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Structural equation model for analysing critical risks associated with facilities management outsourcing and its impact on firm performance

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Abstract

Purpose – This study aimed to develop and empirically test a structural equation model for investigating risk factors associated with outsourcing of facilities management (FM) services and its impact on firm performance.

Design/methodology/approach – Using data derived from an earlier study, a conceptual model was hypothesized and empirically tested to clarify causal relationships between risk variables and how they influence firm performance.

Findings – Supported by empirical evidence, the study established that only vendor risk variables have marginal impact on firm performance. There were however significant positive relationship between vendor risks factors *and* relationship risk factors, client based factors *and* relationship risk factors, client based risks *and* vendor related risks, and contract risks factors *and* relationship risk.

Practical implications – The final structural equation model has revealed key risk components that would require standard mitigation measures in order to achieve outsourcing success in the FM sector. It is a sector that is thriving in Nigeria and requires every effort to make it an international recognised market.

Originality/value – This paper provides a greater understanding of the interactions between key elements of outsourcing risks associated with facilities management provision as well as the degree of relationship between them.

Keywords Outsourcing, Structural equation modeling, Risks, Facilities, Nigeria

Paper type Research paper

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1.0 Introduction

Facilities management (FM) has over the years grown to become one of the most emerging disciplines in the globe, gradually gaining a foothold as a force to be reckoned with within the property and construction industry (Ventuvuori *et al.* 2007). Since its establishment in the 1980s, it had consistently aimed to provide high quality, cost-effective and integrated approach to management of building/infrastructure (product) and services of an organization in order to create an environment that supports the primary objectives of that organization (IFMA, 2007; Pitt and Price, 2011).

FM practice in Nigeria has seen a steady growth in recent years with a wide range of applications spreading from US and developed countries in Europe into the country (Opaluwa, 2005; Adewunmi *et al.* 2008). It has grown from what was traditionally described as mere facilities maintenance and management of mainly janitorial services for private organisations and few public agencies in Nigeria (Aloafin, 2003), to a more strategic role in top echelon of management in both public and private organisations. This has been encouraged partly by globalization (Adewunmi *et al.* 2009) and the rising profile of Nigeria as one of the major producers of crude oil in the world (VETIVA, 2010). The world's major multinationals, in response are now seeking for an integrated business resource, infrastructure and management of their facilities (Adewunmi *et al.* 2009). Today government agencies, corporations and non-governmental organisations in Nigeria have realised that the use of organisational structures and bureaucracies to manage functions is not only unhelpful, but economically untenable.

During the last few decades, a major trend in the business world has been to concentrate on core competencies and outsource non-core supportive functions (Ventuvuori & Lehtonen, 2006). This has been largely triggered by a strong conviction that favours a trend towards privatisation, involving the introduction of market mechanisms that support global competition, emergence of more demanding and well informed clients and customers as well as advances in technology. Ventuvuori & Lehtonen (2006) report that organisations, in order to key into this transformation are planning and reorganising their purchases in FM services provision by among others, changing the job description of in-house FM staff from routine purchasing tasks to more strategic tasks that support the overall goals of the company, shifting from using a sole supplier to using a number of

specialists partners (Usher, 2004), while service providers have begun to redevelop the various range of services they have on offer in order to attract contracts from prospective clients.

FM outsourcing is a sourcing strategy that has the potential to improve organisational efficiency and effective management of FM resources. However the seemingly rise in the use of outsourcing as a procurement option for FM services provision coupled with the complexities involved means that it is risk prone. Several studies on the risk factors associated with outsourcing of functions have largely been reported (Adeleye *et al.* 2004; Hoecht & Trott, 2006; Redding, 2007; Dhar & Balakrishnan, 2007 Dorasamy *et al.* 2010)). The studies were unanimous in establishing the existence of risks in outsourcing relationships. A recent study by Ikediashi *et al.* (2012) established some of the critical risks associated with FM outsourcing in Nigeria using mean index and standard deviation, and further developed the most representative of the risk factors using principal component analysis after grouping them into categories. The study confirmed some of existing propositions. However these studies failed to examine how these risks relate to each other as well as performance of an organisation. This is because, with the on-going outsourcing boom in FM, such chronic uncertainties that have the potential of marring the outcome of outsourcing relationships must be addressed by highlighting how key risk issues influence each other and firm performance so that appropriate industry standards can be developed for achieving success across the FM sector.

Based on structural equation modeling (SEM) methodology, this research extends the knowledge contributed in the previous study by providing a further insight into the inter-relationships existing between the hypothesized latent variables (risk components) and their underlying attributes on firm performance. SEM is a multivariate statistical technique that allows assessment of both direct and indirect relationships among latent variables (Maruyama, 1998). Although SEM is widely applied across many disciplines, its application in construction management research including FM is hardly noticeable. The study also contributes to the methodological construct by describing the application of SEM for analysing complex interactions of the latent factors within the FM industry domain.

Given the background above, the primary objectives of this research are to use data from Nigeria's FM industry: (1) develop a structural equation model to analyse the interdependent relationships among the latent variables (risk components) and (2) model the relationship between the independent latent variables and the dependent variable (firm performance operationalized in three constructs of time performance, financial performance, and strategic performance).

2.0 Literature Review

Risks and its impact on performance as it relate to construction projects generally have received a sizeable amount of attention by scholars and practitioners alike. Outsourcing risk however, is the likelihood of occurrence of uncertain, unpredictable and undesirable outcomes that can impact on the success or failure of an outsourcing relationship between a principal and its vendors. An extensive body of literature on the subject of outsourcing risks exists and is summarized below with the intention of putting the study in a proper perspective.

Atkin & Brooks (2009) developed 19 key risk variables associated with outsourcing of FM services to include among others; inexperienced client function; inadequate planning of the implementation ; misapplication of transfer of undertakings; poor relationship between contractor and contract manager; conflicts of interest when dealing with in-house tenders; unclear or imprecise roles, responsibilities; possible loss of control over the FM function ; lack of standard forms of FM contracts; inappropriate allocation of risks and rewards ; inadequate definition of the scope and content of services; financial failure of chosen service provider during contract period; Lack of education and training in facilities management; fraud or irregularities in the award and management of contract; absence or poor system for providing incentives for performance; absence of share ownership of outcomes; poor cash-flow position; vendor underperformance. Additionally, Redding (2007) in his work on “managing risks in FM outsourcing” posits that risk factors common to outsourcing facilities management service include; excessively high vendor labour rates, call-out charges for labour, minimal vendor accountability for asset performance, improper invoicing and billing practices, high management overhead, unfavourable contract terms, critical service or asset failures, service provider underperformance, financial underperformance, cultural rejection, loss of knowledge and labour risks. Whitmore (2006) also developed a set of risk factors and grouped them under vendor risks, third party risks and esoteric risks. He classified political risks, war, forced divesture, selective discrimination, government acts and confiscation under the esoteric risk, while injuries to employers that occur in vendor’s premises and child labour practices were classified as third party liability risks. While the inherent risk factors associated with outsourcing have been widely discussed above, the findings were largely identified through a literature review and based on anecdotal evidence. In other words, it was devoid of robust statistical vigour inherent in empirical research.

However in a recent study by Ikediashi *et al.* (2012), these factors were analysed and grouped into five major categories namely client risks, vendor risks, outsourcing contract risks, relationship risks and general risks while principal component analysis was conducted to determine the factors that

have significant loadings for each grouping. Inexperienced client, interruption to supply of services, and unclear responsibilities and targets were found to be significantly loaded on clients risks; financial failure of chosen vendor, poor quality of services, and vendor underperformance were significantly loaded on vendor risks; absence of benchmark for quality, inadequate definition of scope of services, lack of standard forms of contract for FM, inadequate planning of policies implementation, and loss of strategic flexibility were significantly loaded on outsourcing contract risks; relationship risks had poor relationship between vendor and clients, and conflict of interest as significant factors; while security requirement issues and fear of uncertainty were significantly loaded under general risk category. However the study stopped short of investigating the hidden inter-relationships existing within the risk variables.

With regards to firm performance, Na *et al.* (2009) examined the impacts of specific outsourcing risk management strategies and residual performance risk on objective performance measures such as cost and schedule overrun using data collected from software development projects in Korea. Their findings indicate that performance risks are positively associated with cost and schedule overrun performance. In another study on the influence of risks on intension to outsource, Gewald *et al.* (2006) used SEM to measure the relationship between perceived risks of business process outsourcing (BPO) (operationalized as financial risk, performance risk, strategic risk and psychosocial risk), and the intension to outsource by bank managers in Germany. The result shows a significant relationship between perceived risk and the decision to outsource. In another study to establish a relationship between risk and project performance in Indonesian building industry, Wiguna & Scott (2006) used path models to reveal causal effects between project risk index and project performance in terms of schedule. Findings indicate that there was no correlation between perceived riskiness of project and project duration, while project risk index influenced schedule performance indirectly, with progress performance as the mediator. Jin *et al.* (2007) used structural equation model to investigate the inter-relationships between relational risks, relationship-building tools and project performance considered in terms of hard and soft performance in China. The study concluded that relational risks exert a negative influence on project performance. While perceptive judgement based on relative impacts of general attributes of risks on performance is clearly reported in these studies, objective assessment of the collective impact of outsourcing risks on firm performance in FM services has not been found in the literature. Besides, most of these studies failed to examine how risks work together to impact time, financial and strategic performance of organisations.

In all the selected literature review above, it is apparent that in most studies, priority was given to identifying critical risk factors based on perception of different stakeholders in outsourcing, while

most have been pedagogic in nature relying on anecdotal evidence. However, quantification of the dependencies of one variable on another and their relative impact on firm performance has not been found in many studies, while research is yet to be conducted in identifying the relationship between the relative importance of risk factors in groups and developing a model for explaining their quantitative impacts on firm performance in FM services provision.

3.0 Theoretical framework

The above review provided the theoretical basis for developing a research framework for this study. It is assumed that client based factors (CBF) include inexperienced client function (ICF), interruption to supply of services (ISS), and unclear responsibilities and targets (URT). Vendor related factors (VRF) are financial failure of vendor (FFV), poor quality of services (PQS), vendor underperformance (VUP), and critical service failure (CSF). Contract related factors (CRF) include absence of benchmark for quality (ABQ), inadequate definition of scope of services (IDS), lack of standard form of contract for FM (LSC), inadequate planning of policies implementation (IPP), and loss of strategic flexibility (LSF). Relationship related factors (RRF) are poor relationship between vendor and client (PVC), and conflict of interest (COI). General related factors (GRF) include security requirement issues (SRI) and fear of uncertainty (FOU).

The dependent variable “firm performance” (FP) is operationalized as three-dimensional constructs of financial performance (FiP), strategic performance (SP) and time performance (TP). In order to explore the direct and indirect relationships within the risk variables, the research sets out the following hypotheses to examine causal relationships in the structural model:

Hypothesis 1: Severity of impact of client based factors (CBF) impacts on firm performance (FP)

Hypothesis 2: Severity of impact of vendor related factors (VRF) impacts on firm performance (FP)

Hypothesis 3: Severity of impact of contract related factors (CRF) impacts on firm performance (FP)

Hypothesis 4: Severity of impact of relationship related factors (RRF) impacts on firm performance (FP)

Hypothesis 5: Severity of impact of client based factors (CBF) triggers vendor related factors (VRF)

Hypothesis 6: Severity of impact of client based factors (CBF) triggers contract related factors (CRF)

Hypothesis 7: Severity of impact of client based factors (CBF) triggers relationship related factors (RRF)

Hypothesis 8: Severity of impact of vendor related factors (VRF) triggers contract related factors (CRF)

Hypothesis 9: Severity of impact of vendor related factors (VRF) triggers relationship related factors (RRF)

Hypothesis 10: Severity of impact of contract related factors (CRF) triggers relationship related factors (RRF)

A conceptual diagram of the structural model is presented in figure 1. The arrows represent the direction of hypothesized influences in the structural model.

[Insert figure 1 here]

4.0 An overview on application of structural equation modeling

Structural equation modeling (SEM), a tool largely devoted to the fields of sociology and psychology (Yang & Ou, 2008; Dollo *et al.* 2012) was developed by Joereskog & Goldberger (1975) and Joereskog (1981). It is a multivariate tool designed to investigate interrelationships between two types of variables; observed and latent variables while taking into account measurement errors that might accompany the variables (Blunch, 2008). Observed variables, otherwise called indicators or manifest variables are those that possess data that can be directly measured using numerical responses to a rating scale item on a questionnaire while latent variables are those that cannot be directly measured (Blunch, 2008; Hui & Zheng, 2010; Bagozzi & Yi, 2012). It is a perfect technique for analysing causal relationships among endogenous variables (referred to as the structural model in SEM), and between endogenous and exogenous variables (referred to as the measurement model in SEM). Theoretically, SEM is made up of two models namely: measurement model and structural model. Measurement models assesses how well the variables measure the latent factors addressing their reliability and validity, while structural model models the relationships between the latent variables by describing the amount of explained and

unexplained variance, which predicates system of simultaneous regression models (Wong & Cheung, 2005; Chinda & Mohamed, 2008).

SEM methodology is yet to gain an established foothold in property and construction management research despite its acclaimed advantages over other contemporary techniques. Molenaar *et al.* (2000), Wong & Cheung (2005), Yang & Ou (2008), Hui & Zheng, 2010, Doloi *et al.* (2012) have all demonstrated SEM as a viable tool for quantifying relationships for resolving complex cases within the property and construction management domain. This study extends that knowledge contributed in previous studies on application of SEM.

5.0 Methodology

To achieve the stated objectives, a conceptual model was hypothesized and empirically tested using 50 risk attributes drawn from the literature were subjected to the views of respondents using a questionnaire survey. It was designed to elicit responses from respondents about the likely risk factors associated with FM outsourcing and to evaluate the impacts of the perceived risks on their firm's performance. 32 critical risk factors were extracted from the original 50 and were further grouped into 5 categories while principal component analysis was performed to identify 15 risk factors that are most representative of risk items in the 5 risk categories. Table 1 shows the 5 risk categories (latent variables), the 15 risk indicators, the dependent variables and the scales used to measure them.

[Insert table 1 here]

A list of 146 registered members of international facilities management association, Nigeria chapter who conduct their professional practice in Lagos, Nigeria was used as sample for the study. Targeted respondents were selected based on the assumption they hold senior appointments (facilities managers, property managers, maintenance managers and procurement officers) in their respective organisations. These professionals fall under two broad categories namely; client and vendor organisations. A total of 61 usable responses were returned giving a response rate of 41.8%. The demographic profile of respondents show that 19 are facilities managers, 17 are property managers, 13 are maintenance managers, while 12 are procurement officers. The result also indicated that 2 had 0-5 years experience, 30 had 5-10 years experience, 21 had 10-20 years experience while only 8 had over 20 years experience.

Two statistical analyses were performed to empirically test the hypothesized model; exploratory factor analysis (EFA) and structural equation modeling (SEM). An exploratory factor analysis was conducted to confirm or otherwise restructure the proposed factor structure of the outsourcing risk

model developed from an earlier study. Principal axis factoring, with varimax rotation was used to measure the dimensionality of the risk attributes and also for better interpretability of factor loadings (Chinda & Mohamed, 2008). Covariance-based SEM methodology with the help of AMOS 18 software package was used to perform the SEM based on the assertion of Doloï *et al.* (2012) and Oke *et al.* (2012) that they are most suited for construction management research. Although covariance-based SEM requires a relatively large sample size usually in the order of 10 to 20 times the model parameters, several studies have violated the assertion. For instance, Islam & Faniran (2005) used 61 valid datasets to quantify the influence of project planning effectiveness in the Australian construction industry, Eriksson & Pesamaa (2007) used 87 responses to successfully identify key issues of procurement effects on cooperative arrangements with construction organisations, Vinodh & Joy (2012) applied SEM based on 60 responses to investigate factors affecting lean manufacturing practices across different industries in India, while Doloï *et al.* 2012 recently used 77 valid responses to investigate factors affecting delay of construction projects in India. These studies highlight a clear lack of unanimity on any acceptable numbers of parameters or sample size. However, despite the relatively small size of sample (61), the quality of response is deemed reliable for SEM analysis in this research due to the calibre of respondents in terms of years of experience with outsourcing of FM services, relevant professional background as well as clear understanding of constructs in the questionnaire. It is therefore considered appropriate.

6.0 Results and analysis

6.1 Exploratory factor analysis

An exploratory factor analysis using principal axis factoring was performed on the 15 risk constructs derived from an earlier study to confirm its current structure or rearrange them for suitable structural equation modeling procedure. Hair *et al.* 1998 was of the view that factor loadings of less than 0.45 should be screened out because they are likely to be weak indicators capable of interfering with results of analysis. Therefore, three factors namely; inadequate planning of policies implementation (IPP), fear of uncertainty (FOU) and loss of strategic flexibility (LSF) failed to meet the cut-off factor loading and were subsequently dropped from the data file. A total of 4 latent variables represented by 12 items were extracted as indicated in table 2. The items with (*) failed to meet the 0.45 threshold while item “security requirement issues” tagged ** in table 2 was re-allocated to client based factors (CBF) based on the outcome of EFA. Consequently, “General risk factors” was deleted from the hypothesized model. Both eigenvalue > 1 (Kaiser, 1960) and %

of total variance > 5% (King, 1969) (see table 3) confirmed validity of the exploratory factor analysis procedure.

[Insert table 2 and table 3 here]

6.2 Structural equation modeling

Structural equation modeling (SEM) was used in this study to analyse the inter-relationships between 5 constructs (4 independent variables and 1 dependent variable) of the hypothesized model. The use of SEM was justified because of its ability to model latent variables, correct and specify measurement errors and their covariance structure, and avoid multi-collinearity that would have resulted if other statistical techniques such as multiple regression was used (Chinda & Mohamed, 2008; Henseler, 2011).

Theoretically, SEM comprises of two models, a measurement model and a structural model. According to Doloi *et al.* (2012), the measurement model is concerned with how well various exogenous variables measure latent variables. In other words, the measurement model within the structural equation incorporates estimates of measurement errors of the exogenous variables and their intended latent variable (Green, 1990). The structural model on the hand models the inter-relationships between underlying variables and allows for direct, indirect, and correlation effects to be analysed unlike regression models which allows for only direct relationships. The researcher uses the structural model to make inferences about relationships between latent attributes and the mechanism underlying them. The next two sub-sections demonstrate how it was conducted.

6.2.1 Measurement model

Confirmatory factor analysis (CFA) was used to establish confidence and strength in the measurement model. According to Chinda & Mohamed (2008), CFA allows for assessment of fit between observed and a *priori* conceptualized, theoretically grounded model that specifies the causal relationships between the latent factors and their observed variables. For the purpose of testing the strength of the measurement model, CFA was established using recommended levels of goodness of fit (GOF) measures, reliability analysis, and convergent validity.

A feasible model is the one that satisfies recommended GOF measures before it is finally selected for SEM analysis (Molenaar *et al.* 2000). Based on two trials and elimination of two observable variables, the model refinement was achieved to improve its fit to the recommended level (see table 4). The two eliminated variables are “unclear responsibilities and targets” (URT) and “vendor underperformance” (VUP). They were deleted after the first trial because of low correlations

(loadings) with their latent factors in the SEM. A summary of GOF attributes for both the initial and final model is shown in table 4 and indicates that the best-fit measurement model is supported satisfactorily.

[Insert table 4 here]

Reliability analysis was used to determine how the standardized loadings of the measurement paths correlate with their respective latent variables. A threshold of 0.7 is regarded as an acceptable level, which means that since the loading are correlations, a loading of 0.7 implies that 50% of variance in measured construct is attributable to the latent variable (Field, 2005; Doloi *et al.* 2012). The standardized solution of the final model is shown in figure 2. All path loadings of the measured variables are above 0.7 except “inadequate definition of scope (IDS) with 0.68. They are therefore satisfactory.

[Insert table 5 here]

Convergent validity measures the internal consistency of measured variables. For Cronbach’s alpha (α), a cut-off value of 0.7 is used to indicate an acceptable level of internal consistency (Nunnally, 1978; Jin *et al.* 2007). As indicated in table 5, all the attributes in the final model exhibited values above the cut-off threshold and therefore deemed reliable.

6.2.2 Structural model

Having established confidence in the measurement model, a final structural equation model with standardized coefficients on the structure paths is shown in figure 2. The direction of the arrows denotes the direction of the assumed relationships between variables. The significance of the path coefficients corresponding to the 10 hypotheses was tested using t-values (one-tailed) at 5% significant level. Therefore a hypothesis is rejected for p-value < 0.05 and accepted for p-value > 0.05 (Field, 2005).

[Insert table 6 and figure 2]

As depicted in figure 2 and table 6, six out of the ten hypotheses are accepted at 5% significant level. They are *vendor risk factors (VRF) to firm performance (FP)* with a path coefficient of 0.54 and p-value of 0.061; *client based factors (CBF) to vendor risk factors (VRF)* with a path coefficient of 0.81 and p-value of 0.18; *client based factors (CBF) to relationship risk factors (RRF)* with a path coefficient of 0.79 and p-value of 0.074; *vendor risk factors (VRF) to contract risk factors (CRF)* with a path coefficient of 0.54 and p-value of 0.056; *vendor risk factors (VRF) to relationship risk factors (RRF)* with a path coefficient of 0.88 and p-value of 0.210; and *contract*

risk factors (CRF) to *relationship risk factors* (RRF) with a path coefficient of 0.75 and p-value of 0.082. Four other hypotheses are not supported at the acceptable level of $p > 0.05$. *Client based factors* (CBF) to *firm performance* (FP) with a path coefficient of 0.28 and p-value of 0.025 is not supported, while *relationship risk factors* (RRF) to *firm performance* (FP) is not supported by the analysis as its path coefficient was 0.18 while its p-value of 0.011 was below 0.05. Additionally, *client based factors* (CBF) to *contract risk factors* (CRF) (path coefficient of 0.13 and p-value = 0.002) failed to meet the 0.05 threshold. However, the path from *contract risk factors* (CRF) to *firm performance* (FP) with a path coefficient of 0.31 was found to be marginally significant at a p-value of 0.049.

7.0 Discussion

This study examined the interactions between key components of risks associated with outsourcing of facilities management services and how they influence firm performance. The test results provide support for the proposed linkages among the model's variables as well as valuable insights through which outsourcing risks influence firm performance. For instance, it confirmed the existence of a very strong relationship between vendor risks factors and relationship risk factors. An obvious implication is that the severity of risks attributed to such outcomes as financial failure of chosen provider, and poor quality of services will have a profound effect on the relationship between the client and vendor which can give rise to undesirable consequences in the outsourcing relationship. Also, client based risks was found to have a significant relationship with vendor related risks, implying that risks associated with overbearing influence of the client could have effect on vendors opportunistic behaviour. It is probably because any noticeable lapse on the side of the client through acts like inexperience, interruption to supply chain of FM services provision, and security issues could give vendors opportunity to default in the outsourcing contract which could trigger undesirable outcomes. Furthermore, a strong positive path coefficient between client based factors and relationship risk factors ($\beta = 0.79$) suggests that it is not possible to have a harmonious relationship in an outsourcing contract if the likely risks associated with clients are not properly addressed. This is further corroborated by another proposition supported by the findings. Contract risks factors had a strong positive influence on relationship risk factors with a path standardized loading of $\beta = 0.75$. This indicates that respondents have plausible concerns about issues related to contractual obligations within an outsourcing contract. It must be free of any ambiguity to avoid any backlash that might affect the course of the contract which could in turn actuate risks associated with outsourcing relationship in the execution of FM services provision.

Two other hypotheses were moderately supported by the result. They are vendor risk factors *versus* firm performance ($\beta = 0.68$) and vendor risk factors *versus* contract risk factors ($\beta = 0.54$). It is instructive to particularly observe that only vendor risk factors out of four risk components showed a significant impact on firm performance. This is however in line with the works of Na *et al.* (2009) and Gewald *et al.* (2006). The findings could be attributed to the fact that respondents who are mainly FM practitioners in the city of Lagos, Nigeria perceive risks associated with vendors as the most critical concern to affect the overall performance of an organisation within Nigeria's FM market. The practice of FM is relatively new in Nigeria making it more difficult to understand the full implication of outsourcing risks on outcome of firm performance. However, the result indicates that outsourcing risks, other than vendor risks have no direct significant impact on firm performance. Additionally, the correlation between relationship risks and firm performance showed a minimal significance as only 18% ($\beta = 0.18$) of variance in firm performance can be explained by relationship risk factors. Although firm performance is not project performance, however within the context of performance the finding is consistent with the study by Jin *et al.* (2007).

8.0 Conclusion

This study addressed the importance of risks as it relates to outsourcing of facilities management services provision. Few studies have however recognised the need to examine the hidden relationships between outsourcing risks variables and their impact on firm performance. Firm performance is considered in terms of financial performance, time performance, and strategic performance. A hypothesized model was developed based on outcome of a previous study and tested using SEM techniques. It was discovered that only vendor risks out of four risk components used for the research has marginal impact on firm performance. It was also found that virtually all the risk components relate to one another with varying degrees of relationship. However, vendor risks factors *versus* relationship risk factors, client based factors *versus* relationship risk factors, client based risks *versus* vendor related risks, and contract risks factors *versus* relationship risk factors showed strong relationships in their loadings.

The final structural model has a number of implications for research and practice. First, the study proposed and tested a structural equation model that examined the interdependent relationships between outsourcing risk variables associated with facilities management outsourcing thereby extending knowledge contributed in previous studies on application of SEM methodology. Secondly, the findings confirm the existence of relationships among outsourcing risk variables and highlight the importance of key constructs which may help in further studies in the field of FM outsourcing. This is currently being explored in an on-going research. Thirdly, the results of this

study extend previous knowledge about FM by using data generated from Nigeria's FM practitioners, meaning that the outcome could be used to compare findings from other parts of the world. The findings also have implication for FM practitioners particularly in Nigeria. It has revealed key risk components that would require standard mitigation measures in order to achieve outsourcing success in the FM sector. It is a sector that is thriving in Nigeria and requires every effort to make it an internationally recognised market.

The study has some limitations; there is a possibility of bias playing a major role in the final outcome of this study due to the fact that data collected were based on perceptions of FM practitioners in Lagos, Nigeria; the sample size was quite small to make the SEM test results reliable as SEM generally requires a large sample size. However, an on-going study on FM outsourcing in Nigeria hopes to incorporate a broader and larger sample size able to provide additional validity and empirical support for the theoretical framework in this area.

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Table 1 Constructs and scales of measurement

Variable	Indicator/Code	Scale of measurement
Client based factors (CBF)	Inexperienced client function (ICF)	1=strongly disagree 5= strongly agree
	Interruption to supply of services (ISS)	ditto
	Unclear responsibilities & targets (URT)	ditto
Vendor related factors (VRF)	Financial failure of vendor (FFV)	ditto
	Poor quality of services (PQS)	ditto
	Vendor underperformance (VUP)	ditto
	Critical service failure (CSF)	ditto
Contract related factors (CRF)	Absence of benchmark for quality (ABQ)	ditto
	Inadequate definition of scope (IDS)	ditto
	Lack of standard form of contract (LSC)	ditto
	Inadequate planning of policies (IPP)	ditto
Relationship related factors (RRF)	Poor relationship between client and vendor (PVC)	ditto
	Conflict of interest (COI)	ditto
General risk factors (GRF)	Security requirement issues (SRI)	ditto
	Fear of uncertainties (FOU)	ditto
Time performance (TP)	Ability to achieve on-time schedule	1=very low 5=very high
Strategic performance (SP)	Ability to focus on core activities	1=strongly disagree 5= strongly agree
Financial performance (FiP)	Ability to achieve cost efficiency	1=strongly disagree 5= strongly agree

Table 2 Result of the exploratory factor analysis (EFA)

Item	CBF	VRF	CRF	RRF	GRF
Inexperienced client function (ICF)	0.736				
Interruption to supply of services (ISS)	0.595				
Unclear responsibilities & targets (URT)	0.532				
Security requirement issues (SRI)	0.503**				
Financial failure of vendor (FFV)		0.471			
Poor quality of services (PQS)		0.559			
Vendor underperformance (VUP)		0.501			
Absence of benchmark for quality (ABQ)			0.477		
Inadequate definition of scope (IDS)			0.730		
Lack of standard form of contract (LSC)			0.682		
Inadequate planning of policies (IPP)			0.385*		
Los of strategic flexibility (LSF)			0.316*		
Poor relationship between client and vendor (PVC)				0.550	
Conflict of interest (COI)				0.521	
Fear of uncertainties (FOU)					0.405*

Table 3 Total variance explained from EFA

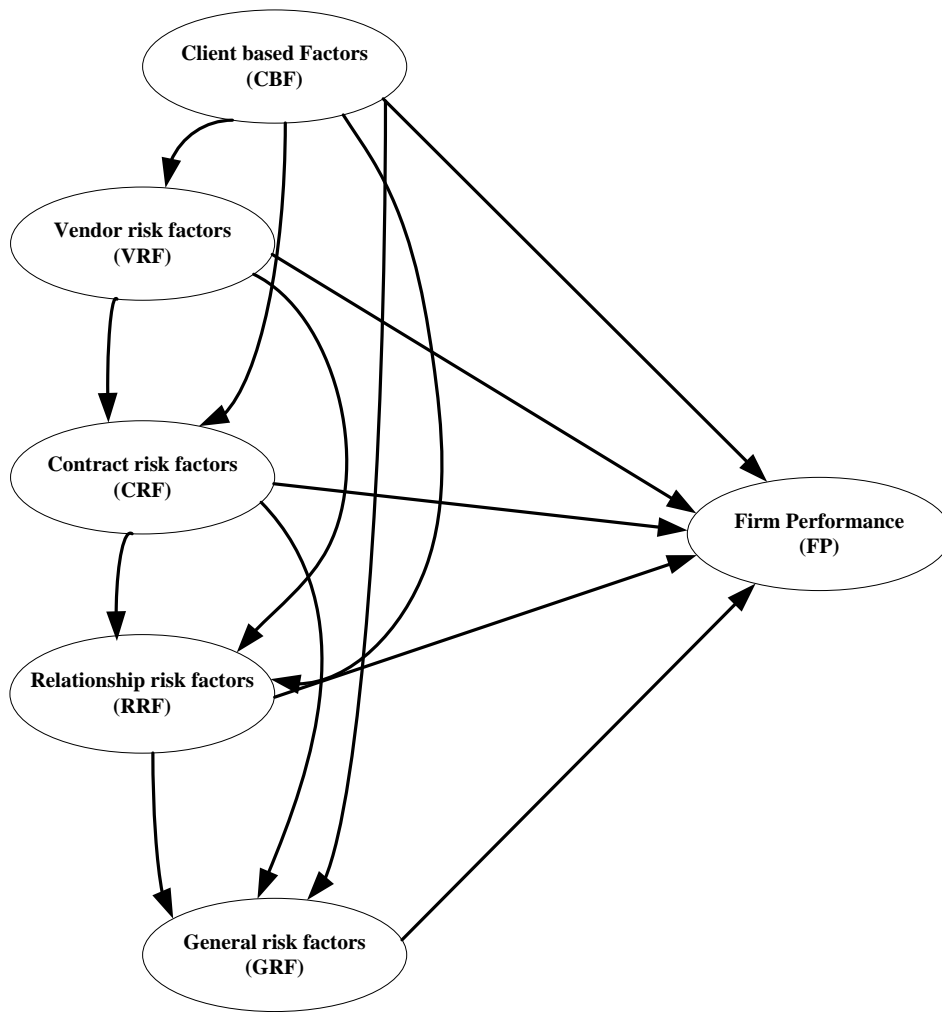
Component	Initial eigenvalues		Cumulative %
	Total	% of variance	
1	2.106	21.198	21.198
2	1.657	17.745	38.943
3	1.476	11.353	50.296
4	1.448	11.135	61.432

Table 4 Result of GOF measures for measurement model

Goodness of fit (GOF) measure	Recommended level	Initial SEM	Final SEM
$\chi^2/\text{degree of freedom}$	< 2 (Byrne, 2001)	2.21	1.71
Goodness of fit index (GFI)	0 – 1 (Bagozzi and Yi, 2012)	0.69	0.98
Root mean sq. error of approx (RMSEA)	≤ 0.10 (Tabachnick and Fidell, 2007)	0.12	0.07
Comparative fit index (CFI)	> 0.9 (Kline, 2005)	0.72	0.90
Tucker-Lewis index (TLI)	≥ 0.92 (Bagozzi and Yi, 2012)	0.78	0.93
Normal fit index (NFI)	0 – 1 (Doloi et al. 2011)	0.81	0.82
Incremental fit index (IFI)	0 – 1 (Molenaar et al. 2000)	0.82	0.93

Table 5 Result of reliability and convergent validity tests for the final model

Variable	Indicator/Code	Cronbach's alpha (α)	Path loadings
Client based factors (CBF)	ICF	0.774	0.74
	ISS		0.88
	SRI		0.81
Vendor related factors (VRF)	FFV	0.851	0.85
	PQS		0.72
Contract related factors (CRF)	ABQ	0.782	0.71
	IDS		0.68
	LSC		0.77
Relationship related factors (RRF)	PVC	0.796	0.84
	COI		0.76
Firm Performance	FIP	0.827	0.82
	TP		0.78
	SP		0.79



Note that “General risk factors” was deleted after the exploratory factor analysis

Figure 1 Hypothesised model showing relationship between latent variables

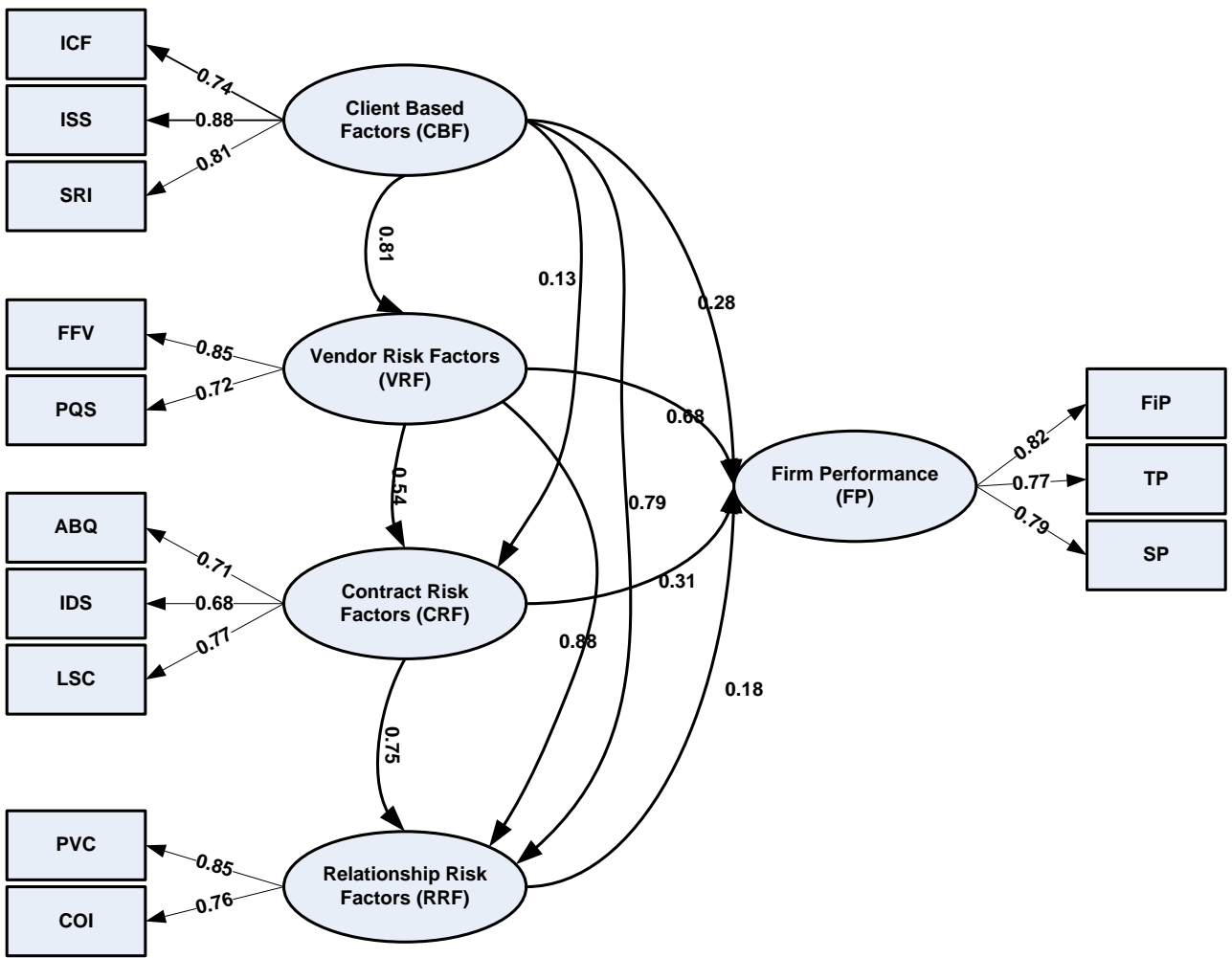


Figure 2 Final structural equation model