

The Moderating Effects of Information Technology Sophistication on Services Practice and Performance

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Structured Abstract

<i>Purpose of this paper</i>	To investigate the relationship between service practices, service performance, business performance and IT sophistication.
<i>Design/methodology/approach</i>	We develop a conceptual framework incorporating dimensions of services practice and performance performance and use structural equation modeling to test the model with data from 231 companies.
<i>Findings</i>	This paper extends the basic service practice-service performance relationship by incorporating the interaction effects of IT sophistication in a contingency framework. Previous studies found mixed support for the direct effects of IT sophistication on service performance.
<i>Research limitations/implications (if applicable)</i>	Using single informants leads to common methods bias.
<i>Practical implications (if applicable)</i>	Companies need to identify how IT contributes to service effectiveness from a customer perspective
<i>What is original/value of paper</i>	This study adds to the emerging literature of the relationship between services management and information technology.

KEYWORDS: Information Technology, Service Practices and Performance, Contingency Model

The Moderating effects of Information Technology on Services Practice and Performance

Introduction

The role of information technology (IT) in the services sector is currently the subject of considerable scholarly reflection (Voss 2003). Empirical results of studies of the link between information technology (IT) investment and performance have generally been mixed, though recent evidence shows some support of a positive relationship. In his review of past research, Weill (1992) notes that not all IT investment is alike and that the context of the firm is important for converting IT investments into productive outputs. Likewise, in a recent London School of Economics survey, senior executives revealed that while over half of their company's IT investments were aimed at getting a competitive advantage, only one third of these were actually profitable (Compass 1998). With this in mind, this paper investigates the effect of IT in the services sector.

This paper builds upon the report entitled "Service in Britain" which deals with the practice-performance relationship in services management (Voss and Johnston 1995). The basic proposition underlying this body of work is that the adoption of best practice in services management leads to higher service performance, which in turn leads to improved business and financial performance. Building on this contribution, we further propose that the relationship between service practices and performance is contingent upon the level of IT sophistication. We define IT sophistication as the degree to which

an organisation's processes, equipment and personnel compares favourably or unfavourably with its competitors. Figure 1 illustrates our conceptual framework.

Take in Figure 1

This paper is structured as follows: firstly we review the theoretical context and outline our hypotheses; secondly we describe our research methodology; thirdly we develop and test a model of the moderating effect of IT sophistication of the service practices-service performance relationship; finally we reflect on the implications our study and conclude with some suggestions for future research.

Theoretical Context and Hypotheses

Service Practices-Performance Model

The theoretical background to this paper draws on distinct but overlapping literatures in services management/marketing, quality management and information management. For example, practice-performance models have been the subject of empirical research in both the manufacturing (Voss *et al.* 1995) and the services sector (Heskett *et al.* 1997). These studies provide empirical support linking employee satisfaction, productivity, service value, customer satisfaction and business performance. In the services marketing literature, the SERVQUAL (Parasuraman *et al.* 1988) model is widely used for measuring service quality. In the services management literature, Roth's service capabilities indices links service strategy and performance (Roth 1993; Roth and Jackson 1995). Finally, the

quality management literature is replete with practice-performance studies (Sousa and Voss 2002).

Coughlan and Harbison (1999), in a comparative study of practice and performance sought both to measure the service practice and performance in Irish service organizations, and also to determine if there were significant differences with similar organizations in the UK. Using Voss'(1995) model to benchmark four specific sectors (financial services, public services, tourism and transportation), they found that the pattern of service practices and performance that emerged reflects similarities and differences in both Irish and UK service organizations. The central hypothesis of both the Irish and UK studies was confirmed, i.e., best practice has a direct link to the attainment of high levels of service quality which in turn leads to improved business performance. Given the evidence of the services-practice performance model we propose the following hypotheses:

H1: Best practices in service management leads to better service performance.

H2: Better service performance leads to better business performance.

Information Technology Sophistication as a Moderator

The relationship between a company's IT sophistication and performance has received considerable attention in the literature over the years. However, empirical studies indicate mixed support for the hypothesis that IT sophistication has a direct effect on service performance. In this section we outline the basis of our theoretical argument by

firstly defining what we mean by technological sophistication and IT sophistication in particular. Secondly, we argue that IT sophistication is central to an organisation's listening capacity.

IT sophistication embraces a wide landscape and has important implications for the management of organisations. As such, the basis of our theoretical argument rests on the assumption that the relationship between service practice and performance is contingent upon the extent of IT sophistication. In attempting to define IT sophistication we first widen the scope of our definition to include what we mean by technological sophistication. Khandwall (1976) argues that a technologically sophisticated firm “implies that the products and processes produced or utilised involved the use of very sophisticated and complex operations technologies with a lot of research and development involved, while a relatively technologically unsophisticated environment implies the opposite” (pp.27-8). De Búrca et al. (2005) suggest that a firm needs to face up to a number of challenges in order to be categorised as technologically sophisticated: firstly, the business requires a strong scientific-technical base; secondly, new technology can quickly make existing technologies obsolete and thirdly as new technologies come on stream, their applications create or revolutionise markets and demands. Porter {, 1880 #679} provides strong evidence that technological sophistication is related to firm performance. He contends that profits frequently tend to be higher in emerging industries characterized by great technological uncertainties than in more mature industries where technological change is minimal. Likewise, Fynes et al. (2001) have argued that small

firms' viability is particularly dependent on their technological sophistication. How then do these arguments relate to IT sophistication?

IT is the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numeric information by a microelectronics-based combination of computing and telecommunication (Fletcher 1991). It includes all hardware, software, communications, telephone and facsimile facilities (Weill 1992). Such a broad definition underscores that IT is used extensively throughout organizations in some form or other. The application of IT in services management ranges from what Fletcher (1991) labels as personal productivity tools (spreadsheets, word processing and simple customer databases) to more sophisticated decision support systems. One of the early attempts at characterizing IT sophistication was made by Nolan (1973) with his "stages of growth" model. In this model, the evolution concept is used in identifying and planning the different stages of systems growth. One of Nolan's objectives was to explain the relationship between a stage and the prior or subsequent stage. A fundamental concept put forward by Nolan was that of information systems (IS) "maturity". IT maturity refers to a state where information resources are fully developed and computer-based systems are fully integrated. Building on this, a number of authors investigated different criteria of systems "maturity" or "sophistication". Cheney and Dickson (1982) examined the relationship between what they defined as "technological sophistication" (hardware and software system, nature of application systems), "organizational sophistication" (information resources management activities) and system performance. Similarly, Saunders and Keller (1983) referred to IT maturity as the sophistication of the mix of technology and

applications available in the organisation. More recently, Raymond and Paré (1992) defined IT sophistication in terms of technological support, hardware and systems. For the purposes of this study we have taken this definition of sophistication with some minor adaptations.

Mulligan and Gordons'(2002) study of customer and supplier relationships in the financial services industry revealed that, in terms of IT sophistication, threats of disintermediation, cannibalization of channels, selecting the wrong standards and failure to keep up with change are forcing companies to address their relationships with their customers. They identified a number of industry and technology drivers shaping companies strategy for inter-organizational communication such as cost pressures, pressure for uniform interfaces, increasing customer expectations and web/telephone/wireless convergence.

Each new IT investment is made on the expectation that a firm will become more efficient and/or effective; yet, frequently, few of the anticipated benefits are obtained within the projected time frame (Alserhan and Brannick 2002). In many instances, anticipated benefits fail to materialize until many years after a firm introduces a new IT application. Brynjolfsson and Hitt (1996) label this phenomenon 'the productivity paradox' of IT investment. Similarly, Harris (1991) found that firm performance is linked to the level of IT investment intensity. Weill (1992) argues that the context of the firm is important for converting IT investments into productive outputs: he found a positive relationship between IT investment and firm performance in the manufacturing sector.

His findings revealed that heavy use of transactional IT investment was significantly and consistently associated with strong firm performance.

IT sophistication is closely associated with listening capability (Glynn *et al.* 2003). A listening organisation can be characterised as having knowledge of customers and an ability to satisfy those customers (Parasuraman 1995). To manage the service exchange process successfully, the service organisation needs to develop market intelligence: in other words employ sophisticated listening practices. These comprehensive information-laden practices not only endeavour to understand the needs of the external customer, but also examine the needs of the internal customer in themselves and their relationship to the needs of the external customer (Glynn and Lehtinen 1995). Listening is often more tiring than talking and it demands intellectual effort. In the future, the successful leader will have not the loudest voice, but the readiest ear (Bennis 1993). The business world allocates a vast amount of financial and human resources to listening to internal and external customers. Marketing firms are continually conducting customer surveys and opinion polls in the hope of identifying future needs and public trends. Listening to customers and translating what is heard into an action plan is a mark of a successful organisation (Scarnati 1998).

Service encounters are more socially interactive and information dependent than those that occur in manufacturing settings. IT related practices are central to many facets of service management practices (Coughlan and Harbison 1999). As a result, Glynn *et al.* (2003) contend that the listening organisation can be seen as a comprehensive approach

to dealing with customer orientation, internal marketing issues and embraces all modes and form of IT. However, other studies in the services sector indicate disappointing productivity from IT investment. For example, Roach (1998) reported that considerable investments in IT have failed to boost performance. Likewise, Turner (1985) found no significant relationship existed between performance and IT investment in the banking sector while Strassmann (1997) found little evidence of any productivity improvement despite 10 years of computerization in US industry

In summary, empirical studies indicate mixed support for the hypothesis that IT sophistication has a direct effect on service performance. Instead, we posit that the relationship between service practice and performance is contingent upon the extent of IT sophistication. In other words:

H3: IT sophistication moderates the services practice-performance relationship.

Research Methodology

Constructs and Survey Instrument

To reiterate, this research extends the existing basic service practice-service performance model (Voss 1995) to include the moderating effect (if any) of IT sophistication. The instrument used to test the stated hypotheses was a mail survey. A questionnaire based on existing scales was initially drafted. We used the multi-item measurement scales developed and tested for validity and reliability by Glynn et al (2003). These scales include measures for service practice constructs (employee practices, benchmarking, supplier management, customer management), service performance constructs (service comprehensiveness, service efficiency and customer responsiveness) and the business

performance construct (return on investment, sales, earnings before tax and market share). These are based on the work of Voss and Johnston (Voss and Johnston 1995) and are shown in Appendix A. We measured IT sophistication by calculating a composite index of respondents' perceptions of their IT equipment, processes and staff relative to their competitors using five-point Likert scales (anchored by 'state-of-the-art' and 'in need of replacement').

Respondents were asked to rate their organisation's performance relative to their major competitors on a five-point scale anchored by "much superior to much inferior" (except in the case of IT sophistication as described above). While it could be argued that objective scales are more insightful we have used subjective scales because of the multi-sectoral nature of our survey. In addition, companies can be reluctant to disclose exact performance figures (Ward and Duray 2000); however, managers well-acquainted with performance data can provide an accurate subjective assessment (Choi and Eboch 1998). Indeed past research indicates that managerial evaluations correspond closely to objective data obtained from both internal and external sources (Dess and Robinson 1984; Venkatraman and Ramanujam 1986). The draft questionnaire then was pre-tested with fifteen academics and practitioners to check its content validity and terminology and modified accordingly. The modified questionnaire was then pilot-tested with twenty service organisations to check its suitability and appropriateness for the target population before mailing. To encourage completion, respondents were promised, and received, a summary of the research findings. Two repeat mailings of the instrument were carried out to improve the overall response rate.

Sample

Dun & Bradstreet's directory of service companies (with more than 20 employees) in Ireland provided a sampling frame of 5123 companies. A disproportionate stratified probability procedure was employed whereby a proportionately higher number of larger enterprises were selected because of the high proportion of small to medium-sized enterprises in the population. Using a stratified sample design (based on company size and sector), we forwarded the questionnaire to 642 companies in Ireland. Following two repeat mailings, we received a total of 231 completed responses (giving a response rate of 36%).

Telephone contact was established with each of these companies prior to mailing and the key informant was also identified at this stage. The key informant was identified by enquiring as to which single individual was responsible and capable of responding to questions on service practices and performance. This step was taken in order to improve the quality and quantity of responses as well as to reduce the impact of potential inaccurate recall, hindsight bias and subconscious attempts to maintain self-esteem that can occur from using a single informant.

Analysis

Descriptive Statistics

The degree to which the sample is representative of the population was addressed by carrying out a series of standard chi-square goodness-of-fit tests with respect to employee

numbers and sectoral breakdown (see Table I). For each of the characteristics, we found no significant difference between the population percentages and the sample percentages. This suggests that the sample response profile is not significantly different from the population profile and that the sample is broadly representative on key variables.

Take in Table I

In addition, evidence of non-response bias was assessed by comparing answers between questionnaires that were returned early and those returned late to determine if there were statistical differences (Lambert and Harrington 1996). The final sample was split into two, depending on the dates they were received. The early wave group consisted of 142 responses while the late wave group consisted of 89 responses. Eleven of the thirty-two survey items (33%) were randomly selected and t-tests were performed on each item. The *t*-tests yielded no statistically significant differences.

Confirmatory factor analysis

For this paper, we undertook a single-step analysis of both measurement and structural models to test our hypotheses using AMOS 4. Using this approach, the measurement and structural models are analysed *simultaneously*. There has been considerable methodological debate in the literature as to the merits of this approach when compared to a two-step analysis (where the measurement and structural models are performed *sequentially*). The Anderson and Gerbing (1988) paper recommending the two-step

approach was critiqued by Fornell and Yi (1992) which in turn was followed by a reply from Anderson and Gerbing (1992) and a rejoinder by Fornell and Yi (1992). Hayduk and Glaser (2000) stirred the embers of this debate by reviewing these exchanges and recommending against routine use of the two-step approach on the basis that it reduces theoretical precision. On the basis of this argument, we decided to use the single-step procedure.

The covariance matrix is shown in table II. The overall fit statistics for the model are $\chi^2=786.77$, $df = 516$, $\chi^2/df=1.52$, $p < 0.001$, $GFI=0.92$, $AGFI = 0.81$, $CFI = 0.90$, $NNFI = 0.92$ and $RMSEA=0.05$. While a p value of 0.001 does not indicate good fit, this measure is particularly sensitive to sample size and assumptions of normality (Hu and Bentler 1995). As a consequence, in large samples “almost any model with positive degrees of freedom is likely to be rejected as providing a statistically unacceptable fit” (Long 1983, p. 75). Indeed the p value is rarely used in empirical studies in either the management literature in general or more specifically in the operations/supply chain literature (see Narasimhan and Das 2001; Das *et al.* 2002; Frohlich 2002; Lai 2003). However, when one considers measures of fit, the threshold levels for the $GFI (\geq 0.90)$ and $AGFI (\geq 0.80)$, $CFI (\geq 0.80)$, $NNFI (\geq 0.90)$ and $RMSEA (\leq 0.05)$ are all met, indicating reasonable fit. Likewise, our χ^2/df ratio also indicates good fit, as it is less than the threshold level of 2.0. Overall, then our analysis demonstrates an acceptable level of fit. In addition, it is important to note that goodness-of-fit indices should not be considered in isolation; additionally close attention needs to be paid to the predictiveness of the model and the structural path loadings (Chin 1998).

Take in Table II

The factor loadings (λ), standard errors and t-Values are shown in Table III. All but two of the items (i.e. BM2 and EP4) have high ($\lambda > 0.60$) and significant ($t > 1.96$) loadings (Chin 1998). However we retain BM2 and EP4 given that their factor loadings (0.56 and 0.54) are reasonably high and also significant ($p < 0.01$). In addition, the reliability of each scale was satisfactory with Cronbach α values of at least 0.70 achieved in all cases (Nunnally 1978). Composite reliability was calculated using the Werts, Linn, and Jöreskog (WLJ) reliability coefficient; all coefficients were greater than 0.75 and thus satisfactory (Werts *et al.* 1974). Discriminant validity was addressed by calculating the average variance extracted (AVE): in all cases the AVE was a greater than the threshold level of 0.50 (Fornell and Larcker 1981). Table IV shows the path estimates are both high ($\gamma > 0.20$) and significant ($t > 1.96$) (Chin 1998).

Take in Table III

Take in Table IV

Moderator Effects

Hypotheses 3 addresses the moderating influence of IT sophistication on the relationship between service practices and service performance. Multigroup analysis within Amos 4.0 was used to assess the moderating variable effects on the structural model (Byrne 2001). The test is conducted in a two-step approach. First, the appropriate structural parameters are constrained to be equal across groups, thereby generating an estimated covariance matrix for each group and an overall χ^2 value for the sets of submodels as part of a single structural system. Next, the parameter equality constraints are removed, resulting in a second χ^2 value with fewer degrees of freedom. The moderator effects are tested by assessing whether statistical differences exist between the two χ^2 values. If the change in the χ^2 value, typically a decrease, is statistically significant, the null hypothesis of parameter invariance is rejected and a moderator effect is indicated (Brockman and Morgan 2003). The results of this analysis are shown in Table V. As the difference in χ^2 values exceeds the 0.05 critical value ($3.96 > 3.84$), H3 is supported: the level of IT sophistication moderated the service practices-service performance relationship. We reflect on this finding in the following section.

Take in Table V

Discussion of Findings

This study adds to the emerging literature of the relationship between services management and information technology. In doing so it extends the basic service

practice-service performance relationship by incorporating the interaction effects of IT sophistication in a contingency framework. Previous studies found mixed support for the direct effects of IT sophistication on service performance. Accordingly, we investigated the enabling or indirect effect of IT sophistication. Our analysis supports our overall hypothesis of this interaction and highlights the practical implications for managers in service organisations.

In line with previous research (Voss 1995), we found there is positive relationship between service practices and service performance (H1). The basic proposition that improvements in service practices lead to better service performance is supported. The implications for management are that firms dependent upon information need to adopt processes and assimilate information so as to create a sustainable competitive advantage. For example, the adoption of one-to-one customer relationship management (CRM) models has brought mass customisation to the services sector. This is typically achieved through expanded functionality in existing IT or development of new technology.

In addition, we found support for the hypothesis that improved service performance leads to improved business performance (H2). Previous studies have indicated only mixed support for this relationship and argued that overall business performance is a complex phenomenon that requires a consideration of factors such as industry size/structure, technological uncertainty and market dynamism (Dess and Robinson 1984). In contrast, our findings are more consistent with studies such as the profit impact of market strategy

(PIMS) studies which provide support for the relationship between product/service quality and firm performance (Buzzel and Weirsema, 1981).

Finally, we found support for the hypothesis that IT sophistication moderates the services practice-service performance relationship (H3). However this finding should be considered in the context of how the service is provided and how service organisations classify or position themselves. Service organisations can be classified in their service provision in terms of people / equipment focus, level of customer contact time, the degree of customisation and degree of employee discretion (Silvestro et al 1992). The implications of the above for managers are that they will have to carefully weigh up their service context before embracing an IT strategy to improve their performance. For example, for mass service organizations which are characterised by low levels of contact time, customisation and employee discretion and where large numbers are processed by a typical service unit per day, high levels of IT sophistication play an important role in the delivery of service performance. Companies like Ryanair and Amazon are typical exemplars of how high levels of IT sophistication can impact on their service performance. IT sophistication enables these companies to out-perform their competitors. Indeed, this mirrors the case of traditional manufacturing companies such as Dell and Zara who have embraced IT sophistication to create technological turbulence in their industry and utilise service delivery as a competitive weapon in their quest for market dominance. Service companies can take notice of these strategies and integrate them into their business model.

On the other hand, for professional services organizations characterised by high levels of contact time, customisation, employee discretion and where a small number of these services are processed by a typical service unit per day, the impact of IT sophistication is less important. For example, while many service processes are information intensive, this does not automatically mean that they require sophisticated IT systems. The service delivered by psychotherapy is information-intensive, but does not necessarily require IT support. Most services have a mix of service processes which can be easily supported (or even substituted) by IT or which require face-to-face communication without any IT support.

Reflections, Limitations and Future Research

In the context of our findings, we now reflect on how IT sophistication is closely associated with listening capability. Glynn et al. (2003) provide evidence to support the close association between IT sophistication and an organization's listening capability. As outlined by Scarnati (1998), listening to customers and translating what is heard into an action plan is a mark of a successful organisation. Customer service employees in a sophisticated IT environment will typically have easy access to both organizational and customer data when this information is scanned into a central database and made available to all customer service employees. An appropriate usage of IT should give all employees the information required to assist them in dealing with customer requests immediately without having to follow up with other departments of the organization. Service managers will have to motivate employees to embrace this new role and the

accompanying responsibility. Therefore, IT will have the effect of widening all roles to become more market oriented and thus acts as an enabler or supporting tool in achieving competitive advantage.

Furthermore, information intensive work activities in terms of service practices require well developed IT systems so as to enable improved service performance. Because most service products are information-rich they lend themselves well to the extraction of the information components of the service, which can then be communicated by technology. In this regard, we argue that the complex web of network relationships, is inherent in the services sector, are intensely information dependent and are consequently IT reliant. The relationship between the parties in the services sector results in a high degree of interdependences, thereby creating a complex web of reciprocal relationships that resembles more a network than the traditional linear supply chain of manufacturing firms. As a result of this high degree of interdependency in service organisations, managers can enhance their service performance by embracing IT sophistication to capture the complexities and dynamics of the everyday interactions of service encounters.

We acknowledge the limitations of our study. More specifically, we recognise that relying on a single informant can limit the scope of response to the survey instrument and lead to common method bias. However, to counteract this we reduced this potential source of bias by identifying the most appropriate key informant by making telephone contact with each respondent company. Nonetheless a research design incorporating multiple informants could add further insights to our findings.

Finally, this study also points to areas of potential future research. As is often the case, longitudinal research could provide valuable contributions to theory development and refinement in the fields of services management. There is a considerable body of knowledge in the service management literature which suggests that best practices evolve over a considerable period of time within companies and that different challenges are faced at different points in time (Roth 1993). Research from the customer's perspective would complement and add to the findings of this study. Future research could examine issues such as customer perceptions of service performance. The impact of other contingency variables on the service practice-service performance relationship such as competitive intensity, technological turbulence and process complexity should also be considered. Identifying the circumstances or variables that have an intervening effect on the service practice-service performance relationship could provide both the academic and practitioner communities with potentially compelling insights into the nuances of the practice-performance relationship in services management.

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Appendix A

Service Practices: Glynn *et al.* (2003).

Employee Practices

- EP1 Employees are rewarded for service quality improvements
- EP2 Non-financial incentives are used to reward service quality improvement
- EP3 This establishment pays a group incentive for service quality improvement
- EP4 Supervisors are rewarded for service quality improvement

Benchmarking

- BM1 This establishment sets internal benchmarking standards for assessment
- BM2 This establishment has an active competitive benchmarking programme
- BM3 This establishment researches best practices in other organizations
- BM4 This establishment has a clear understanding of how we compare with our competitors in terms of service quality

Supplier Management

- SP1 We like to build a long-term relationship with our suppliers
- SP2 This establishment relies on a small number of high quality suppliers
- SP3 Quality is the number one criterion in selecting suppliers

Customer Practices

- CP1 Our customers give us feedback on service quality performance

- CP2 We are frequently in close contact with our customers
- CP3 We actively solicit information on service quality from our customers

IT Sophistication Pre-test interviews

- IT1 Our IT systems are state-of-the-art
- IT2 Our IT equipment is state-of-the-art
- IT3 We have strong IT employee expertise

Service and Business Performance: Glynn *et al.* (2003). and Maani et al(1990)

Service Comprehensiveness

- SC1 Flexibility in dealing with customer requests
- SC2 Service availability (hours)
- SC3 Speed of new service introductions
- SC4 Service customisation

Service Efficiency

- SE1 Unit cost of service provision
- SE2 Service reliability
- SE3 Employee retention

Customer Responsiveness

- CR1 Customer support and service level
- CR2 Customer retention rates

- CR3 Customer complaint resolution levels
- CR4 Level of individual customer attention

Business Performance

- BP1 Growth in return on investment
- BP2 Growth in sales
- BP3 Growth in earnings before tax
- BP4 Growth in market share

(Anchored by a five point scale: 1 = much better than the industry average through to 5 = much worse than the industry average)

Table I: Population and Sample Profiles

Characteristic	Population (%)	Sample (%)	Chi-square
<i>No. of Employees</i>			
20 but less than 50	56	52	
50 but less than 100	19	18	
100 but less than 200	13	13	
200 but less than 500	4	12	
500 or more	7	23	NS
<i>Service Sector</i>			
Distribution	50	40	
Financial Services	17	25	
Retail	24	22	
Transport and Logistics	9	13	NS

Table II: Covariance Matrix

	EP1	EP2	EP3	EP4	BM1	BM2	BM3	BM4	SP1	SP2	SP3	CP1	CP2
EP1	0.58												
EP2	0.36	0.54											
EP3	0.26	0.24	0.5										
EP4	0.17	0.13	0.26	0.4									
BM1	0.21	0.18	0.24	0.24	0.47								
BM2	0.15	0.14	0.17	0.17	0.18	0.43							
BM3	0.2	0.22	0.19	0.15	0.19	0.21	0.45						
BM4	0.14	0.19	0.17	0.1	0.1	0.13	0.2	0.55					
SP1	0.23	0.27	0.17	0.16	0.13	0.09	0.19	0.2	0.62				
SP2	0.17	0.2	0.15	0.13	0.13	0.02	0.13	0.21	0.33	0.55			
SP3	0.19	0.22	0.15	0.11	0.12	0.07	0.13	0.21	0.32	0.34	0.59		
CP1	0.04	0.09	0.06	0.07	0.11	0.07	0.09	0.11	0.1	0.1	0.06	0.49	
CP2	0.02	0.05	0.09	0.08	0.07	0.09	0.03	0	0.03	-0.01	0	0.27	0.63

Table III: Confirmatory factor analysis and reliabilities

Construct	Standardised Loading λ	Standard error	t-Value	α WLJ AVE	Construct	Standardised Loading λ	Standard error	t-Value	α WLJ AVE
Service Practices									
Employee Practices				0.81	Benchmarking				0.82
EP1 *	0.89			0.82	BM1 *	0.75			0.84
EP2	0.80	0.06	12.24	0.66	BM2	0.56	0.08	8.18	0.66
EP3	0.66	0.07	9.34		BM3	0.81	0.10	11.69	
EP4	0.54	0.07	8.12		BM4	0.71	0.08	10.65	
Supplier Management				0.74	Customer Management				0.78
SP1 *	0.61			0.76	CP1 *	0.62			0.78
SP2	0.82	0.10	8.55	0.61	CP2	0.84	0.25	6.11	0.64
SP3	0.63	0.11	8.12		CP3	0.61	0.74	5.49	

Table III continued

Construct	Standardised Loading λ	Standard error	t-Value	α WLJ AVE	Construct	Standardised Loading λ	Standard error	t-Value	α WLJ AVE
					Service and Business Performance				
Service Comprehensiveness				0.86	Service Efficiency				0.71
SC1*	0.68			0.88	SE1*	0.66			0.75
SC2	0.73	0.13	9.34	0.71	SE2	0.67	0.12	5.44	0.61
SC3	0.84	0.12	10.35		SE3	0.61	0.11	5.43	
SC4	0.75	0.13	10.12						
Customer Responsiveness				0.82	Business Performance				0.84
CR1*	0.66			0.82	BP1*	0.74			0.86
CR2	0.72	0.13	8.88	0.69	BP2	0.72	0.04	10.76	0.71
CR3	0.75	0.13	8.95		BP3	0.85	0.08	12.201	
CR4	0.66	0.12	7.81		BP4	0.65	0.06	9.34	

*The corresponding parameter is set to 1 (unstandardised) to fix the scale of measurement

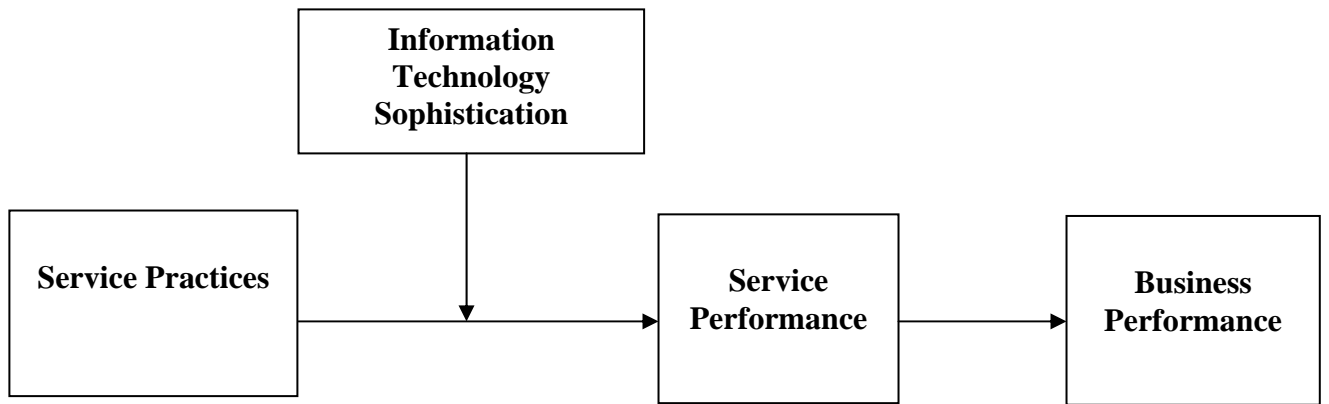
Table IV: Structural Model (Unmoderated) Coefficients

	Path	Standardized Path Estimate γ	Standard error	t-Value	Result
H1	Service Practices → Service Performance	0.58	0.07	9.52	Supported
H2	Service Performance → Business Performance	0.42	0.09	4.21	Supported

Table V: χ^2 difference test for moderator effects of IT sophistication

Hypothesis	Hypothesised Moderated Path	Equality Constraint Model	Free Model	χ^2 Difference	χ^2 at $\alpha = 0.05$
H3	Service Practices → Service Performance	$\chi^2 = 13.27$ (d.f. = 8)	$\chi^2 = 9.11$ (d.f. = 7)	$\chi^2 = 4.16$ (d.f. = 1)	3.84

Figure 1: Conceptual Framework



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