

Contextual Determinants and Performance Consequences of Cost System Sophistication in UK Services

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Abstract

Achieving optimal performance partly depends on operating a costing system whose level of sophistication matches the requirements of the surrounding context. Prior research on cost system sophistication (CSS) has been conducted largely in manufacturing settings and, even restricted to that setting, has produced markedly inconsistent findings regarding which contextual factors actually drive it. This study examines the contingent determinants of CSS, conceptualised as a continuum based on the number and type of cost pools and cost drivers in use rather than a binary activity based costing (ABC) adopter/non adopter classification, among 204 UK non manufacturing business units. It traces CSS's consequences for non financial and financial performance using a mediation form of contingency fit and structural equation modelling. Competition and cost structure are found to be significant, positive direct determinants of CSS, while service diversity, differentiation strategy, cost leadership strategy, and organisational size are not; cost structure fully mediates the effect of differentiation strategy on CSS. CSS is positively related to service quality, service cycle time reduction, and cost reduction, and is associated with financial performance both directly and indirectly, partly through service quality and partly through cost reduction. These patterns diverge in several respects from prior CSS and ABC adoption studies, and the paper offers measurement and sector based explanations, while treating them as plausible interpretations rather than demonstrated facts given the cross sectional design. The findings extend contingency based costing research to an under examined non manufacturing setting and offer managers evidence based, rather than universal, guidance on when investment in a more sophisticated costing system is likely to be warranted.

Keywords

Cost System Sophistication, Contingency Theory, Costing System Design, Mediation Fit, Structural Equation Modeling, Non Manufacturing Firms, Financial Performance

1. Introduction

Achieving an optimal level of organisational performance is a central objective that businesses pursue in order to succeed and satisfy their stakeholders (Alam, 2006; Kaplan, 2009). Contingency theory suggests that among the main contributors to optimal performance is operating a costing system whose level of sophistication is compatible with the requirements of the surrounding context (Aljabr, 2020; Burkert, Davila, Mehta, & Oyon, 2014; Cooper, 1988; Drury, 2018; Ittner, Lanen, & Larcker, 2002; Schoute, 2009). This is attributable to the fact that a compatible costing system produces balanced information regarding the costs of measurement required by the system and the costs of the errors incurred as a result of making inferior decisions based on distorted product or service costs (Drury, 2018; Kaplan & Cooper, 1998).

Evidence from the Saudi healthcare context further demonstrates that the design and adoption of costing systems are contingent on organisational characteristics. Alshamlan and Zverovich (2018) found that ABC adoption among Saudi Arabian hospitals varied with factors including hospital size, overhead-cost levels, and the accounting and management expertise of staff, reinforcing the importance of contextual factors in explaining costing-system choices.

Given the importance of a compatible costing system, a large body of research has used contingency theory to test the influence of contextual factors on costing system design, most often defined either by the adoption of ABC as a binary variable, or by the level of cost system sophistication (CSS), typically measured as a composite of the number of cost pools and cost drivers in use. The central contextual factors examined in this literature are competition, service or product diversity, differentiation strategy, cost leadership strategy, the proportion of indirect to total cost, and organisational size (Aljabr, 2020; Cooper, 1988; Drury & Tayles, 2005; Schoute, 2009). Yet the empirical results linking these factors to CSS remain markedly inconsistent even in recent work: Diavastis (2025), studying the Greek hotel industry, found that firm size, cost structure, and information technology significantly predicted CSS, while competition, service diversity, and business strategy did not, and Hadid and Hamdan (2022) found that firm size's effect on CSS in UK manufacturing firms was conditional on firm age and mediated by product diversity rather than operating as a simple direct effect. This raises a question the field has not settled in over two decades of research: when, if at all, and through which mechanisms, do contextual factors actually influence CSS?

Recent evidence from UK non-manufacturing firms also supports distinguish-

ing the independent effects of costing-system use and competitive conditions. Alshamlan (2026) found that ABC usage and competition were each positively associated with financial performance, whereas the ABC usage $\times$ competition interaction was not statistically significant, suggesting an additive rather than interaction form of contingency fit.

A second, related limitation is sectoral. The great majority of CSS research has been conducted in manufacturing firms, or in samples that pool manufacturing and non manufacturing firms without distinguishing between them (Al-Omiri & Drury, 2007; Drury & Tayles, 2005; Schoute, 2009). This matters because non manufacturing firms typically carry a substantially higher proportion of indirect to direct cost than manufacturing firms, given their lower reliance on directly traceable material costs, which should in principle strengthen rather than weaken the case for a more sophisticated costing system (Drury, 2018; Szychta, 2010). A third limitation concerns CSS's consequences: much of the literature applies a selection form of fit, testing only whether contextual factors predict CSS without testing whether the resulting system actually improves performance (Drazin & Van de Ven, 1985; Fisher, 1995; Gerdin & Greve, 2004).

This paper addresses these three limitations using survey data from 204 medium and large UK non manufacturing business units, analysed with structural equation modelling (SEM). It applies a mediation form of fit, modelling six contextual factors as antecedents of CSS and modelling CSS, in turn, as an antecedent of financial performance through three non financial performance dimensions.

The paper's contribution can be distinguished along four dimensions. Theoretically, it applies a mediation, rather than a selection, form of contingency fit, so that the model tests not only whether context predicts costing system design but whether that design, in turn, predicts financial performance, and through which specific operational mechanisms; this addresses a longstanding call in the contingency literature to test complete antecedent-to-outcome chains rather than isolated links (Fisher, 1995; Gerdin & Greve, 2004). Methodologically, CSS is conceptualised as a continuum based on the number and type of cost pools and cost drivers in use, rather than as a binary ABC adopter/non adopter dummy, which allows the model to capture firms that have built considerable costing sophistication without ever formally adopting a system labelled "ABC". Empirically, the study isolates the non manufacturing sector, which most prior CSS research has excluded or pooled with manufacturing despite non manufacturing firms' structurally higher indirect cost intensity, and this sectoral focus offers one plausible explanation for why certain contextual factors are significant here but not in several manufacturing based studies. Practically, or managerially, the study identifies which specific contextual signals, namely competitive intensity and cost structure, are most strongly associated with CSS in this setting, offering more targeted guidance than a general recommendation to "increase costing sophistication".

2. Literature Review

CSS has typically been measured either as a binary ABC adoption variable or, in the smaller stream of research this paper follows, as a composite of the number of cost pools and cost drivers in use, positioning costing systems along a continuum from simple to highly sophisticated rather than classifying them as ABC or not (Al-Omiri & Drury, 2007; Drury & Tayles, 2005). This composite approach avoids two problems that affect measures based on the number of cost pools alone: it does not mistake a large number of cost pools driven by organisational structure (e.g., number of departments) for genuine costing sophistication, and it does not exclude firms using variable costing systems purely because they fall outside a narrow ABC/non ABC dichotomy (Al-Omiri & Drury, 2007; Ismail & Mahmoud, 2012).

Empirical results linking contextual factors to CSS are inconsistent across this literature, and the inconsistency has not resolved itself with time. Schoute (2009) found that CSS in Dutch manufacturing and service firms was influenced by competition across price, product, and marketing dimensions, and by cost structure, while Drury and Tayles (2005) and Ismail and Mahmoud (2012) found no significant competition or cost structure effects on CSS in UK and Egyptian manufacturing samples respectively, and Al-Omiri and Drury (2007) similarly found no cost structure effect. Size shows a comparable split: Schoute (2009) and Al-Omiri and Drury (2007) found organisational size positively associated with CSS, while Ismail and Mahmoud (2012) found no relationship, and this disagreement persists in the most recent evidence. Hadid and Hamdan (2022), using SEM and partial least squares on UK manufacturing data, found that firm size's relationship with CSS is not a simple direct effect at all: it depends on firm age and operates indirectly through product diversity rather than through cost structure, a considerably more complex picture than the direct-effect hypotheses tested in most earlier studies, including the present one. Diavastis (2025), in one of the very few CSS studies conducted in a service setting, found that firm size, cost structure, the perceived importance of cost information, and information technology significantly predicted CSS among Greek hotels, while competition, service diversity, business strategy, organisational life cycle, and executive characteristics did not; this pattern of selective significance, drawn from a genuinely comparable non manufacturing context, motivates several of the present study's hypotheses and is revisited directly in the discussion.

Several explanations for this persistent inconsistency have been proposed. One concerns the operationalisation of competition: Holm and Ax (2020) argue that unidimensional, single item measures of competition intensity are an insufficiently rich basis on which to test its relationship with accounting sophistication, and recommend multidimensional measures capturing several competitive forces simultaneously. A second concerns sectoral pooling: manufacturing and non manufacturing firms differ structurally in cost composition, yet are frequently combined within single samples (Al-Omiri & Drury, 2007; Drury & Tayles, 2005).

A third, illustrated directly by [Hadid and Hamdan \(2022\)](#), concerns model specification: contingent factors may operate through indirect paths and boundary conditions (such as firm age) that simple direct-effect models cannot detect, which would mechanically produce non significant direct effects even where a genuine, more complex relationship exists.

A smaller literature has examined CSS's consequences for performance. [Ittner et al. \(2002\)](#) linked ABC use to improved manufacturing performance without finding a consistent direct financial performance effect, and [Cagwin and Bouwman \(2002\)](#) and [Maiga and Jacobs \(2007\)](#) report broadly similar patterns: operational benefits are more consistently documented than direct financial ones. This motivates the mediation form of fit adopted in the present study, in which CSS is expected to affect financial performance through, rather than independently of, its effect on non financial performance.

The broader, related literature on ABC adoption as a binary variable is, if anything, even more inconsistent than the CSS literature it partly overlaps with. [Bjørnenak \(1997\)](#) found that only cost structure predicted ABC diffusion among Norwegian manufacturing firms, while [Malmi \(1999\)](#) linked adoption to competition, strategy, and size in Finnish firms, but not cost structure, and [Schoute \(2004\)](#) found product diversity and differentiation strategy, but not competition, significant among Dutch manufacturing firms. [Brown, Booth, and Giacobbe \(2004\)](#) found top management support, rather than cost structure or diversity, predicted adoption in Australia, and [Brierley \(2011\)](#) found adopters consistently larger than non adopters in the UK but competition and cost structure not significant. [Alcouffe, Maurice, Galy, and Gate \(2019\)](#), in a meta analysis, concluded that diversity driven demand for ABC is considerably more pronounced in manufacturing than in service settings, directly relevant to this study's non manufacturing focus. [Elhamma and Fei \(2013\)](#) similarly found no relationship between business strategy and ABC adoption among Moroccan firms, echoing the null differentiation strategy result reported below for CSS.

Taken together, this literature leaves a specific, still open gap that motivates the present study. Despite two decades of research, no published study has tested the full set of contextual determinants of CSS, together with its non financial and financial performance consequences, within a single non manufacturing sample using a mediation form of fit and a validated multi item measurement model. [Diavastis \(2025\)](#) tests determinants but not performance consequences; [Hadid and Hamdan \(2022\)](#) tests a richer determinants model but in manufacturing and without a performance outcome; and the present study's companion analyses of ABC adoption and activity management usage in the same UK non manufacturing sample examine adjacent but conceptually distinct dependent variables. This gap, rather than the mere age of some of the foundational CSS literature, is the specific justification for the present study.

3. Aim and Hypotheses

The study has two aims: 1) to examine the direct and indirect influence of com-

petition, service diversity, differentiation strategy, cost leadership strategy, cost structure, and organisational size on CSS among UK non manufacturing firms; and 2) to examine the influence of CSS on financial performance, directly and indirectly through service quality, service cycle time reduction, and cost reduction.

3.1. Theoretical Logic: Why a Mediation Form of Fit

Contingency theory holds that no single costing system design suits all organisations; rather, the appropriate level of CSS depends on the surrounding context (Aljabr, 2020; Burkert et al., 2014; Otley, 2016). Gerdin and Greve (2004) distinguish a selection form of fit, which tests only whether contextual factors are associated with system design, from a mediation form, which additionally tests whether system design in turn affects performance. Fisher (1995) argued that most contingency based management accounting research has relied on the simpler selection form, leaving the field able to describe whether a costing system matches its context without saying whether that match delivers any benefit. The present study follows the mediation approach, on the reasoning that a contextual factor which predicts CSS is of limited practical interest unless CSS itself is subsequently shown to affect outcomes managers care about. Contextual factors are therefore specified as antecedents of CSS (Hypotheses 1 - 6), and CSS as an antecedent of non financial performance, hypothesised to mediate its effect on financial performance (Hypotheses 7 - 9).

3.2. Contextual Determinants of CSS

Competition is expected to increase the value of accurate cost information for pricing and process decisions, since competitive markets punish pricing errors more severely (Cooper, 1988; Holm & Ax, 2020). Evidence is mixed: Schoute (2009) found a significant effect while Drury and Tayles (2005), Ismail and Mahmoud (2012), and Diavastis (2025) did not; Holm and Ax's (2020) critique of unidimensional competition measures offers one candidate explanation, addressed here through a multi item scale, though this cannot be confirmed without direct replication.

H1: Competition is positively related to CSS.

Service diversity and differentiation strategy are expected to raise the complexity of resource consumption across services; differentiation strategy is additionally expected to raise service diversity and indirect cost, since differentiation oriented firms typically invest more in service variety and innovation (Shank, 1989), so its effect on CSS may operate partly indirectly.

H2a-c: Service diversity is positively related to CSS (a) and to cost structure (b); cost structure positively mediates the diversity-CSS relationship (c).

H3a-e: Differentiation strategy is positively related to CSS (a) and to service diversity (b); service diversity positively mediates the differentiation-CSS relationship (c); differentiation strategy is positively related to cost structure (d); and cost

structure positively mediates the differentiation-CSS relationship (e).

Cost leadership strategy is hypothesised to relate negatively to CSS, on the reasoning that cost leadership firms already understand their cost base well, reducing the incremental value of further sophistication (Drury & Tayles, 2005). This reasoning is contested rather than settled: a firm competing on cost might equally invest more, not less, in the cost visibility CSS provides, since small errors are more consequential to a lowest-cost competitor. The hypothesis below follows the majority position in the literature while acknowledging this competing logic.

H4: Cost leadership strategy is negatively related to CSS.

Cost structure is expected to increase CSS directly, since higher indirect cost intensity raises the cost of cross-subsidisation errors under a simpler system (Cagwin & Bouwman, 2002; Cooper & Kaplan, 1992). Organisational size is expected to increase CSS via greater administrative and financial resources (Al-Omiri & Drury, 2007; Schoute, 2009), although Hadid and Hamdan's (2022) recent evidence that size's effect is conditional on firm age and mediated by product diversity suggests the direct-effect hypothesis tested here is a simplification.

H5: Cost structure is positively related to CSS.

H6: Organisational size is positively related to CSS.

3.3. Performance Consequences of CSS

CSS is expected to improve service quality and reduce service cycle time by giving managers more accurate, activity level information (Ismail & Mahmoud, 2012; Ittner et al., 2002), supporting cost reduction and financial performance (Cagwin & Bouwman, 2002; Kaplan & Cooper, 1998; Maiga & Jacobs, 2007). Because prior ABC adoption research has largely failed to find a direct financial performance effect (Cagwin & Bouwman, 2002; Ittner et al., 2002; Maiga & Jacobs, 2007), the CSS-financial performance relationship is treated as potentially both direct and mediated, rather than assumed to be purely one or the other.

H7a, b, c: CSS is positively related to service quality (a); service quality positively mediates CSS's effect on financial performance (b); service quality is positively related to service cycle time reduction (c).

Hypothesis 7d, that service quality is negatively related to cost reduction, requires separate justification because the direction runs counter to the generally positive tenor of the other hypotheses; this direction was specified a priori, before estimation, not adjusted afterwards to fit a result. The logic is a quality-cost trade-off specific to labour intensive services: sustaining higher perceived service quality typically requires additional staff input or lower staff-to-client ratios, which raises rather than reduces cost (Anderson, Fornell, & Rust, 1997)—unlike manufacturing, where quality improvements (fewer defects) often cut cost by reducing rework, the setting in which most positive quality-cost findings were established. Because cost reduction is coded so higher scores indicate greater perceived cost reduction, a negative coefficient is consistent with, not contrary to, this trade-off. The interpretation is theoretically defensible given the service context but remains

an ex ante hypothesis under test, revisited critically in the discussion.

H7d: Service quality is negatively related to cost reduction.

H8a, b, c: CSS is positively related to service cycle time reduction (a); service cycle time reduction positively mediates CSS's effect on financial performance (b) and is positively related to cost reduction (c).

H9a, b: CSS is positively related to cost reduction (a); cost reduction positively mediates CSS's effect on financial performance (b).

Figure 1 summarises the hypothesised model. Solid lines indicate a hypothesised direct relationship; dotted lines indicate a hypothesised mediation relationship. This is the a priori structure; Section 5.2 reports whether the estimated model required any modification.

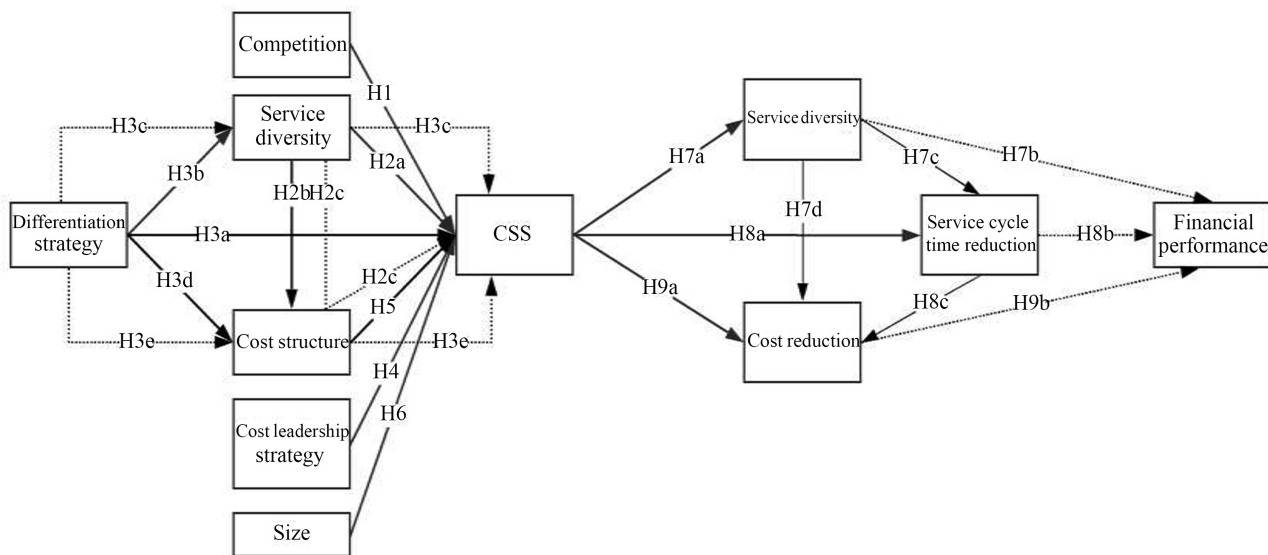


Figure 1. The hypothesised CSS research model.

4. Method

4.1. Design and Sample

A cross-sectional survey questionnaire was used. The population comprised medium and large UK non-manufacturing firms (≥ 50 employees, $\geq \text{£}25$ million annual sales), sampled from the FAME database across thirteen UK Standard Industrial Classification service sections. From a sampling frame of 2969 eligible firms, 2000 firms were randomly selected and one questionnaire was sent to each selected firm. Management accountants or financial directors were targeted because they were expected to have the most relevant knowledge of costing practices. Where a large firm contained several divisions, respondents were instructed to answer from the perspective of the business unit that most clearly defined where they worked. Thus, the unit of analysis is the business unit represented by each returned questionnaire, with one retained questionnaire constituting one independent observational unit. Of 263 returned questionnaires (13.15%), 219 were usable (10.95% effective response rate). Of these, 204 business units reported an

operating costing system and were retained for the CSS model; the remaining 15 units reported no costing system and were excluded because CSS, defined by costing-system design characteristics, was not meaningful for those units.

4.2. Measures

CSS was operationalised using three observed design characteristics: the number of cost pools, the number of volume cost drivers, and the number of non-volume cost drivers. This specification follows the study's original SEM model and treats these indicators reflectively, on the premise that a common underlying level of costing-system sophistication is manifested in greater differentiation of cost pools and greater use of both volume and non-volume drivers. We recognise that the indicators are distinct design features and could alternatively be conceptualised as formative components. Accordingly, the reflective specification is retained to preserve consistency with the prespecified model and original analysis, but this alternative formative interpretation is acknowledged as a measurement limitation. Business units using variable costing systems were not excluded; for these units the number of cost pools used for product/service costing was recoded to zero. Because the raw count indicators were highly skewed and contained many zeros, the original analysis used log-transformed values for the SEM/CFA; raw values are reported descriptively in Section 5.1. The final standardised CFA loadings for CSS were 0.64 (cost pools), 0.91 (volume cost drivers), and 0.84 (non-volume cost drivers).

Competition, service diversity, differentiation strategy, and cost leadership strategy were each measured with multi item five point Likert scales adapted from prior contingency based costing research and validated by CFA; competition used a multi item scale reflecting a broad conceptualisation of competitive forces (Porter, 1980) rather than a single price-competition item, following Holm and Ax's (2020) critique of unidimensional competition measures. Differentiation strategy retained only two items after one was removed for discriminant validity reasons, a thinner basis than the other scales and a limitation acknowledged in Section 7.1. Cost structure was measured as a single indicator, the percentage of indirect to total service cost. Organisational size was measured using two indicators, log transformed employee count and sales revenue; a third indicator, capital employed, was dropped after an unacceptable factor loading of 0.21. Service quality, service cycle time reduction, cost reduction, and financial performance were each measured with multi item five point Likert scales capturing perceived improvement over the preceding period, with cost reduction coded such that higher scores indicate greater perceived cost reduction. Item counts, Cronbach's alpha, and composite reliability for every construct are reported in full in Table 1, established once for the full set of constructs shared across this study's costing system models using the sample of 204 business units.

Using the standard CFA reliability formula $CR = (\Sigma\lambda)^2 / [(\Sigma\lambda)^2 + \Sigma(1 - \lambda^2)]$, the three CSS loadings (0.64, 0.91, 0.84) yield $CR = 0.84$ and $AVE = 0.65$; Cronbach's

α was 0.82. For Size, the two retained standardised loadings (0.69 and 0.68) yield CR = 0.64 and AVE = 0.47; Cronbach's α was 0.64. The previously reported CR values of 0.95 for CSS and 0.85 for Size were transcription/calculation errors and have been corrected. CSS also had MSV = 0.58 and ASV = 0.39.

Table 1. Construct reliability and validity for the shared measurement model (n = 204).

10	Items	Cronbach's α	CR	AVE	MSV	ASV
CSS	3	0.82	0.84	0.65	0.58	0.39
Competition	3	0.85	0.82	0.65	0.61	0.44
Service diversity	3	0.88	0.88	0.72	0.63	0.46
Differentiation strategy ^a	2	0.83	0.78	0.71	0.63	0.45
Cost leadership strategy	3	0.85	0.85	0.68	0.32	0.17
Cost structure	1 (single indicator)	—	—	—	—	—
Size	2	0.64	0.64	0.47	0.34	0.21
Service quality	8	0.96	0.95	0.74	0.63	0.37
Service cycle time reduction	3	0.89	0.88	0.74	0.63	0.46
Cost reduction	2	0.81	0.81	0.71	0.61	0.39
Financial performance	3	0.88	0.88	0.72	0.61	0.43

^aRetained two items after one was removed for discriminant-validity reasons; acknowledged as a measurement limitation in Section 7.1. Size's AVE (0.47) is marginally below the conventional 0.50 threshold and its corrected CR is 0.64; these values are reported transparently and interpreted cautiously given the two-indicator specification. CR was recalculated from the final standardised CFA loadings using $CR = (\Sigma\lambda)^2 / [(\Sigma\lambda)^2 + \Sigma(1 - \lambda^2)]$. All other values reflect the final measurement model after the reported CFA diagnostics.

Discriminant validity was assessed using the [Fornell and Larcker \(1981\)](#) AVE based criterion, satisfied for all constructs after the diagnostic item removals described above, and cross-checked using the Heterotrait-Monotrait ratio (HTMT), an increasingly recommended, more sensitive alternative ([Henseler, Ringle, & Sarstedt, 2015](#)). As a supplementary diagnostic, the full HTMT matrix was computed for all eight reflective constructs: the highest observed ratio was 0.821 (between service diversity and service cycle time reduction), and all pairwise ratios fell below the conservative 0.85 threshold, supporting discriminant validity and reinforcing the Fornell-Larcker conclusion above. Multicollinearity among the exogenous predictors of CSS was assessed via the bivariate correlation matrix (highest correlation 0.79) and, as a further supplementary diagnostic, via Variance Inflation Factor (VIF): the maximum VIF among the six predictors of CSS was 2.66 (service diversity), well below the conventional threshold of 5, indicating no problematic multicollinearity.

4.3. Common Method Bias

Because the perceptual constructs were collected in a single questionnaire from

one respondent per business unit, common method bias is a potential concern. Procedural safeguards included varying question format and item order and assuring respondents of anonymity and confidentiality (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Harman's single-factor test was recalculated using the 27 retained perceptual Likert indicators in the final model (3 competition, 3 service diversity, 2 differentiation strategy, 3 cost leadership strategy, 8 service quality, 3 service cycle-time reduction, 2 cost reduction, and 3 financial-performance items). The objective count/size indicators used for CSS and Size were not included in this common-method diagnostic. Unrotated principal-component analysis produced three components with eigenvalues greater than 1, and the first component accounted for 51.4% of total variance. Thus, no single-factor solution emerged, but the first-component share slightly exceeded the commonly used 50% caution threshold; common method bias therefore cannot be ruled out and is treated as a limitation.

4.4. Analysis

Data were analysed in AMOS using a two-stage SEM procedure comprising a CFA measurement model followed by structural-model estimation. Maximum likelihood estimation (MLE) was used for the measurement parameters and latent constructs. Prior to SEM, outliers and distributional shape were examined. The raw cost-pool, cost-driver, volume-driver, non-volume-driver, employee, sales-revenue, and capital-employed variables showed substantial outliers/skewness; the original analysis therefore applied Log N transformations to these seven variables. One extreme cost-structure observation was winsorised. The transformed CSS indicators, rather than the raw zero-heavy counts, were used in CFA and SEM. Indirect effects were assessed in dedicated mediation models using 2000 bootstrap resamples and 95% confidence intervals. The structural-model and mediation results are reported separately in Section 5. Model fit was assessed using χ^2/df , RMSEA and SRMR, CFI, IFI, TLI/NNFI, and PNFI.

4.5. Ethics

Participation was voluntary and anonymous. A covering letter accompanying the questionnaire explained the study's purpose, assured respondents of confidentiality, and stated that individual business units and respondents would not be identifiable in any resulting output. Ethical approval for the wider research programme of which this study forms part was obtained from the author's institutional research ethics committee prior to data collection.

5. Results

5.1. Descriptive Statistics

Using the raw descriptive data, the mean number of cost pools used for product/service costing was 11.37 (median 1.00) after recoding cost pools to zero for variable-costing units, and the mean number of cost drivers was 3.06. Among the

104 business units with at least one reported cost driver, the corresponding conditional mean was 6.01 drivers. Within this same 104-unit subset, the mean numbers of volume and non-volume cost drivers were 3.36 and 2.65, respectively. Across all 204 units, the corresponding unconditional means were 1.71 and 1.35. The earlier conditional means (4.76, 2.91, and 1.84) were inconsistent with the underlying dataset and have been replaced by values recalculated directly from the raw observations. These descriptive statistics are reported in **Table 2**.

Table 2. Descriptive statistics for the CSS indicators.

Indicator	Mean	Median	SD	Skew.	Kurt.
Cost pools ^a	11.37	1.00	18.18	2.64	9.09
Cost pools ^b	22.30	17.00	21.24	2.09	5.74
Cost drivers ^a	3.06	1.00	6.58	3.04	9.80
Cost drivers ^b	6.01	1.00	8.22	2.01	3.78
Volume cost drivers ^a	1.71	0.00	3.44	3.16	11.56
Volume cost drivers ^b	3.36	1.00	4.21	2.24	5.42
Non volume cost drivers ^a	1.35	0.00	3.62	3.47	12.97
Non volume cost drivers ^b	2.65	0.00	4.73	2.26	5.00

^aBased on all respondents (n = 204). ^bBased only on respondents reporting cost drivers (n = 104).

5.2. Measurement and Structural Model Fit

CFA supported the measurement model after the standard diagnostic sequence described in Section 4.2 (factor loading review, model fit, modification indices, reliability, and discriminant validity). The structural model reported here is the a priori hypothesised model shown in **Figure 1**; no path was added to or removed from this model after estimation. **Table 3** reports the full set of fit indices for the estimated structural model.

Table 3. Fit indices for the CSS structural model.

Fit index	Threshold	Model value	Result
χ^2	$p \geq 0.05$	984.220, $p \leq 0.001$	Not satisfied
χ^2/df	≤ 3.0	2.09	Satisfied
RMSEA	≤ 0.08	0.07	Satisfied
df	> 0	472	Satisfied
SRMR	≤ 0.08	0.11	Not satisfied
CFI	≥ 0.90	0.91	Satisfied
IFI	≥ 0.90	0.91	Satisfied
TLI/NNFI	> 0.90	0.90	Not satisfied (strict); at conventional ≥ 0.90 cut-off, satisfied
PNFI	≥ 0.50	0.75	Satisfied

n = 204. Significant χ^2 statistics are common in models of this size and are not, on their own, treated as evidence of poor fit (Hair et al., 2019).

The structural model showed a mixed pattern of fit. The χ^2/df , RMSEA, CFI, IFI, and PNFI values met conventional criteria, whereas SRMR (0.11) exceeded the commonly recommended 0.08 threshold and TLI/NNFI was at the boundary value of 0.90. Accordingly, the model is not characterised as demonstrating unequivocally good fit. Rather, the overall pattern suggests broadly adequate fit with evidence of residual model misspecification. No post-hoc structural paths were introduced solely to improve fit, and the findings should therefore be interpreted with appropriate caution.

This model fit assessment is based exclusively on the original structural equation modelling procedure. Hypothesis decisions throughout this paper are based exclusively on the prespecified structural model estimated using this original SEM procedure; no structural paths were added or removed after examination of the results.

Table 4 reports the standardised structural path coefficients for all hypothesised relationships.

Table 4. Structural model results: standardised path coefficients.

Hyp.	Path	β	Decision
H1	Competition $\rightarrow$ CSS	0.28*	Supported
H2a	Service diversity $\rightarrow$ CSS	0.06 (ns)	Not supported
H2b	Service diversity $\rightarrow$ Cost structure	0.15 (ns)	Not supported
H3a	Differentiation strategy $\rightarrow$ CSS	0.38 (ns)	Not supported
H3b	Differentiation strategy $\rightarrow$ Service diversity	0.84*	Supported
H3d	Differentiation strategy $\rightarrow$ Cost structure	0.56*	Supported
H4	Cost leadership strategy $\rightarrow$ CSS	0.07 (ns)	Not supported
H5	Cost structure $\rightarrow$ CSS	0.20*	Supported
H6	Size $\rightarrow$ CSS	0.09 (ns)	Not supported
H7a	CSS $\rightarrow$ Service quality	0.61*	Supported
H7c	Service quality $\rightarrow$ Service cycle time reduction	0.37*	Supported
H7d	Service quality $\rightarrow$ Cost reduction	-0.20*	Supported (negative, as hypothesised)
H8a	CSS $\rightarrow$ Service cycle time reduction	0.52*	Supported
H8c	Service cycle time reduction $\rightarrow$ Cost reduction	0.43*	Supported
H9a	CSS $\rightarrow$ Cost reduction	0.61*	Supported
—	Service quality $\rightarrow$ Financial performance	0.26*	—
—	Service cycle time reduction $\rightarrow$ Financial performance	0.15 (ns)	—
—	Cost reduction $\rightarrow$ Financial performance	0.37*	—
—	CSS $\rightarrow$ Financial performance (direct)	0.21*	—

* $p \leq 0.05$ (two-tailed); ns = not significant. n = 204. This is the a priori hypothesised model reported in full; no paths were added or removed after estimation.

Figure 2 presents the estimated model using the same layout as **Figure 1**: solid lines indicate paths for which a statistically significant relationship was found, and dotted lines indicate paths for which no significant relationship was found.

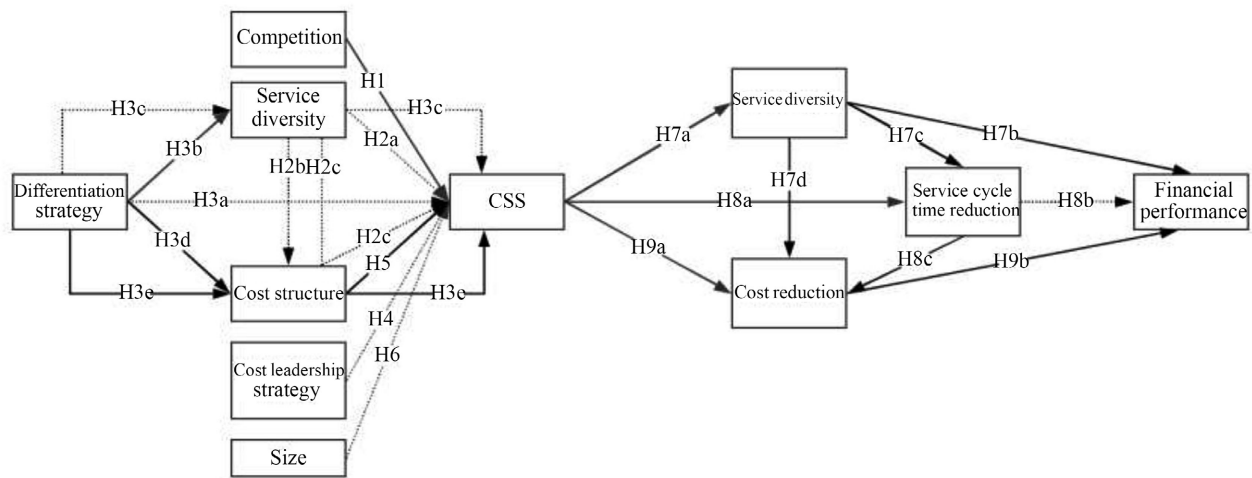


Figure 2. The hypotheses results for the CSS model.

5.3. Mediation Analysis

Table 5 reports the mediation analyses based on 2000 bootstrap resamples and 95% confidence intervals. To avoid conflating estimates from different model specifications, **Table 4** is explicitly identified as the standardised coefficients from the full structural model, while **Table 5** contains standardised direct, indirect, and total effects estimated in the dedicated mediation analyses used in the original study. These mediation estimates therefore should not be reconstructed by multiplying the rounded coefficients in **Table 4**. Cost structure mediated the differentiation strategy-CSS relationship (indirect $\beta = 0.07$, 95% CI [0.02, 0.18]), whereas the service-diversity mediation paths were not significant. On the performance side, service quality (indirect $\beta = 0.21$, 95% CI [0.06, 0.43]) and cost reduction (indirect $\beta = 0.30$, 95% CI [0.08, 0.87]) showed significant indirect effects, while service cycle-time reduction did not. All β values in **Table 4** and **Table 5** are standardised; the confidence intervals in **Table 5** are bootstrap intervals from the mediation analyses.

Table 5. Mediation (indirect-effect) results for key paths, CSS model.

Path	Indirect β^a	LLCI	ULCI	Result
Service diversity $\rightarrow$ Cost structure $\rightarrow$ CSS (H2c)	0.02	-0.02	0.09	No mediation
Differentiation strategy $\rightarrow$ Service diversity $\rightarrow$ CSS (H3c)	0.03	-0.18	0.17	No mediation
Differentiation strategy $\rightarrow$ Cost structure $\rightarrow$ CSS (H3e)	0.07*	0.02	0.18	Full mediation
CSS $\rightarrow$ Service quality $\rightarrow$ Financial performance (H7b)	0.21*	0.06	0.43	Partial mediation
CSS $\rightarrow$ Cycle time reduction $\rightarrow$ Financial performance (H8b)	0.10	-0.15	0.38	No mediation
CSS $\rightarrow$ Cost reduction $\rightarrow$ Financial performance (H9b)	0.30*	0.08	0.87	Partial mediation

^aStandardised indirect effect from the dedicated mediation analysis (not the product of rounded **Table 4** coefficients). *Significant at $p \leq 0.05$ (CI excludes zero). LLCI/ULCI = 95% bootstrapped confidence interval bounds (2000 resamples).

6. Discussion

6.1. Competition and Cost Structure as Determinants of CSS

Competition was positively associated with CSS ($\beta = 0.28$, $p \leq 0.05$), supporting H1. This finding is consistent with the theoretical argument that competitive pressure increases the value of more accurate and detailed cost information (Cooper, 1988; Holm & Ax, 2020), and with Schoute (2009). It contrasts with Drury and Tayles (2005), Ismail and Mahmoud (2012), and Diavastis's (2025) recent Greek hotel evidence, where competition did not predict CSS; this study's multidimensional competition measure, following Holm and Ax's (2020) recommendation, or genuine sectoral variation, are both plausible, undemonstrated explanations for this divergence. However, given the cross-sectional design and the less-than-ideal overall model fit reported in Section 5.2, this finding should be interpreted as evidence of association rather than as a definitive causal relationship.

Cost structure also significantly predicted CSS ($\beta = 0.20$), consistent with the expectation that higher indirect cost intensity raises the cost of cross-subsidisation errors (Cagwin & Bouwman, 2002; Cooper & Kaplan, 1992), and with Diavastis (2025). It disagrees with several manufacturing-based studies (Al-Omiri & Drury, 2007; Drury & Tayles, 2005; Ismail & Mahmoud, 2012). The most parsimonious, though unproven, explanation is sectoral: non manufacturing firms carry structurally higher indirect cost than manufacturing firms, so a relationship weak in manufacturing samples may become detectable here—an interpretation strengthened, not proven, by its convergence with Diavastis's (2025) independent service-sector finding, and offered as one specific, falsifiable account rather than a general claim that “context matters”.

6.2. Service Diversity, Differentiation Strategy, Cost Leadership Strategy, and Size

Service diversity, differentiation strategy, cost leadership strategy, and size were all unrelated to CSS directly. The differentiation strategy null result contradicts Schoute (2009), and a specific measurement reason is available: only two items were retained here against six in Schoute's (2009) instrument, a thin basis for so multifaceted a construct; this is consistent with Elhamma and Fei's (2013) similar null finding and Diavastis's (2025) null business strategy finding, suggesting the difficulty may lie partly in how business strategy is operationalised across this literature generally, not only in this study's instrument.

The size result is more interesting because it survives this measurement critique: size was measured with two well established indicators and still came back null, consistent with Ismail and Mahmoud (2012) but contradicting Schoute (2009) and Al-Omiri and Drury (2007). Hadid and Hamdan's (2022) recent evidence offers a specific, testable explanation: size's relationship with CSS in UK manufacturing firms is conditional on firm age and operates indirectly through product diversity, not as a simple direct effect. The present study tested only a direct path, and it is plausible its null result reflects this under-specification rather

than the genuine absence of any size-CSS relationship—a testable claim for future research, not a conclusion this study’s data can adjudicate. Diavastis’s (2025) contrasting significant size finding, using a similarly simple specification, further suggests that whether a direct-effect model detects a size effect may depend on unmeasured moderators that vary by setting.

6.3. CSS’s Operational and Financial Performance Consequences

CSS was positively related to service quality, service cycle time reduction, and cost reduction, and was associated with financial performance both directly and indirectly through service quality and cost reduction. Most prior ABC adoption research has failed to find a direct financial performance link (Cagwin & Bouwman, 2002; Ittner et al., 2002; Maiga & Jacobs, 2007), so this result deserves caution rather than being reported as a straightforward improvement; Vetchagool, Augustyn, and Tayles (2020) similarly found that the extent of ABC use, rather than adoption per se, better predicted performance among Thai firms, lending some support to the idea that intensity measures capture variation binary adoption measures miss. The likely explanation is that CSS captures a broader range of costing practice than a binary ABC dummy, including firms with considerable sophistication never formally labelled “ABC”—a genuine advantage, but one that also means this result is not strictly comparable to null ABC findings elsewhere and should not be read as evidence CSS “works” where ABC adoption “does not”. The positive service cycle time result echoes Zhang and Isa’s (2010) Chinese manufacturing evidence, suggesting this operational benefit may generalise across sectors, though further replication would strengthen the claim.

H7d was supported in the original structural model ($\beta = -0.20, p \leq 0.05$), consistent with a quality-cost trade-off specific to labour intensive services (Section 3.3). The coding of the cost reduction construct was verified directly against the underlying item wording: both items ask respondents to rate the extent of cost reduction achieved, with higher scores representing greater perceived cost reduction. Because higher values of the cost-reduction construct represent greater perceived cost reduction, the negative coefficient indicates that higher service quality was associated with lower perceived cost reduction. This finding is consistent with the proposed quality-cost trade-off in labour-intensive service settings, although the cross-sectional design does not permit causal interpretation, and the trade-off itself should be understood as a plausible explanation for the observed association rather than a causally demonstrated mechanism.

This study, like most of the survey literature it draws on, uses cross-sectional, single-respondent, self-reported data. The mediation results in Table 5 are evidence of statistical association consistent with the hypothesised model, not evidence that CSS causes improved financial performance; the data cannot rule out a third factor, such as access to capital or management quality, driving both CSS and performance simultaneously. The consistency of this pattern, operational mediators mattering more than a direct link, across this study and companion anal-

yses of ABC adoption and activity management usage in the same sample is suggestive of a plausible mechanism, but a cross-sectional design cannot demonstrate it, and no such claim is made here.

7. Conclusion

This study examined the contextual determinants of cost system sophistication (CSS) and its associations with non-financial and financial performance among 204 UK non-manufacturing business units, using a mediation form of contingency fit and structural equation modelling. Competition and cost structure were the only significant direct contextual determinants of CSS, whereas service diversity, differentiation strategy, cost leadership strategy, and organisational size showed no significant direct relationships with CSS. Cost structure fully mediated the relationship between differentiation strategy and CSS, indicating that differentiation strategy was associated with greater CSS indirectly through its relationship with the proportion of indirect to total costs.

CSS was positively associated with all three non-financial performance dimensions examined: service quality, service cycle time reduction, and cost reduction. CSS was also positively associated with financial performance. The mediation analysis further showed that service quality and cost reduction partially mediated the CSS-financial performance relationship, whereas service cycle time reduction did not. Taken together, these findings suggest that the relationship between costing-system sophistication and financial performance may operate partly through specific operational outcomes rather than exclusively through a direct relationship. Given the cross-sectional nature of the data, however, these mediation patterns should be interpreted as statistical associations consistent with the proposed theoretical model rather than evidence of causal mechanisms.

The study contributes to the management accounting literature in several ways. Theoretically, it extends contingency-based costing research by applying a mediation form of fit that considers contextual antecedents, costing-system design, operational outcomes, and financial performance within a single model. Methodologically, CSS is conceptualised as a continuum based on the number and type of cost pools and cost drivers rather than as a binary ABC adoption decision. Empirically, the study provides evidence from UK non-manufacturing organisations, a setting that has received considerably less attention than manufacturing in previous CSS research. The findings also provide a possible explanation for some of the inconsistencies in the existing literature by suggesting that sectoral context and the way costing-system sophistication is measured may influence observed relationships. These explanations should nevertheless be regarded as propositions for further investigation rather than as conclusions established by the present design.

For managers, the findings suggest that greater CSS may be particularly relevant to business units operating in competitively intense environments or with high indirect-cost intensity. The positive associations between CSS and service quality, cycle-time reduction, cost reduction, and financial performance also indicate that

costing-system sophistication may be relevant when organisations seek better cost information to support operational and performance management. However, these associations should inform, rather than determine, managerial decisions regarding investment in costing-system sophistication. In particular, organisational size alone does not appear to provide a reliable indication that greater CSS is warranted. Given the cross-sectional and self-reported nature of the evidence, the findings should be interpreted as contextual associations rather than causal prescriptions.

For researchers, the results reinforce the importance of moving beyond simple binary distinctions between ABC adopters and non-adopters and examining costing-system sophistication as a multidimensional continuum. They also indicate the value of testing complete contextual factor-CSS-performance relationships rather than examining isolated direct effects. Future research should therefore investigate whether the relationships identified here persist across different sectors, institutional settings, and longitudinal designs, and whether additional organisational characteristics, including firm age, service complexity, and increasingly digitalised costing-system features, further explain variation in CSS and its performance associations.

Limitations and Future Research

This study has several limitations. The cross-sectional design precludes causal inference; the **Table 5** mediation results describe statistical patterns consistent with the hypothesised model, not demonstrated mechanisms. All study constructs were obtained from a single respondent in each business unit using a self-reported questionnaire, creating the possibility of common method bias. Harman's single-factor analysis did not identify a single-factor structure; however, the first factor accounted for 51.6% of the total variance. Because this slightly exceeds the commonly used 50% cautionary benchmark and Harman's test is itself a limited diagnostic, common method bias cannot be ruled out, and the results should be interpreted with this limitation in mind. Performance was measured perceptually rather than with objective accounting data. The differentiation strategy measure retained only two items, a plausible explanation for its null result. CSS was estimated reflectively to remain consistent with the prespecified original SEM, although its cost-pool and driver indicators can also be viewed as formative design components; future research should compare reflective and formative/composite specifications directly. The study is confined to the UK non manufacturing sector, limiting generalisability to other countries and to manufacturing; direct manufacturing-services comparison within one design would test the sectoral explanations in Section 6 more directly than between-study comparison can. Finally, the model omits variables recent evidence suggests may matter, notably firm age as a boundary condition on size (Hadid & Hamdan, 2022) and service complexity as an alternative to size, so the size null result should be read as evidence against this specific model rather than a settled conclusion.

Future research should prioritise longitudinal or matched-pair, multiple-responder designs; objective financial performance measures; cross-country replication and direct manufacturing-services comparison within one design; a refined differentiation strategy scale; explicit tests of firm age and service complexity following Hadid and Hamdan (2022); and attention to how increasingly digitalised costing-system characteristics, not captured by this study's cost-pool/driver measure, might extend the constructs used throughout this literature.

Data Availability Statement

Data are available from the corresponding author upon reasonable request.

Conflicts of Interest

The author declares no conflict of interest.

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