) decided that incentive mechanisms could be linked to key performance indicators (KPIs) enabling focus upon the client’s outcomes through financial incentives. Framework suppliers prefer the chance of winning further work rather than individual project bonuses and the framework agreement examined reflected this choice.

According to a case study of a county council conducted by Lam and Gale (2014), collaborative civil engineering frameworks can bring significant reductions in total transaction costs for engagement and performance monitoring, based on the independent samples t-test results. Efficiencies gained from understanding through long-term relationships and continuity with programmes of work contribute to effective construction management practice.

Lam (2020) identified which KPIs and performance drivers should be applied during the construction phase to monitor and drive project outcomes in sustainable design and construction for development. A regression analysis results demonstrated that economic, functional, social and environmental sustainability KPIs are relevant for monitoring the performance of construction frameworks, and these could be significantly driven by related task and contextual performance factors. Although most KPIs within construction measure the performance of suppliers, Butcher and Sheehan (2010) recognised the role clients play. Clear leadership and outcomes together with commitment and inclusion are qualities of ‘good client’s’ according to the Cabinet Office (2020b). Such qualities are reinforced through longer relationships afforded by framework procurement methods as all parties feel a part of a collaborative team and this reinforces the leadership offered by a client.

Client’s organisational performance drivers and their measures which should be applied at the procurement and construction monitoring phases are summarised in **Table III**.

**Insert Table III.** Client’s organisational performance drivers

<b>Performance driver</b>	<b>Operationalised measure</b>
Procurement approach	it is better to have more suppliers in the framework rather than fewer due to competition
	frameworks that use pre-priced schedule of rates provide a better share of risks between client and supplier
	frameworks do improve performance through standard documentation in clear and concise language with clear evaluation procedures
	frameworks establish stronger relationships between suppliers and clients due to longer arrangements
	an extension to the framework is an incentive to gain continued good performance from suppliers
Communication	effective communication is achieved with a framework supplier due to stronger and longer relationships
Incentives	monitoring performance within a framework encourages better outcomes and the ability to win further projects



	publication of performance results creates a culture of driving performance
Performance monitoring	use of specific key performance indicators concentrates performance upon the client's desired outcomes
	carry out monthly formal and informal site inspections to measure performance is worthwhile and effective
	applying incentive payment to actual performance criteria is worthwhile and effective
Leadership	frameworks encourage strong leadership and effective performance from a supplier

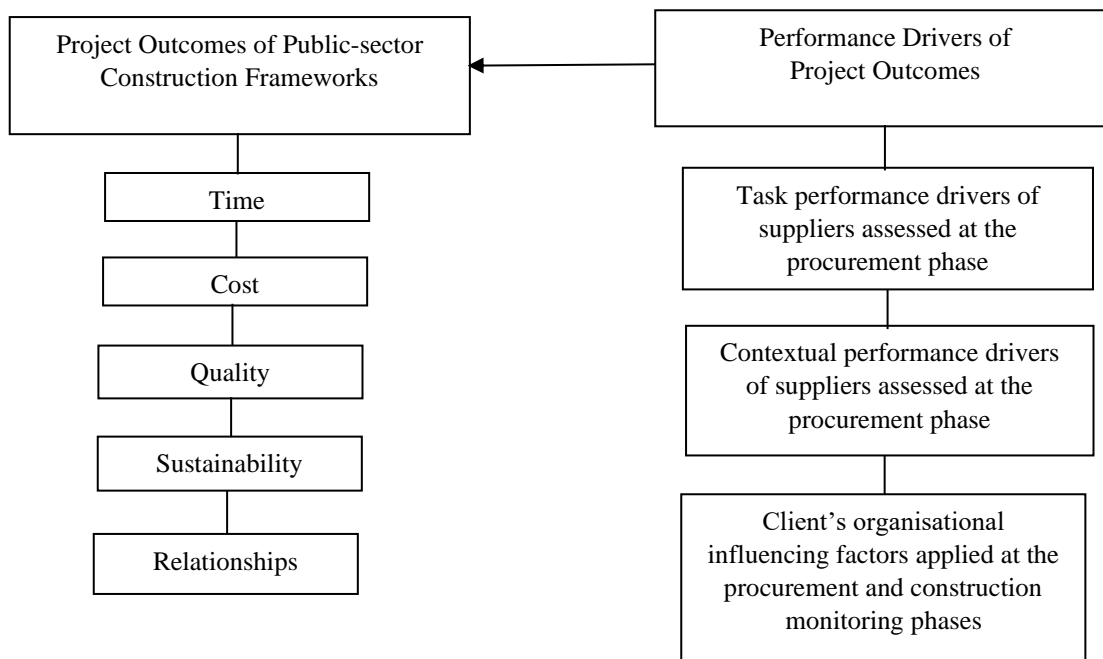
Source: table by authors

#### 4. Research hypotheses and methods

The following research hypotheses (RH) were drawn from a literature review:

- RH1: Individual project outcomes of time (POT), cost (POC), quality (POQ), sustainability (POS) and closer relationships with clients (POR) positively correlated to the level of supplier's task and contextual performance drivers (TCF) assessed at the procurement (tender) phase.
- RH2: Individual project outcomes (POT, POC, POQ, POS and POR) positively correlated to the level of client's organisational drivers (COF) applied at the procurement and construction monitoring phases.

On the basis of these hypotheses, a hypothetical performance-driving model for construction framework procurement (**Figure 1**) was constructed which simulated the impact of performance drivers (identified by the right column) on project outcomes (identified by the left column), as hypothesised by RH1 and RH2.



**Figure 1.** Hypothetical performance-driving model for public-sector construction framework procurement

Source: figure by authors

To validate the hypotheses and hence the performance-driving model, the following empirical work was conducted:

- A quantitative hierarchical regression analysis was conducted to address RH1 and RH2, based on the 70 data sets of performance influences collated from a questionnaire survey.
- A successive qualitative multiple-case study including structured interviews conducted on eight typical building construction and civil engineering framework projects (for capital and asset management works) in order to provide further explanation and evidential support for the casual relationships revealed by the regression study.

Fellows and Liu (2015) suggest that regression is appropriate when investigating relationships between the predicted outcome variables (POT, POC, POQ, POS or POR) and the predictor variables (TCF and COF drivers) within the context of construction. When compared with other research methods such as Pearson Coefficient Correlation, regression analysis has proven to be an effective statistical tool to examine the relationship between two or more variables (Draper and Smith, 1998). Hierarchical regression can also assess the relative contribution of each block of predictors (Pallant, 2020), namely task performance, contextual performance and a client's organisational driver blocks.

The questionnaire was sent to two significant areas of public-sector organisations in England that regularly require construction services: infrastructure offices of all public government authorities and highway authorities listed by the Local Government Association (LGA), and estate offices of public universities and colleges. At the time of issue of the questionnaire in 2019, there were 343 local authorities (unitary, county and district councils) and 111 universities and university colleges within the geographical area of England. The number of responses received for the survey was 70, representing 15.4% of the total possible maximum (454). Generalising the regression analysis results requires having a sufficient number of cases. Coakes and Steed (2007) stipulate that a minimum requirement is at least six times the number of predictor variables. As this research generated 12 possible predictor variables from the literature review (possible task, contextual, and client's organisational drivers), the minimum number of cases required would be 72. A sample of 70 datasets used by this research appears sufficient to meet these standards. Out of the 70 returns, 35 were related to building construction frameworks with the other 35 to civil engineering frameworks, providing a balanced sample of common construction projects for the regression analysis.

Participants in the questionnaire survey were front-line project managers who have been actively involved (from 6 to 35 years of experience) in building construction and civil engineering construction frameworks. The participants were asked questions related to project outcomes and performance-driving drivers (**Tables I to III**). These were placed within the context of recently completed or substantially completed framework projects. Views were rated against levels of performance and associating influencing factors, using a Likert scale between 1 (strongly disagree) and 7 (strongly agree). The questionnaire sought to find the level of a:

- supplier's task and contextual performance drivers revealed in the tender assessment at the procurement phase, covering prequalification, interview and tender evaluation.
- client's organisational drivers that the client adopted to motivate and monitor the supplier's performance at the procurement and construction monitoring phases.

The line of questions used in the survey exactly corresponds to the sub-scale performance indicators of the project outcomes in Table I, and the sub-scale operationalised measures of the performance drivers in Tables II and III.

The use of multiple-case study to gain rich data is advocated by Yin (2018) as a method allowing the collection of reliable evidence to produce reliable results. For the qualitative multiple-case study and interviews in this research, eight typical case organisations were selected in order to provide a contextual balance. These organisations were chosen according to similarities with asset management responsibilities, types of services and works, procurement routes and procedures, and where the organisation offered performance monitoring and incentives. Within each organisation, a representative building construction or civil engineering framework project was chosen in terms of size, value and scope of works to assist with the explanation of causal relationships between project outcomes and the performance drivers identified. The line of questions was shown in **Table IV**. Eight typical cases were considered to be sufficient to draw common views/themes through saturation of data where the collection of further data provides no additional information about the attributes of any themes (Fellows and Liu, 2015).

**Table IV.** Semi-structured questionnaire for the multiple-case study interviews

<b>Project outcome</b>	<b>Performance driver</b>
Time	Which factors do you think encourage the case study framework project to keep to agreed programme?
	Which factors do you think encourage the case study framework project to start on time?
	Which factors do you think encourage the case study framework project to finish on time?
Cost	Which factors do you think encourage the case study framework project to keep to agreed budgets?
	Which factors do you think encourage the case study framework project to ensure life cycle costs minimised?
Quality	Which factors do you think encourage the case study framework project to deliver a functional product with a minimum of remedial works?
Sustainability	Which factors do you think encourage the case study framework project to encourage innovations leading to cost/time savings expressed as a proportion of project outcomes?
	Which factors do you think encourage the case study framework project to offer higher standards of health and safety?
	Which factors do you think encourage the case study framework project to offer environmental improvements in terms of reduction in carbon emission, water consumption and waste?
Closer relationships	Which factors do you think encourage the case study framework project to ensure participants are treated fair, responsive and courteous?
	Which factors do you think encourage the case study framework project to ensure sub-contractors and suppliers get things right first time?
	Which factors do you think encourage the case study framework project to respond effectively to client's requests?
Leadership	Which factors do you think encourage leadership in the case study project?

Source: table by authors

## 5. Results

### 5.1 Hierarchical regression analysis and performance drivers

Data from the questionnaire survey were used to identify significant performance drivers that influence the project outcomes, as described by Hypotheses RH1 and RH2, using hierarchical regression analysis. The results are summarised below and shown in **Table V**.

#### Project outcome of time

Project outcome of time (POT) had a significant overall correlation and significant individual relationships with the supplier's 'conscious behaviour and attitude' (CON) and 'trust and collaboration' (CFW), as well as the client's 'incentives' (ICE) and 'performance monitoring' (MON), with the causal relationship developed as follows:

$$POT = 0.115 + (0.381CON + 0.685CFW) + (0.303ICE + 0.245MON)$$

#### Project outcome of cost

Project outcome of cost (POC) had a significant overall correlation and significant individual relationships with the supplier's 'project staff' (PST), 'competence' (COP) and 'culture' (CUL), with the causal relationship developed as follows:

$$POC = -0.435 + (0.941PST + 0.146COP) + (0.261CUL)$$

#### Project outcome of quality

Project outcome of quality (POQ) had a significant overall correlation and significant individual relationships with the supplier's 'culture' (CUL) and the client's 'procurement approach' (PRO), with the causal relationship developed as follows:

$$POQ = 0.03 + (0.715CUL) + (1.139PRO)$$

#### Project outcome of sustainability

Project outcome of sustainability (POS) had a significant overall correlation and significant individual relationships with the supplier's 'culture' (CUL) and the client's 'procurement approach' (PRO), with the causal relationship developed as follows:

$$POS = 0.026 + (0.517CUL) + (0.802PRO)$$

#### Project outcome of closer relationships of parties (POR)

Project outcome of closer relationships (POR) had a significant overall correlation and significant individual relationships with the supplier's 'structure' (SOS) and 'trust and collaboration' (CWF) as well as the client's effective 'communication' (COM) with a framework supplier, with the causal relationship developed as follows:

$$POR = 1.404 + (0.205SOS) + (0.740CWF) + (0.422COM)$$

**Table V.** Hierarchical regression analysis of project outcomes

Project Outcome	Performance factor	sr <sup>2</sup>	p-value	Tolerance value	Adjusted R <sup>2</sup>	R <sup>2</sup> Change (Sig. F Change)	ANOVA Sig.
POT	CON	0.040	0.002	0.213	0.731	CON & CFW: 0.673 (<0.0005)	<0.0005
	CFW	0.029	0.009	0.242			
	ICE	0.036	0.003	0.501			
	MON	0.024	0.015	0.893			
						ICE & MON: 0.074 (<0.0005)	

POC	PST	0.232	<0.0005	0.693	0.643	PST & COP: 0.635 (<0.0005) CUL: 0.024 (0.037)	<0.0005
	COP	0.023	0.037	0.699			
	CUL	0.024	0.037	0.567			
POQ	CUL	0.213	<0.0005	0.996	0.376	CUL: 0.239 (<0.0005) PRO: 0.155 (<0.0005)	<0.0005
	PRO	0.155	<0.0005	0.996			
POS	CUL	0.261	<0.0005	0.996	0.454	CUL: 0.290 (<0.0005) PRO: 0.179 (<0.0005)	<0.0005
	PRO	0.179	<0.0005	0.996			
POR	SOS	0.036	0.005	0.650	0.705	SOS: 0.032 (<0.0005) CWF: 0.299 (<0.0005) COM: 0.098 (<0.0005)	<0.0005
	CWF	0.141	<0.0005	0.809			
	COM	0.422	<0.0005	0.550			

Source: table by authors

Notes:

Project outcomes of: time (POT), cost (POC), quality (PQ), sustainability (POS), closer relationships with clients (POR)

Task performance driver blocks: PST (project staff), COP (competence), SOS (structure of suppliers)

Contextual performance driver blocks: CON (conscious behaviour & attitude), CFW (trust & collaboration), CUL (culture)

Client's organisational driver blocks: ICE (incentives), MON (performance monitoring), PRO (procurement approach), COM (communication with a framework supplier)

sr<sup>2</sup>: relative contribution of individual performance drivers to the overall correlation

P-value: individual relationships between the project outcome and performance drivers; p-value <0.05 means significant relationship.

Tolerance value: multicollinearity of the predictor variables can be checked through examination of the tolerance value. Multicollinearity occurs if the tolerance value is < 0.1.

Adjusted R<sup>2</sup>: overall correlation between the project outcome and all performance drivers; Adjusted R<sup>2</sup> around 0.4 or ANOVA Sig. <0.05 means a significant correlation.

R<sup>2</sup> Change: relative contribution of individual performance blocks to the Adjusted R<sup>2</sup>

The strength of inter-relationships among the predictor variables can be measured by a statistic called tolerance. A value close to 1 indicates that a predictor variable has little to be explained by the other predictor variables. A value close to 0 indicates that a variable is almost a linear combination of the other predictor variables. Such a relationship is termed the multicollinearity. A rule of thumb is that a tolerance value smaller than 0.1 indicates the presence of multicollinearity problem (Pallant, 2020). The results in **Table VI** indicate that the tolerance values of the predictor variables in each regression analysis were > 0.1 (ranging from 0.213 to 0.996), indicating there was no multicollinearity problem among the performance predictors.

This research aims to develop a performance-driving model for construction framework procurement by identifying the performance drivers and their causal relationships with the project outcomes. Each project outcome (time, cost, quality, sustainability or closer relationships with clients) was successfully regressed against the performance drivers. The inter-relationship among the dependent variables was not the primary objective of the research but can form a separate area for future research.

### **5.2 Multiple-case study and causal relationships**

Eight case study projects were chosen from public authorities and public universities, which included three building construction framework projects and five civil engineering framework projects. These organisations had already participated in the questionnaire survey and had

indicated a willingness to be further involved. Each case study included an in-depth structured qualitative interview with a senior practitioner project manager. All the project managers chosen had 10 to 25 years of experience managing frameworks. Each interview lasted approximately 45 minutes and comprised structured questions focused upon the performance drivers associated with the project chosen for this study. The project manager’s responses, along with any supporting documents, were analysed through qualitative content analysis. Performance drivers for the project outcomes are summarised in **Table VI**:

**Table VI.** Performance drivers identified by content analysis of the multiple cases

<b>Project outcome</b>	<b>Performance driver</b>
Time	longer and stronger relationships and teamwork; working as a team to achieve the agreed programme
	performance monitoring using key performance indicators; continuity in workload and good reputation
Cost	staff and company’s experience of similar projects within the longer-term framework to enhance design and construction programmes
	teamwork and commitment to keep to the agreed budget; open discussions with the client
Quality	after doing a number of similar projects, the suppliers know which areas to look for to reduce defects; experience sharing with the clients and other suppliers within the framework;
	constant performance monitoring using key performance indicators
Sustainability	teamwork and discussions with the client; discussions between the suppliers on a framework for improvements of future projects
	longer and stronger relationships within the framework; use of key performance indicators for monitoring and selection for future projects
Closer relationships	having key sub-contractors in the supply team
	teamwork and respect
	providing effective responses to client’s requests

Source: table by authors

## 6. Discussion

### 6.1 Project outcomes and task performance drivers

Examination of the ‘project outcome of cost’ with the case study participants (senior project managers) pointed out that regular meetings and open discussions held between clients and the supplier’s project staff assisted with agreeing to cost variations and the final account. With larger value programmes of work, the suppliers also offered advice on design improvement, planning and sequencing of construction methods and reductions in life cycle costs, based upon their experience with the successes of similar projects (Bleda and Chicot, 2020).

Amongst the task performance drivers, the regression analysis also showed the most significant predictor for ‘project outcome of cost’ was ‘*project staff*’. Morledge *et al.* (2021) contended that directly-employed project staff with relevant expertise is one of the critical factors to

guarantee project success. This includes skills in budget and life cycle cost control, time commitment of project managers and directors towards the project, and enhancement of relationships with the client and the subcontractors. Such expertise and skills are essential to managing construction frameworks which are often associated with high-risk, high-spend construction and maintenance programmes (Constructing Excellence, 2019a). '*Competence of suppliers*' relating to past performance was also identified by the regression analysis to be a significant driver for the project outcome of cost. Knowledge gained from past experiences is particularly relevant to design, management and hence the project outcome of cost. This causal relationship is supported by Kashiwagi (2004) who demonstrated that previous success is closely linked to future performance, especially when construction projects are located in constricted areas, i.e., existing highways, transportation and buildings. The ways in which work and services are delivered and communications are handled are becoming increasingly critical for project success (Atkin and Brooks, 2021).

### ***6.2 Project outcomes and contextual performance drivers***

In relation to the 'project outcome of closer relationships', the case study participants felt that as relationships were built over time between clients, supervisors and framework suppliers, this reduced conflicts. The relationships provided a collaborative partnership scenario, with everyone treating each other with respect and courtesy and sharing experience within the team for improving existing and future projects. The closer relationship allowed suppliers to understand client's needs better and this allowed alignment with the client's culture and effective responses to their requests. Moreover, the longer-term arrangements afforded through the framework allowed, in some cases, key sub-contractors to be included as part of the supply team. Constructing Excellence (2019b) suggests that it is necessary to create and maintain closer relationships with the whole supply chain (main and sub-suppliers) in order to achieve project success.

Amongst the contextual performance drivers, '*trust and collaboration*' was also found by the regression analysis to be a significant factor influencing 'project outcome of closer relationships.' With collaborative frameworks, suppliers offer high levels of trust and respect to a client and other stakeholders, which are essential for project success. This is in line with the findings of Lam and Gale (2021) that trust and respect are critical for solving problems.

A supplier's '*culture*' was a significant factor influencing 'project outcomes of cost', quality and sustainability. Frameworks encourage commitment from suppliers' senior management regarding the ownership of programmes, alignments with a client's culture and requirements, and encourage a shared culture of learning and development amongst all suppliers (Butcher and Sheehan, 2010). This in turn drives a project to achieve the key requirements of clients in relation to project cost, quality and sustainability output.

### ***6.3 Project outcomes and client's organisational drivers***

Senior project managers involved with the case studies recognised that as longer and stronger relationships are nurtured within a framework, the supplier, the supervisor and the client worked closer together as a team to achieve the desired project outcomes. This ensured that framework suppliers invested in keeping to agreed start and completion times and maintenance of the agreed budgets. Performance monitoring using key performance indicators provided

constant reminders to ensure that project outcomes of time, cost, quality, sustainability and closer relationships are behaviours adopted by the whole construction team. Conclusions from the research identified that frameworks provided higher levels of certainty and continuity in workload, where suppliers had to perform well in order to be selected for future projects and hence to gain good a reputation. These provided strong incentives in driving performance for ‘all project outcomes.’

Among the client’s organisational drivers, ‘*incentives*’ and ‘*performance monitoring*’ were also found by regression analysis to be significant in influencing ‘project outcome of time’. These included the use of framework contractual control measures for performance improvements by allowing performing suppliers to gain a better chance to be selected for further projects. Such contractual measures are supported by KPIs from site inspections and publication of performance results. The contract-based KPIs were found to be very effective performance measures for control of time for civil engineering frameworks by Lam and Gale (2015). Bresnen and Marshall (2000) and Morledge *et al.* (2021) also suggested that financial incentives can improve both commitment and motivation, and hence outcomes of construction projects.

‘*Procurement approach*’ had a significant impact upon ‘project outcomes of quality and sustainability’. Framework procurement often involves the use of standard forms and clear documentation for tendering, clear evaluation procedures, pre-priced schedule of rates or key prices to allocate risk appropriately between client and supplier. All of these elements can drive the project success (Lam and Gale, 2015) and in particular the quality and sustainability performance for building construction and civil engineering frameworks, as demonstrated by the regression results of this study.

‘Leadership’ is one of the client’s organisational drivers and frameworks are expected to encourage strong leadership leading to effective performance from a supplier. However, it was not identified as a significant performance driver across all project outcomes by the regression analysis. Tolerance values from this factor in the regression analyses were all around 0.18, which is quite close to 0.1, suggesting that its effect may be masked by other influencing factors, particularly incentive and performance monitoring which involved the input of leadership. Nonetheless, leadership and ownership are encouraged through the operation of a framework.

In summary, the causal relationships revealed by the case studies explain and support the regression results.

#### ***6.4 Validation of the framework performance-driving model***

Results from the quantitative and qualitative analyses validated RH1 and RH2 and hence the performance-driving model for construction framework procurement as shown in **Figure 1**, confirming that project outcomes of time, cost, quality, sustainability and closer relationships were all significantly driven by task performance, contextual performance and client’s organisational drivers. Using this model, practitioners can manipulate the driving forces at procurement and construction monitoring phases to accomplish desired outcomes. The model may also be used in the selection of the best supplier to undertake a project. In addition, the



model can also be used to drive project performance by adopting a client's organisational drivers at the procurement and construction monitoring phases.

## 7. Conclusions

The hierarchical regression analysis clearly identified significant performance predictors/drivers for project outcomes as follows:

- 'Task performance drivers' of suppliers assessed at the procurement phase were found to be the most significant predictors for project outcome of cost, and significant predictors for project outcomes of quality and closer relationships. Related performance drivers are project staff, competence of suppliers, execution approach, and structure of suppliers.
- 'Contextual performance drivers' of suppliers assessed at the procurement phase were found to be the most significant predictors for project outcomes of time, quality, sustainability and closer relationships, and significant predictors for project outcome of cost. Related performance drivers include trust and collaboration, supplier's culture, and conscious behaviour and attitude.
- 'Client's organisational drivers' applied at the procurement and construction phases were found to be significant predictors for project outcomes of time, quality, sustainability and closer relationships. Related performance drivers comprise incentives, performance monitoring, procurement approach, and communication.

These causal relationships were explained and supported by the qualitative multiple-case study results, which demonstrated similar performance drivers. From this empirical evidence, the performance-driving model at Figure 1 was successfully validated. For theoretical implications, this model provides procurement principles for construction frameworks by identifying significant drivers that influence project outcomes. Such principles would be useful for not only the researcher and academicians but also industry stakeholders, government, society and learners.

For practical implications, the performance-driving model can be used to select suppliers at the procurement phase by focusing on the related task and contextual performance factors. The model also demonstrate that project outcomes can be further enhanced at the procurement and construction phases by focusing on the client's organisational factors. Although some practitioners are reluctant to move from traditional discreet engagement methods, the model may provide confidence that limitation of carefully selected but suitably qualified and experienced suppliers provides desired project outcomes provided that drivers are suitably applied.

The results contained in this paper will be valuable in supporting the strategic objectives of The Construction Playbook (Cabinet Office, 2022), and other public-sector organisations contemplating using framework procurement for executing continuing construction activities. The empirical evidence supports public sector policymakers with the use of frameworks as a key construction strategy to enhance time, cost, quality and sustainability and closer relationship outcomes with projects.

As the performance driving model can significantly improve the quality and sustainability of public-sector projects, the outcomes of this research have significant connectivity and impact on society.

It is recognised that this research, although applied to two significant public-sector organisations in the UK which account for significant expenditure (namely, infrastructure offices of local authorities and estate offices of universities), has limitations. It is suggested that further research should be conducted on other public-sector organisations on a national or international basis to provide a more robust model, as suggested by Lam and Gale (2021).

## Acknowledgments

This research forms part of a research project funded by Property Research Trust ([www.propertyresearchtrust.org](http://www.propertyresearchtrust.org)) whose support is greatly acknowledged. In addition, those practitioners and participants working for local authorities and university estate offices who responded to the questionnaires and interviews are greatly appreciated.

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