

Contingent Determinants and Performance Consequences of Activity-Based Costing Adoption in UK Services

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Abstract

Costing-systems research has produced inconsistent evidence on why some firms adopt activity-based costing (ABC) and whether adoption is associated with performance. This study examines contingent determinants of ABC adoption and its cross-sectional associations with operational and financial performance among 204 medium and large UK non-manufacturing business units. Because ABC adoption is binary (43 adopters; 21.08%), the revised analysis uses a recursive generalized structural path model in which the adoption equation is estimated with a Bernoulli-probit specification and the continuous equations use Gaussian identity links. Robust standard errors and 2000 case-bootstrap replications are reported. Competition, service diversity, and differentiation strategy are positively associated with the probability of ABC adoption, whereas cost structure, cost leadership strategy, and organisational size are not significant at the 5% level. ABC adoption is positively associated with service quality, service cycle-time reduction, and cost reduction, but not directly with financial performance. Specific indirect associations with financial performance operate through service quality, cycle-time reduction, cost reduction, and several serial pathways. These findings are associative rather than causal because the cross-sectional measure records current ABC use but not implementation timing, maturity, or intensity. The study extends contingency-based costing evidence to UK services while showing that conclusions about a binary adoption outcome depend on using an estimator appropriate to its categorical scale.

Keywords

Activity-Based Costing, ABC Adoption, Contingency Theory, Structural Equation Modeling, Non-Manufacturing Firms, Cost Structure, Financial Performance

1. Introduction

Since the 1980s, management accounting research has paid close attention to costing-system design (Chenhall & Smith, 2011). Traditional costing systems allocate overhead using a small number of volume-based drivers, an approach that becomes increasingly unreliable as overhead grows and output diversity increases (Drury, 2018; Johnson & Kaplan, 1987). Activity-based costing (ABC) addresses this problem by tracing overhead to activities and then to cost objects using a mixture of volume and non-volume drivers, offering more accurate cost information (Cooper, 1988a; Cooper & Kaplan, 1988; Mishra & Vaysman, 2001).

A large contingency-based literature has examined why firms adopt ABC, typically linking competition, product or service diversity, cost structure, business strategy, and organisational size to adoption (Bjørnenak, 1997; Cagwin & Bouwman, 2002; Cohen, Venieris, & Kaimenaki, 2005; Khalid, 2005; Krumwiede, 1998; Malmi, 1999; Schoute, 2004; Rankin, 2020; Van Nguyen & Brooks, 1997). This literature is nonetheless markedly inconsistent, a problem attributed to the absence of a standardised definition of ABC adoption (Al-Omiri & Drury, 2007; Bri-erley, 2011) and to pooling manufacturing and non-manufacturing firms despite their structurally different cost profiles (Alcouffe, Maurice, Galy, & Gate, 2019). A further limitation is that most studies apply a selection form of fit, testing only whether contingent factors predict adoption without also testing whether adoption improves performance (Drazin & Van de Ven, 1985; Fisher, 1995), leaving an incomplete account of ABC's practical value.

Non-manufacturing firms are a particularly important, yet under-researched, setting in which to examine these questions. Unlike manufacturing firms, whose cost structures are typically dominated by directly traceable material and labour cost, non-manufacturing firms tend to carry a substantially higher proportion of indirect, overhead cost relative to direct cost (Drury, 2018). This structural difference should, in principle, make the case for adopting a more accurate overhead-tracing system such as ABC stronger for non-manufacturing firms than for manufacturing firms; yet most existing evidence on ABC adoption and its consequences continues to derive from manufacturing samples, or from samples that pool the two sectors together, obscuring any sector-specific pattern (Alcouffe et al., 2019). This gap motivates the present study's exclusive focus on the non-manufacturing sector.

This paper addresses these limitations using survey data from 204 medium and large UK non-manufacturing business units, analysed with structural equation modelling (SEM). The study makes three contributions: it applies a mediation form of fit that links contingent antecedents to ABC adoption and, in turn, links adoption to financial performance through non-financial performance; it applies SEM, rarely used in this literature (Vetchagool, Augustyn, & Tayles, 2020), which corrects for measurement error in the latent constructs and allows direct and indirect effects to be estimated simultaneously within a single model (Hair et al., 2019); and it isolates the non-manufacturing sector, where the determinants and

consequences of ABC adoption remain comparatively under-researched relative to manufacturing. Taken together, these choices allow the study to address two questions that prior research has typically examined separately: which contingent factors actually distinguish non-manufacturing adopters of ABC from non-adopters, and whether the resulting costing information translates into measurable gains in non-financial and, ultimately, financial performance.

2. Literature Review

Since the late 1980s, a substantial stream of management accounting research has investigated the factors that lead organisations to adopt ABC in preference to traditional, volume-based costing (Cooper & Kaplan, 1991). This research is unified by a common contingency-theoretic premise—that adoption is more likely where the benefits of more accurate cost information outweigh the costs of implementing and maintaining a more complex system—but has produced a fragmented and, at times, contradictory body of findings regarding which specific organisational and environmental factors actually predict adoption in practice.

Definitions of ABC adoption vary across studies, undermining comparability (Brierley, 2011). Some authors classify firms merely considering ABC as adopters (Bjørnenak, 1997), while others classify them as non-adopters (Brierley, 2011; Cohen et al., 2005). Brierley (2011) compared ten competing definitions statistically and concluded that adoption is best restricted to firms currently using ABC. Following this approach, the present study measures ABC adoption as a binary variable: adopters are business units currently using ABC, and non-adopters comprise all other experiences, including investigation, intention, and prior rejection or abandonment.

Cooper (1988b) argued that the case for ABC strengthens with output diversity, competitive intensity, and the proportion of indirect to direct cost, prompting extensive contingency-based testing. Findings, however, are inconsistent: cost structure predicted adoption in some studies (Bjørnenak, 1997; Krumwiede, 1998) but not others (Brown, Booth, & Giacobbe, 2004; Cohen et al., 2005; Malmi, 1999); competition predicted adoption for Malmi (1999) and Van Nguyen and Brooks (1997) but not for Bjørnenak (1997) or Brierley (2011); and organisational size predicted adoption in several studies (Cagwin & Bouwman, 2002; Krumwiede, 1998) but not others (Cohen et al., 2005; Schoute, 2004). Business strategy has received comparatively less attention: Schoute (2004) found that differentiation-oriented firms were more likely to adopt ABC, while Elhamma and Fei (2013) found no such relationship. This inconsistency is commonly attributed to differing measurement of both ABC adoption and the contingent factors themselves (Aljabr, 2020; Holm & Ax, 2020), and to pooling manufacturing and non-manufacturing samples despite non-manufacturing firms typically carrying higher overhead intensity (Drury, 2018; Szychta, 2010). The present study responds by focusing exclusively on non-manufacturing firms and measuring each construct

with multiple validated indicators. Evidence from Saudi Arabian hospitals similarly indicates that ABC adoption in service settings varies with overhead intensity, organisational size, and staff capability, while an important perceived benefit is improved service quality (Alshamlan & Zverovich, 2018).

A related, smaller literature has examined whether ABC adoption improves organisational performance, generally with mixed results. Cagwin and Bouwman (2002) found that ABC use was associated with improved return on investment, particularly among complex, diverse firms operating in competitive, cost-sensitive environments, while Ittner, Larcker, and Randall (2002) linked ABC use to improved product quality and reduced cycle time in a manufacturing sample without finding a consistent direct link to financial performance. Maiga and Jacobs (2007, 2008) similarly found that the extent of ABC use was positively associated with several operational performance measures, with financial performance benefits emerging indirectly rather than directly. This pattern—significant operational effects but weak or absent direct financial effects—recurs across several studies and motivates the mediation form of fit adopted here, in which ABC adoption is expected to affect financial performance through, rather than independently of, its effect on operational and service-level outcomes.

3. Aims

The study has two aims: (1) to examine the direct and indirect influence of competition, service diversity, differentiation strategy, cost leadership strategy, cost structure, and organisational size on ABC adoption among UK non-manufacturing firms; and (2) to examine the influence of ABC adoption on financial performance, directly and indirectly through service quality, service cycle time reduction, and cost reduction.

4. Theoretical Framework and Hypotheses

Contingency theory holds that no single costing system suits all organisations; system appropriateness depends on fit between the system and organisational context (Otley, 2016). Prior ABC research has predominantly applied a selection form of fit, testing only contingent factors-system associations (Gerdin & Greve, 2004). This study instead applies a mediation form of fit: contingent factors are modelled as antecedents of ABC adoption, and ABC adoption is modelled as an antecedent of non-financial performance, hypothesised to mediate its effect on financial performance (Fisher, 1995). This approach follows Fisher's (1995) call for contingency-based control research to test a comprehensive model incorporating multiple contingent factors, a focal control system, and multiple outcome variables simultaneously, rather than examining antecedents and consequences of costing-system choice in isolation from one another.

Competition increases the cost of pricing errors arising from distorted cost information, strengthening the case for ABC (Cooper, 1988b), though evidence is

mixed (Bjørnenak, 1997; Malmi, 1999). Service diversity is expected to raise cost-allocation complexity and, separately, cost structure. Differentiation strategy is associated with more complex costing needs (Shank, 1989), while cost leadership firms are argued to already understand their cost base well, reducing ABC's incremental value (Drury & Tayles, 2005). Cost structure the proportion of indirect to total cost—is expected to increase ABC adoption directly (Drury & Tayles, 2005), and organisational size is expected to increase adoption via greater resources (Krumwiede, 1998). Differentiation strategy is additionally expected to raise both service diversity and cost structure, given that firms competing on uniqueness typically expand their service range and invest more heavily in service or process innovation (Shank, 1989); this raises the possibility that differentiation strategy's effect on ABC adoption operates partly indirectly, through these two constructs, rather than solely through a direct path. ABC adoption is, in turn, expected to improve service quality and reduce service cycle time (Ittner, Larcker, & Randall, 2002), which are expected to support cost reduction and, ultimately, financial performance (Maiga & Jacobs, 2007, 2008). Because prior research has found inconsistent direct links between ABC adoption and financial performance, the model treats this relationship as fully or partially mediated by three non-financial performance dimensions rather than assuming a direct effect. The following hypotheses were tested:

H1: Competition is positively related to ABC adoption.

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

H3a-e: Differentiation strategy is positively related to ABC adoption (a), service diversity (b), and cost structure (d); service diversity (c) and cost structure (e) positively mediate the differentiation-adoption relationship.

H4: Cost leadership strategy is negatively related to ABC adoption.

H5: Cost structure is positively related to ABC adoption.

H6: Organisational size is positively related to ABC adoption.

H7a-d: ABC adoption is positively related to service quality (a); service quality positively mediates ABC adoption's effect on financial performance (b); service quality is positively related to service cycle time reduction (c) and negatively related to cost reduction (d).

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

H9a-b: ABC adoption is positively related to cost reduction (a); cost reduction positively mediates ABC adoption'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.

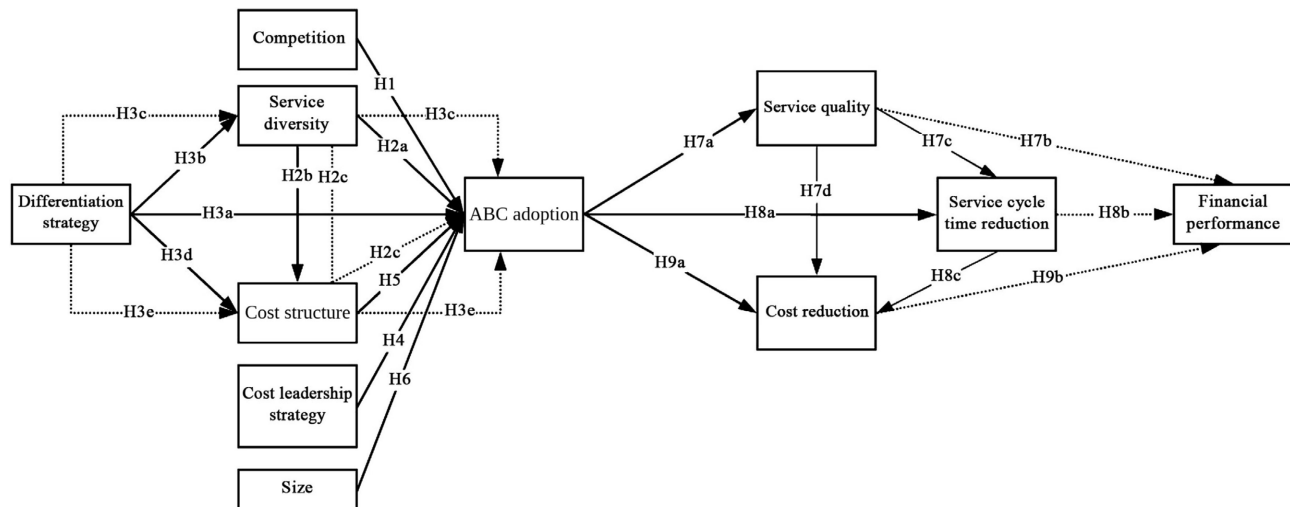


Figure 1. The hypothesised ABC adoption research model.

5. Method

5.1. Design and Sample

A cross-sectional survey questionnaire was used. The population comprised medium and large UK non-manufacturing firms (at least 50 employees and at least GBP25 million annual sales) identified in FAME across thirteen UK Standard Industrial Classification service sections. Financial and insurance activities were excluded before distribution. Screening FAME for duplicate, incomplete, and out-of-scope records produced 2969 eligible firm-level records, from which 2000 firms were randomly selected and each received one questionnaire. The covering instructions asked the respondent to answer for the business unit that most clearly represented where that person worked; consequently, one respondent and one focal business unit represented each sampled firm. The survey targeted management accountants or financial directors because they were expected to know the unit's costing practices. Before mailing, 595 addressees were identified by name through company contact or LinkedIn; the remaining 1405 questionnaires were addressed to the financial director. Respondents' exact job titles were not collected as a separate demographic item, which is acknowledged as a limitation. Of 263 returned questionnaires (13.15%), 44 were excluded: 16 were outside the eligible service classifications, 19 contained inconsistent cost-pool or cost-driver answers, eight had at least 10% missing responses, and one lacked a required variable. This left 219 usable questionnaires (10.95% effective response rate). Fifteen units reported no operating costing system and completed only the demographic section, yielding the 204 business units analysed in the ABC-adoption model.

5.2. Measures

ABC adoption was measured from Question A1 as a binary variable: 1 for business units currently using ABC and 0 for all other reported experiences, including intention, investigation, rejection, abandonment, or no prior consideration. The

multi-item measures used five-point response scales. The revised measurement model retained three competition items, three service-diversity items, two differentiation-strategy items, three cost-leadership items, eight service-quality items, three service-cycle-time items, two cost-reduction items, and three financial-performance items. One item each was removed from competition, service diversity, differentiation strategy, and service cycle-time reduction because of discriminant-validity concerns; capital employed was removed from organisational size because its standardised loading was 0.21. Cost structure was the ratio of indirect service cost to total directly attributable service cost, and size was represented by log-transformed employees and sales revenue. Appendix A provides every item, its source and retention status, standardised loading, composite reliability, average variance extracted, and discriminant-validity statistics.

5.3. Analysis

Data were analysed in two stages. First, confirmatory factor analysis evaluated the reflective measurement structure using maximum-likelihood estimation for the continuous item indicators. Second, because ABC adoption is dichotomous, the structural relations were re-estimated as a recursive generalized structural path model. The adoption equation used a Bernoulli distribution with a probit link; the observed 0/1 response was represented by a single estimated threshold on an underlying normally distributed response propensity (residual variance fixed to 1 for identification). Continuous endogenous variables used Gaussian distributions with identity links. Retained indicators were converted to standardised loading-weighted construct scores using the CFA loadings reported in Appendix A. Probit paths are reported on the fully standardised latent-response scale; continuous paths are standardised coefficients, while paths from binary ABC adoption to continuous outcomes represent the standard-deviation difference between adopters and non-adopters. Heteroskedasticity-robust sandwich standard errors were used for the probit equation and HC3 standard errors for continuous equations. Percentile confidence intervals for direct, total, and specific indirect effects were obtained from 2000 case-bootstrap samples using a fixed reproducibility seed (20260914). The adoption threshold was 1.572. With 43 adopters and six predictors, the adoption equation contained 7.17 events per predictor. As a stability check, a logit-link model and the 2000 bootstrap samples were compared with the probit results; coefficient directions and significance decisions were unchanged for all six adoption predictors.

5.4. Ethics

Participation was voluntary and anonymous. Ethical approval for the study was obtained prior to data collection. 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. No personally identifying information was collected beyond

optional contact details for a supplementary stage of the wider project; these were stored separately from questionnaire responses and are not used in this paper.

6. Results

6.1. Descriptive Statistics

ABC had been adopted by 21.08% of the 204 business units, close to the 19% reported for Irish non-manufacturing firms by [Clarke and Mullins \(2001\)](#), lending some external validity to the sample. **Table 1** summarises the contingent factors: mean competition was 3.15 (SD 0.94, out of 5), somewhat lower than the levels of competition reported for UK and Dutch manufacturing samples in prior research, though differing measurement scales make direct comparison difficult; differentiation strategy (3.05) exceeded cost leadership strategy (2.95), a smaller gap than reported for Australian manufacturing firms in prior work; and mean cost structure was 24.91% (SD 17.62%), higher than the 21.11% reported for UK manufacturing firms by [Brierley \(2011\)](#), consistent with non-manufacturing firms carrying relatively more overhead than manufacturing firms.

Table 1. Descriptive statistics for the contingent factors, cost structure and size.

Construct	Mean	SD	Scale
Competition	3.15	0.94	1-5 Likert
Differentiation strategy	3.05	1.05	1-5 Likert
Cost leadership strategy	2.95	0.95	1-5 Likert
Service diversity	3.01	0.88	1-5 Likert
Cost structure (% indirect of total cost)	24.91%	17.62%	Percentage
Size—number of employees	1902	4345	Count
Size—sales revenue	£431.7m	£1149.8m	GBP

n = 204.

UK non-manufacturing firms reported moderate improvements in service quality (mean 3.29), service cycle time reduction (3.08), cost reduction (2.70), and financial performance (2.90), each below the corresponding figures reported for US manufacturing firms by [Maiga and Jacobs \(2008\)](#) (4.30, 4.29, 4.00, and 3.91, respectively).

6.2. Measurement and Structural Model

CFA supported the measurement model after removal of capital employed and one indicator each from competition, service diversity, differentiation strategy, and service cycle-time reduction. The refined measurement model fit was acceptable (chi-square/df = 1.72, RMSEA = 0.06, SRMR = 0.06, CFI = 0.95, IFI = 0.95, TLI = 0.93, PNFI = 0.72). Composite reliability ranged from 0.78 to 0.95 for the multi-item constructs; AVE was at least 0.65 except for size (AVE = 0.47; CR =

0.85). The largest HTMT ratio calculated from the retained item set was 0.821, below the 0.85 criterion. **Table 2** reports the re-estimated structural paths using the categorical adoption specification.

Common-method variance was evaluated rather than assumed to be mitigated by CFA. An unrotated single-factor diagnostic applied to the retained perceptual indicators yielded a first factor accounting for 52.03% of their variance. Because this value is slightly above 50%, it does not rule out shared respondent or method bias. The result is therefore treated as a cautionary diagnostic, not evidence that common-method variance is absent; the single-respondent, cross-sectional design remains a limitation.

Table 2. Structural model results: standardised path coefficients.

Hyp.	Path	Coefficient	<i>p</i> -value	Decision
H1	Competition → ABC adoption	0.227	0.020	Supported
H2a	Service diversity → ABC adoption	0.321	0.002	Supported
H2b	Service diversity → Cost structure	0.359	<0.001	Supported
H3a	Differentiation strategy → ABC adoption	0.327	0.003	Supported
H3b	Differentiation strategy → Service diversity	0.658	<0.001	Supported
H3d	Differentiation strategy → Cost structure	0.339	<0.001	Supported
H4	Cost leadership strategy → ABC adoption	0.018	0.838	Not supported
H5	Cost structure → ABC adoption	0.155	0.057	Not supported
H6	Size → ABC adoption	−0.017	0.818	Not supported
H7a	ABC adoption → Service quality	0.502	<0.001	Supported
H7c	Service quality → Service cycle-time reduction	0.449	<0.001	Supported
H7d	Service quality → Cost reduction	−0.134	0.075	Not supported
H8a	ABC adoption → Service cycle-time reduction	0.848	<0.001	Supported
H8c	Service cycle-time reduction → Cost reduction	0.509	<0.001	Supported
H9a	ABC adoption → Cost reduction	0.915	<0.001	Supported
--	Differentiation strategy → Service quality	0.580	<0.001	Post-hoc path
--	ABC adoption → Financial performance	0.070	0.721	Not significant
--	Service quality → Financial performance	0.313	<0.001	Significant
--	Service cycle-time reduction → Financial performance	0.230	0.014	Significant
--	Cost reduction → Financial performance	0.372	<0.001	Significant

* $p \leq 0.05$ (two-tailed). ^aPath added during model modification; not part of the a priori hypotheses. $n = 204$.

The differentiation-strategy to service-quality path was added after model modification, but it also has a theoretical basis. Differentiation strategies commonly rely on superior quality, service, design, and responsiveness to create uniqueness for which customers will pay a premium (Grant, 2016; Prajogo & Sohal, 2006). The path was therefore retained and explicitly identified as post hoc. In a sensitiv-

ity model omitting this path, the ABC-adoption to service-quality coefficient increased from 0.502 to 1.363; the remaining central ABC paths to cycle-time reduction (0.848), cost reduction (0.915), and financial performance (0.070) were unchanged because the recursive outcome equations otherwise retained the same observed predictors. Thus, the modification materially affects attribution of service quality between strategy and ABC adoption, but not the other central ABC paths.

The revised categorical structural results are reported in **Table 2**; the original results diagram has been removed because it represented the superseded linear treatment of ABC adoption.

6.3. Mediation Analysis

Table 3 reports total, direct, and specific indirect associations with percentile confidence intervals from 2000 case-bootstrap samples. Differentiation strategy was indirectly associated with ABC adoption through service diversity (standardised probit-scale effect = 0.210, 95% CI [0.068, 0.357]), but its indirect association through cost structure was not significant (0.047, 95% CI [−0.015, 0.111]). For performance, ABC adoption had no direct association with financial performance (0.070, 95% CI [−0.312, 0.437]) but had significant specific indirect associations through service quality (0.156), service cycle-time reduction (0.192), and cost reduction (0.338), as well as significant serial pathways. The total indirect association was 0.917 (95% CI [0.641, 1.221]) and the total association was 0.986 (95% CI [0.624, 1.324]). These estimates describe contemporaneous associations and do not establish causal mediation or temporal ordering.

Table 3. Mediation (indirect-effect) results for key paths.

Path	Effect type	Estimate	95% CI lower	95% CI upper
Service diversity → Cost structure → ABC adoption	Specific indirect	0.053	−0.016	0.132
Differentiation strategy → Service diversity → ABC adoption	Specific indirect	0.210	0.068	0.357
Differentiation strategy → Cost structure → ABC adoption	Specific indirect	0.047	−0.015	0.111
Differentiation strategy → Service diversity → Cost structure → ABC adoption	Serial indirect	0.035	−0.010	0.089
ABC adoption → Financial performance	Direct	0.069	−0.312	0.437
ABC adoption → Service quality → Financial performance	Specific indirect	0.156	0.068	0.266
ABC adoption → Cycle-time reduction → Financial performance	Specific indirect	0.192	0.041	0.378
ABC adoption → Cost reduction → Financial performance	Specific indirect	0.338	0.169	0.552
ABC adoption → Service quality → Cycle time → Financial performance	Serial indirect	0.052	0.010	0.110

Continued

ABC adoption → Service quality → Cost reduction → Financial performance	Serial indirect	−0.025	−0.063	0.004
ABC adoption → Cycle time → Cost reduction → Financial performance	Serial indirect	0.160	0.072	0.283
ABC adoption → Service quality → Cycle time → Cost reduction → Financial performance	Serial indirect	0.043	0.016	0.085
ABC adoption → Financial performance	Total indirect	0.917	0.641	1.221
ABC adoption → Financial performance	Total	0.986	0.624	1.324

p-values are two-tailed. Probit paths use robust sandwich tests; continuous paths use HC3 tests. All confidence intervals use 2000 case-bootstrap samples.

7. Discussion

Using the categorical adoption specification, competition (STDYX = 0.227, $p = 0.020$), service diversity (STDYX = 0.321, $p = 0.002$), and differentiation strategy (STDYX = 0.327, $p = 0.003$) were positively associated with ABC-adoption propensity. Cost structure was positive but fell just outside the 5% threshold (STDYX = 0.155, $p = 0.057$); cost leadership strategy and size were not significant. The revised results therefore provide broader support for the contingency argument than the original linear treatment of adoption, while also showing why estimator choice matters for a binary outcome with only 43 adopters.

ABC adoption was positively associated with service quality, service cycle-time reduction, and cost reduction in the revised model, but had no direct association with financial performance. Service quality, cycle-time reduction, and cost reduction each carried a significant specific indirect association between ABC adoption and financial performance. These patterns are consistent with the proposition that ABC-related information may be linked to financial outcomes through operational channels, but the data do not establish that ABC preceded those outcomes.

These results suggest that service firms' strategic and operating environments are associated with ABC adoption: differentiation, service diversity, and competition distinguish adopters from non-adopters in the revised categorical model. The performance associations should be interpreted cautiously. Current adopters reported stronger quality, cycle-time, and cost outcomes, but the study does not observe when ABC was implemented, how mature the system was, or how intensively it was used. Managers should therefore view the estimates as evidence of covariation rather than guaranteed effects of adopting ABC.

8. Conclusion

This study examined contingent determinants of ABC adoption and its associations with performance among UK non-manufacturing business units. A categorical probit specification showed positive associations of competition, service diversity, and differentiation strategy with adoption propensity. ABC adoption was positively associated with service quality, cycle-time reduction, and cost reduction

and was indirectly, but not directly, associated with financial performance. The findings extend evidence on costing systems in services while demonstrating the importance of modelling adoption as a binary outcome.

Several limitations qualify the findings. The cross-sectional design precludes causal or temporal inference: current ABC use does not reveal implementation timing, maturity, duration, or intensity, and the estimated indirect effects are therefore statistical decompositions of contemporaneous associations rather than causal mediation effects. Only 43 of 204 units were adopters, producing 7.17 events per predictor in the adoption equation; bootstrap and alternative-link checks supported stability, but replication with more adopters is needed. The 10.95% effective response rate limits generalisability. Exact respondent roles were not collected, although the questionnaire targeted management accountants and financial directors. Self-reported performance and other perceptual measures came from one respondent, and the first-factor diagnostic accounted for 52.03% of retained-indicator variance, so common-method variance cannot be excluded. Indicator removals and the post hoc differentiation-strategy to service-quality path also warrant independent confirmation. Future longitudinal research should record adoption date, implementation stage, maturity, intensity of ABC use, and objective performance measures.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix A1. Measurement Items and Validity Evidence

All appendix content is newly added in response to the reviewer. Loadings are standardised CFA loadings from the retained measurement model. Removed indicators are reported without a retained-model loading.

Construct	Code	Survey item	Original source	Status	Loading	CR/AVE
Competition	COMP1	Intensity of competition for the major services provided.	Drury & Tayles (2005); Schoute (2004)	Removed	--	0.82/0.65
Competition	COMP2	Suppliers can negotiate higher prices.	Porter (1979)	Retained	0.82	
Competition	COMP3	Customers can negotiate lower prices.	Porter (1979)	Retained	0.77	
Competition	COMP4	Threat from substitute services.	Porter (1979)	Retained	0.83	
Service diversity	SD1	Different processes are required to design services.	Baird (2007); Brown et al. (2004)	Removed	--	0.88/0.72
Service diversity	SD2	Different processes are required to provide services.	Baird (2007); Brown et al. (2004)	Retained	0.81	
Service diversity	SD3	Differences in service volume across services.	ElMaraghy et al. (2013)	Retained	0.88	
Service diversity	SD4	Differences in service volume across service segments.	Geringer et al. (2000)	Retained	0.84	
Differentiation strategy	DIFF1	Maintain brand identification.	Frey & Gordon (1999)	Removed	--	0.78/0.71
Differentiation strategy	DIFF2	Seek uniqueness for which buyers pay a premium.	Frey & Gordon (1999)	Retained	0.85	
Differentiation strategy	DIFF3	Invest in technology to develop unique service designs.	Frey & Gordon (1999)	Retained	0.84	
Cost leadership	CL1	Seek to be the lowest-cost service provider.	Frey & Gordon (1999)	Retained	0.73	0.85/0.68
Cost leadership	CL2	Emphasise cost advantages from all services.	Frey & Gordon (1999)	Retained	0.86	
Cost leadership	CL3	Invest in technology to develop low-cost service designs.	Frey & Gordon (1999)	Retained	0.88	
Service cycle time	CT1	Simplify methods to reduce time in value-added activities.	Self-developed	Removed	--	0.88/0.74
Service cycle time	CT2	Simplify methods to reduce time in non-value-added activities.	Self-developed	Retained	0.80	
Service cycle time	CT3	Use technology to reduce time in value-added activities.	Self-developed	Retained	0.89	

Continued

Service cycle time	CT4	Use technology to reduce time in non-value-added activities.	Self-developed	Retained	0.89	
Service quality	SQ1	Required skills and knowledge.	Parasuraman et al. (1985)	Retained	0.86	0.95/0.74
Service quality	SQ2	Perform correctly the first time and honour promises.	Parasuraman et al. (1985)	Retained	0.90	
Service quality	SQ3	Keep customers informed about timing.	Parasuraman et al. (1985)	Retained	0.87	
Service quality	SQ4	Provide easily accessible services.	Parasuraman et al. (1985)	Retained	0.85	
Service quality	SQ5	Convenient service-facility locations.	Parasuraman et al. (1985)	Retained	0.81	
Service quality	SQ6	Convenient operating hours.	Parasuraman et al. (1985)	Retained	0.83	
Service quality	SQ7	Customers feel safe in transactions.	Parasuraman et al. (1985)	Retained	0.87	
Service quality	SQ8	Respond readily to customer requests.	Parasuraman et al. (1985)	Retained	0.87	
Cost reduction	CR1	Reduction in direct service costs.	Self-developed	Retained	0.79	0.81/0.71
Cost reduction	CR2	Reduction in indirect service costs.	Self-developed	Retained	0.89	
Financial performance	FP1	Improvement in net sales.	Cagwin & Bouwman (2002); Jänkälä & Silvola (2012)	Retained	0.79	0.88/0.72
Financial performance	FP2	Improvement in return on investment.	Cagwin & Bouwman (2002); Jänkälä & Silvola (2012)	Retained	0.89	
Financial performance	FP3	Improvement in return on assets.	Maiga & Jacobs (2007)	Retained	0.87	
Organisational size	SIZE1	Log number of employees.	Brierley (2011)	Retained	0.69	0.85/0.47
Organisational size	SIZE2	Log annual sales revenue.	Brierley (2011)	Retained	0.68	
Organisational size	SIZE3	Capital employed.	Self-developed	Removed	0.21	

Appendix A2. Discriminant Validity

HTMT ratios based on retained indicators ranged from 0.275 to 0.821. The maximum was 0.821 between service diversity and service cycle-time reduction, below the conservative 0.85 criterion. The CFA average variance extracted values were: competition 0.65; service diversity 0.72; differentiation strategy 0.71; cost leader-

ship 0.68; service quality 0.74; service cycle time 0.74; cost reduction 0.71; financial performance 0.72; and size 0.47. In the original CFA assessment, AVE exceeded maximum shared variance for every construct.