Governance of Inter-Organisational Relationship through Canonical Correlation Analysis Approach: The Case between Mobile Network Operators and Content Providers.

Alhassan Alolo Abdul- Rasheed Akeji[12], Wenyuan Li[1*], Isaac Adjei Mensah[3] Ibrahim Abdul-Fatawu[4],

[1]School of Management, Jiangsu University, 301 Xuefu Road, Zhenjiang, Jiangsu, P.R. China
[2]Tamale Technical University, Tamale- N/R.Ghana
[3]Faculty of Science, Jiangsu University
[4]Wa Polytechinc,Upper West Region, Ghana.

[*] Corresponding author: Wenyuan Li (liwenyuan8@ujs.edu.cn)

ABSTRACT

This paper develops and investigates a model of boundary decisions of inter-organisational relationship governance mechanisms in the mobile communication industry. The measurement variables of the framework were obtained from Williamson's transaction cost analysis and modelled through canonical correlation analysis, which is estimated with empirical survey data from the mobile network operators and content providers in the telecommunication industry in Ghana. Consistent with the logic of transaction cost analysis framework, the study found support for significance relationship of behavioural uncertainty and frequency of transaction to have positive influence on the choice of authority-base governance mechanisms. However, empirical findings of environmental uncertainty and technological uncertainty that negatively influence the choice of authority base governance mechanisms do not corroborate with the transaction cost framework. We found significant and positive relation of environmental and technological uncertainties with contract-base governance mechanisms. Surprisingly, empirical findings never found support for asset specificity, which Williamson described as the 'locomotive' dimension of transaction cost analysis framework. Asset specificity was positively related to authority-base governance but was proofed not to be relevant in this relationship because it was insignificant.

INTRODUCTION

Mobile network operators cannot expect to appropriately serve their wide range of customers alone if they are to provide the kind of services that customers will increasingly demand. They will be forced to enter into business relationships with a range of organizations. This therefore, requires that the network operators embrace the inter- organizational relationship governance concept and its implications. The way a relationship is governed affects the functioning of the organisations involved. Appropriate decision making is an important part of the inter-organisational relationship governance. However, the predominant question that is evidenced in literature is how to organise economic activities

(de Reuver and Bouwman (2012)). Several governance mechanisms have been suggested to organise economic activities. (Williamson, 1985) identified hierarchical, hybrid and contract, while Powell and DiMaggio (2012) ,Dyer Jeffrey H. (1998) identified trust, reputation, and referral and goodwill as governance mechanisms. Some scholars in other disciplines have supported these mechanisms.

However, available literature largely applies these mechanisms in the governance of large platform leaders such as Google and Apple platforms (Ghazawneh & Henfridsson, 2013) or governance of value network de Reuver and Bouwman (2012). Scholars seldom pay attention on the governance of the MNOs platform in extant literature. Thus, insight into the governance of the MNOs platform is lacking.

In the past, MNOs were at the centre of almost communication activities. They had control over all communication activities in relation to innovation in mobile communication. They kept control of the communication network and as well as access to the customers. The MNOs only allowed other players on their platform if they satisfy or met certain standards set by the MNOs.

In recent time, the MNOs have less authority due to the increasing demands of their customers, they have realised that, they have to be flexible and collaborate with others if only they want to serve their customers well. Therefore, the focus of this paper is deliberately narrowed, for our overarching objective is to concisely gauge how the mobile network operators govern their relationship with content providers. Thus, identifying what governance mechanisms are used, and what determines the choice of these governance mechanisms. This paper contributes to the growing body of knowledge in the field of marketing by deepening the application and the understanding of inter firm relationship governance concept through the methodological approach of canonical correlation analysis. We therefore begin by briefly summarising the overview of the relationship between the mobile network operators and the content providers as found in literature. In the next section we present a theoretical background of organising and governing economic relationship activities and the related hypotheses. The third section describes our materials and the procedures we used to collect data. The fourth section finally analyses the data collected, presents the results and discuss findings and conclusion.

2.0 Overview of the relationship between the mobile network operator and the Content Providers.

It is said that in the future, hand held mobile devices connected to telecommunications network are predicted to become a critical way to gain access to the increasing amounts of content now in digital format as well as avail of services and applications. What is becoming clear is that mobile operators are unlikely to develop and manage all these services. Content and services are likely to be provided by a myriad of third party organisations ranging from the large media conglomerates to smaller organisations Peppard and Rylander (2006). Therefore, the mobile network operators will have to go into business relationship with content providers.

Mobile network operators are companies that possess a mobile communication network and provide mobile communications and information services to customers wireless (Zhang and Liang (2011). A mobile network operator (MNOs), as (Bormann, Flake, & Tacken, 2007) said are telephone companies that "operate the access network infrastructure, delivers basic services to the user (e.g., Voice, SMS, Internet Access)", provide mobile devices, and control the billing systems for the customers' usage. For the mobile network function, the MNO "plans the network architecture and topology, acquires (buys or leases) and develops (in terms of civil engineering) the sites needed for rolling out the network, oversees the network implementation by suppliers and subcontractors, and operates and maintains the network"

(Frisanco, Tafertshofer, Lurin, & Ang, 2008).They own the network (platform) and the end users which are their assets and capabilities. The platform (mobile network) is central and serves as a critical resource in the business network. In view of this, the platform owners (MNOs) offer a stable and predictable set of assets that other organizations can use to build their own offerings (Iansiti and Levien (2004)). The value that the industry provides, including the value from terminals, network and system equipment, and all kinds of services including basic services and VAS (value –added services) are integrated into the network and transferred to the end customers (Zhang and Liang (2011).These end-users play a critical role around the MNOs business relationships. They are the final determinants of the success or otherwise of the MNOs business relationships. In order to build their networks, the MNOs enter into business relationship with the content providers.

The content providers are third parties that go into a business relationship with the MNOs to enrich the network services by developing an array of content applications and services hosted and sometimes managed by the MNOs for customers to access. This

value proposition often integrates a multi-channel distribution offering that helps to broaden the reach and exploit the complementary characteristics of different channels. The core activities of the content providers usually falls in the category of content collection, content processing and formatting, content publishing, content distribution, distribution agreements management. In some cases some of the contents may range from downloadable ringtones, games and news bulletins to live streaming television, cinema tickets, and music purchases. These services are commonly sold to the network operator by a host of content developers and preferred publishers. Where outright sales fails, sometimes agreement could be reached in respect of sharing of the revenue generated from the use of such services. For instance as one content provider noted 'we find the standard 85%:15% revenue sharing or split for i-mode much more reasonable than the 60% we get from Vodafone live' (Peppard and Rylander (2006)). In the relationship between the MNOs and the content providers there is power difference in the relationship that allows the MNOs to act opportunistically by exercising its influence on the agreement resulting in an imbalance split of the revenue generated.

In a relationship between the MNOs and the content providers, there is an exchange relationship between the actors in which both parties depend on each other in the telecommunication industry. However, the relevant issues are the dimensions of exchanges that are brought on board by both parties and the extent to which these exchange dimensions influence the choice of governance mechanisms in governing the relationship.

3.0 LITERATURE REVIEW AND HYPOTHESES FORMULATION

3.1: The Transaction Theory and the Governance Structures

Transaction cost economics (TCE) theory can be viewed as a first endeavour in analysing economic exchanges, or transactions, rather than the goods or services, deviant from the neoclassical perspective of the firm. The transaction cost economics principle has been introduced by Coase (1937) but has become widely known by Williamson (1979) by defining the cost of transactions in making or buying a product. Transaction Cost Economics maintains that there are 'rational economic reasons' for choosing the means of governing transactions Williamson (1985)). This is captured in what Williamson (1991) called the 'discriminating alignment hypothesis,' which holds that transactions, which differ in their attributes, are aligned with governance structures-i.e., market, hybrid, or hierarchy in a discriminating (i.e., transaction-cost-economizing) way. In other words, the governance mode (hierarchy, hybrid, or market) that minimizes transaction costs is the preferred option. The principal attributes of transactions, according to TCE, are asset specificity, uncertainty, and frequency.

The primary assumption of TCA is that if adaptation, performance evaluation, and safeguarding costs are absent or low, rational economic actors will favour market governance. If these costs are however high enough to exceed the production cost advantages of the market, firms will favour internal organization. The sense making behind this position is relied on certain a priori assumptions about the properties of internal organization and its ability to minimize transaction costs. Three specific aspects of organizations are relevant in this respect. First, organizations have more powerful control and monitoring mechanisms available than do markets because of their ability to measure and reward behaviour as well as output(Anderson & Oliver, 1987; Eisenhardt, 1985) . As a result, the firm's ability to detect opportunism and facilitate adaptation is enhanced. Second, organizations are able to provide rewards that are long term in nature, such as promotion opportunities. The effect of such rewards is to reduce the payoff from opportunistic behaviour. Third, Williamson (1999) acknowledges the possible effects of the organizational atmosphere, in which organizational culture and socialization processes may create convergent goals between parties and reduce opportunism ex ante. For instance as transactions become more specific and uncertain, transactors become more concerned about the threat of opportunism. First, as asset specificity increases, the threat of opportunism increases as a result of the difference between an asset's first- and second-best use (Mahoney and Pandian (1992)). Using markets or hybrids therefore exposes firms to greater exchange hazards. Second, when environmental uncertainty increases, contracts are more incomplete. This can cause adaptation problems because as environmental uncertainty increases, the number of unforeseen contingencies that can arise also increases. However, because these contingencies are unforeseen, transactors cannot specify them in contracts, which increases the threat of opportunism when adaptations are needed(Williamson, 1985).

Third, when performance is difficult to measure, transactors can either lower output or quality that other transactors cannot easily detect. To protect the firm against such threats, firms can either craft and negotiate extensive market or hybrid contracts, which

is costly, or use hierarchical governance (Barthelemy & Quélin, 2002; Barthélemy & Quélin, 2006). Also, when non-specific assets support transactions or when there is little uncertainty, firms are less concerned about the threat of opportunism or the difficulty of adaptation in markets or hybrids. Firms are less concerned because they can easily redeploy assets or identify alternative transactors without high search costs(Williamson (1985)). Moreover, markets and hybrid modes of governance preserve stronger incentives. Thus, when transactions are supported by nonspecific assets or lack uncertainty, TCT postulates that market and hybrid modes economize on transaction costs, and thus, improve performance (Williamson (1985)). He predicts a positive relationship between these transaction attributes and more integrated governance structure.

In summary, support has been found for the key explanation of boundary choice: that increasing asset specificity leads to diminishing effectiveness of market governance because markets lack effective mechanisms for resolving coordination problems and opportunism in specialized exchanges Poppo and Zenger (2002). It has also be found that, performance measurement difficulties are high when outputs cannot be easily monitored and evaluated. The threat of opportunism is increased on the grounds that transactors can intentionally bring down output or lessen quality in ways that might not be detected by others. Furthermore, an increased frequency of transaction will reduce the information asymmetry between the organizations making hierarchical mechanisms more appropriate(Van de Vrande, Lemmens, & Vanhaverbeke, 2006; Van de Vrande, Vanhaverbeke, & Duysters, 2009). Base on the support from literature, we hypothesise that:

- H1: In a relationship between the mobile network operator and content provider, high asset specificity positively influence the decision to adopt authority-base governance mechanism,
- H2: In a relationship between the mobile network and content provider, high environmental uncertainty positively influence the decision to adopt authority-base governance mechanism,
- H3: In a relationship between the mobile network and content provider, high behavioral uncertainty positively influence the decision to adopt authority-base governance mechanism,

- H4:In a relationship between the mobile network and content provider, high technological uncertainty negatively influence the decision to adopt authority-base governance mechanism,
- H5: In a relationship between the mobile network and content provider, high frequency of transaction positively influence the decision to adopt authority-base governance mechanism,

4.0 MATERIALS AND METHODS

Data Source

The study principally borders on organizational-level decisions; therefore, a key respondent or informant survey through questionnaire was used to collect data for the study between February and June, 2017.In this approach, the researchers used one or more respondents in each organization who are deemed to have knowledge and take part in transaction partnership decisions and as well report on behalf of the organization. These respondents are not randomly selected from each organization. Rather, they are purposefully selected to be key respondents or informants by virtue of their position within the firm. The respondents in this survey were the managers and staff at executive positions. Transaction governance decisions are typically managerial decisions that reside largely within the managerial units of a firm. Individuals in these positions are likely to be abreast with and knowledgeable about the issues of relationship governance. With this consideration in mind, it was felt that the appropriate key respondents would be the managers or staff at executive position responsible for transaction partnership relationship. The key respondents were drawn from different categories, namely: mobile network operators being the principal firms that do businesses with the service value –added firms (content providers). Efforts were made to ensure that the right respondents were engaged. Finding respondents for this type of survey was a difficult task, since no database exists for all relevant partners engaged in transaction partnership in the telecommunication industry from any national database. However, we managed to get a list of service value-added firms in the telecommunication industry from the database of the mobile network operators. These lists aggregated and constitute the total population of service value-added firms. Transaction actors that transacted with more than one

mobile network operator were recognised as one actor in the population. This was to avoid duplication of transaction partners.

Research assistants were engaged to help in the data collection. They were adequately trained for that purpose. To explain the questionnaire and its context, the participants were offered a detailed background of the study either through an introductory letter or meeting. Relevant areas or topics that needed to be responded were covered. The broad topics included, transaction governance, modes of transaction exchanges in transaction partnerships and how these transaction exchanges influence their choice of governance modes. Participants were given adequate time to prepare themselves as well as to express interest in taking part of the exercise. Follow ups were made to identify participants who were willing to take part in the exercise. In the administration of the survey questionnaires, the research assistants ensured that participants submitted questionnaires that were completely answered and did not allow room for incomplete questionnaires. Email was also provided for those who expressed to take soft copies of the questionnaires for response or for onward submission to appropriate officers to respond. A total of 178 of completed questionnaires with valid responses for the survey were received. The completed questionnaires were thoroughly checked for response bias. In the analysis of data, canonical correlation analysis model was used.

5.0 DATA ANALYSIS
5.1 Exploratory Factor Analysis and Reliability

Exploratory Factor analysis was conducted to examine the factor structure of each variable. In accordance with Hair, Ringle, and Sarstedt (2011), it was decided that in order to reduce the number of items and to facilitate interpretation, principal component analysis with the orthogonal rotation (varimax rotation) was used. This was performed for the measures of both the governance mechanism and transaction dimensions (authority governance mechanism, contract governance mechanism, and trust governance mechanism, asset specificity, environmental uncertainty, technological uncertainty, behavioural uncertainty, and frequency). Secondly, the reliability of the scale was equally measured with Cronbach alpha criterion to find out if all the indicators of the scale will measure the same construct. Each measure had satisfactory internal consistency with a Cronbach's *alpha* value above .70. The KMO and Bartlett's test for sample adequacy was also performed to assess the communalities of the indicators. Cross loadings of factor indicators

were adequately checked to find out the extent of correlations among the factor indicators, that is convergent and discriminate validity were checked to find out the internal consistency of the factor indicators'. The factors demonstrate sufficient convergent validity, as their loadings were all above the recommended minimum threshold of 0.350 for a samples size of 300Hair et al. (2011). The factors also demonstrate sufficient discriminant validity, as the correlation matrix shows no correlations above 0.70 and there are no problematic cross-loadings. The number of factors indicators for each construct was determined, based on the eigen-value greater than 1 criterion. Items were retained if they loaded above 0.50 on the factor.

Finally we modelled a canonical correlation analysis to determine the relationship between the dependent and independent variables (governance mechanisms and transaction dimensions). CCA is most appropriate when a researcher desires to examine the relationship between two variable sets. For CCA to make theoretical sense as a multivariate analysis there should be some rationale for why the variables are being treated together in variable sets. For example, a researcher may have four different measures of transaction attributes in the predictor variable set and three different measures of governance mechanisms in the criterion variable set. The research question of interest, then, would be whether there is a relationship between transaction attributes and governance mechanisms as multi operationalized in the variable sets. In contrast, if the researcher only had one criterion measure of governance mechanism, then multiple regressions would be conducted. If only one variable set were available, then the researcher may choose to conduct some sort of factor analysis to synthesize the variables. If more than one variable exists in both sets, then CCA may be the analysis needed. The model also has the ability to minimize the threat of committing Type 1 error. It allows for simultaneous comparisons among the sets of variables rather than requiring many statistical tests be conducted(Thompson, 1993). Another reason is that, this technique can be used instead of other parametric tests in many instances, making it not only an appropriate technique to use but a comprehensive technique as well. As has been demonstrated by (Henson, 2001)and (Thompson, 1993), virtually all of the parametric tests most often used by researchers (e.g., ANOVA, MANOVA, multiple regression, Pearson correlation, *t* test, point-biserial correlation, discriminant analysis) can be subsumed by CCA as special cases in the GLM. This is not to say that CCA should always be used instead of these

other methods because, in many cases, this may be a long, tedious way to conduct an otherwise simple analysis.

Theoretical considerations of CCA

Canonical correlation analysis is used in examining the relationship between two sets of variables that is the independent set which is normally denoted as X and dependent set which is also denoted as Y. Canonical correlation analysis focuses on the correlation between a linear combination of the variables in one set (independent variable set) and the linear combinations of variables in another set (dependent set of variables). The object is then to find the linear combinations;

$$U = a_i^T X = a_{i1} X_1 + a_{i2} X_2 + ... + a_{ip} X_p \qquad (1)$$

$$V = b_i^T Y = b_{i1} Y_1 + b_{i2} Y_2 + ... + b_{ip} Y_q \qquad (2)$$

such that U and V have the largest possible correlation. Such a linear combination can give insight into the relationships between the two set of variables. A typical way to view canonical correlation analysis (CCA) is as an extension of the traditional multiple regressions. In such case, the dependent set (Y-set) contains one variable instead of q variables and the regression solution involves the linear combination; $a^T X$ which in most cases is highly correlated with Y. While in the canonical correlation analysis the dependent set (Y-set) contains $q \geq 1$ variables (that is multiple variables) and we look for vectors a and b for which the correlations between the linear combinations ($a^T X$ and $b_i^T Y$) is maximized. With respect to this research, U and V are the canonical variates of governance mechanism and transaction attributes respectively, $X_1, X_2 ... X_p$ are the latent variables of observed variables of governance mechanisms whilst $Y_1, Y_2 ... Y_p$ also represents the latent variables of transaction attributes. The parameter estimates $a_{i1}, a_{i2}..a_{ip}$ and $b_{i1}, b_{i2},...,b_{ip}$ are the canonical loadings for $X_1, X_2 ... X_p$ and $Y_1, Y_2 ... Y_p$ respectively.

Suppose X is a $p \times 1$ random vector and Y is also a $q \times 1$ random vector that is;

$$\begin{bmatrix} X_{p \times 1} \\ Y_{q \times 1} \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ . \\ . \\ x_p \\ y_1 \\ y_2 \\ . \\ . \\ y_q \end{bmatrix} \qquad (3)$$

Suppose further that, X and Y have means μ_X and μ_Y respectively and that,

$$E[(X - \mu_X)(X - \mu_X)^T] = \sum_X ,$$
$$E[(Y - \mu_Y)(Y - \mu_Y)^T] = \sum_Y$$
$$E[(X - \mu_X)(Y - \mu_Y)^T] = \sum_{XY} = \sum_{YX}$$

Then by considering the two linear combinations $U = a_i^T X$ and $V = b_i^T Y$, the correlation between U and V is formulated as;

$$\rho_{(U,V)} = \frac{a^T \sum_{XY} b}{\left(a^T \sum_X a b^T \sum_Y b\right)^{1/2}} \qquad (4)$$

where $\sum_X$, $\sum_{XY}$ and $\sum_Y$ are covariance matrices for X, Y and XY.

Testing the Significance of the Canonical Correlation Coefficient

In testing the significance of the canonical correlation coefficient, the null and the alternative hypothesis are respectively stated as;

$$H_o : \rho_1 = \rho_2 = ... = \rho_p = 0$$
$$H_A : \rho_1 \neq \rho_2 \neq ... \neq \rho_p \neq 0 \qquad (5)$$

In order to test the above hypothesis, the most widely used test statistic is the Wilk's Lambda which is given by the relation;

$$\Lambda = \prod_{i=1}^{p} (1 - \rho_i) \qquad (6)$$

The critical value (p-value) for the test is obtained from F-distribution with a specific level of significance (α). If the probability value (p-value) of the test is small (less than the level of significance (α)) then it indicates the rejection of the null hypothesis, which implies the two set of variables are dependent or correlated.

6.0 PRESENTATION OF RESULTS AND DISCUSSION

6.1 Multivariate Test of Significance for relationship governance between the MNOs and content providers

To examine the variables that influence the choice of mechanisms in governing the relationship between the MNOs and the content providers, various multivariate statistical techniques were used to test the significance of the model. The multivariate test of significance exhibits whether the full canonical model obtained is statistically significant or not by using various tests such as the Pillais, Hoteling, Wilk's Lambda and Roys test of significance. Most researchers generally choose to interpret the results of the Multivariate test of significance on the basis of the Wilk's lambda due to its high level of practicality. The findings or results from table7.1 below collectively indicates that the full canonical model across functions using the Wilk's lambda (λ) =0.31489 criterion with F (15, 386.44) =8.11742, p<0.000) is statistically significant. This is result is additionally supported by the other tests (Pillais, Hoteling, and Roys test) which have their respective p-values being less than the 0.05 level of significance. Since the Wilk's Lambda represents the variance unexplained by the full model, then 1-λ yields the full canonical model effect or the amount of variance explained by the full canonical model. Hence for the full canonical model obtained, the effect size or the amount of variance being explained is 0.68511, which indicates the full canonical model explains a substantial portion of the variance shared between the variable sets (Exchange Dimensions set of variables and Governance Mechanism set of variables).

Table 1Multivariate Test of Significance for relationship governance between the MNOs and content providers

Test name	Value	Approx. F	Hypothesis Df	Error Df	Sig. of F
Pillais	0.32635	7.24892	15.00	426.00	0.000
Hoteling	0.44307	8.93889	15.00	416.00	0.000
Wilk's	0.31489	8.11742	15.00	386.44	0.000
Roys	0.68511				

6.2 Eigen Values and Canonical Correlations for relationship governance between the MNOs and content providers

The Eigen values and the canonical correlations on the other hand help in making decisions on which canonical function has the maximum correlation and also significant based on their respective shared variances (canonical correlation squared values). Table 2 below therefore gives the root number representing the number of canonical functions generated, percentages, cumulative percentages, canonical correlation values and the squared canonical correlation values of the respective canonical functions generated. From the table 2, it can be deduced from the column labelled "Root No." that, three (3) canonical functions were derived from the canonical correlation analysis. Furthermore, among the three (3) canonical functions obtained from the analysis, the first canonical with the root number 1 had the largest Eigen value (0.40359), the highest canonical correlation value (0.82771) with a substantial amount of shared variance between the first and second set of variables used in the analysis (ie.68.5%). This is followed by the second canonical function (Root No. 2) which from the table 2 had an Eigen value of 0.02292, a canonical correlation value of 0.14970 with a shared variance of 2.24% between the two sets of variables. The third canonical function among the three canonical functions had the least Eigen value as well as the least canonical correlation value and the least shared amount of variance between the two sets of variables. The summary of this result points out that, the first canonical function (Root No. 1) is considered noteworthy and significant since it is the only root with the maximum correlation value and also explained a substantial amount of variance between the data sets.

Table 2 Eigen Values and Canonical Correlations for relationship governance between the MNOs and content providers

Root No.	Eigen Value	Percentage	Cumulative Percentage	Can. Corr.	Can. Corr. Sqrd
1	0.40359	91.08992	91.08992	0.82771	0.68511
2	0.02292	5.17413	96.26405	0.14970	0.02241
3	0.01156	2.60830	98.87235	0.10689	0.01142

6.3 Dimension Reduction Analysis for the governance of relationship between the MNOs and Content Providers

The dimension reduction analysis on the other hand is employed to identify the extent to which each canonical function is able to account for the shared variance between the data sets and also allows the researcher to test the hierarchical arrangements of the functions for statistical significance. As noted from the result in the table3 above, it can be deduced that the full model (1-3) is statistically significant and also accounted for the largest amount of shared variance between the two data sets (i.e. $1 - \lambda = 0.68511 \approx 68.5\%$) with F (20, 1344.18) =8.11742. The functions 2-3 and 3-3 did not explain a statistically significant amount of shared variance between the variable sets hence insignificant with their respective p-values being greater than the 5 percent level of significance.

Table 3 Dimension Reduction Analysis for the relationship governance between the MNOs and content providers

Roots	Wills L	F	Hypoth. DF	Error DF	Sig. of F
1 TO 3	0.31489	8.11742	20.00	1344.18	0.000
2 TO 3	0.96162	1.33445	12.00	1074.47	0.193
3 TO 3	0.98366	1.12211	6.00	814.00	0.347

6.4 Canonical correlations for the First Canonical Function concerning the influence of transaction dimensions on choice of governance mechanisms with respective to the relationship between the MNOs and Content Providers**.** Given the canonical correlation squared value of each function, only the first canonical function was considered noteworthy in the context of the analysis since it explained a substantial portion of the variance. The last two canonical functions only explained a smaller portion of the variance shared between the variable set after the extraction of the prior function (refer table 3). Hence a canonical correlation analysis for only the first canonical function concerning the correlation between the two sets of variables (Transaction attribute set of variables and Governance Mechanism set of variables) is created. In order to determine the extent to which the variables in the two sets relate to each other using the first canonical function, the standardized or the structural coefficients (r_s) of the respective variables are used. The results from this analysis indicated in the table4below include the evaluation of the variables using the standardized coefficients or the structural coefficients of the first canonical function and the squared structure coefficients representing the percentage of shared variance. This illustrated in the figure1 below as the structural model.

Table 4: Canonical correlations for the First Canonical Function concerning the influence of transaction dimensions on choice of governance mechanisms with respective to the relationship between the MNOs and Content Providers.

Variable	First (1st) Canonical Function		
	Coefficient	r_s	r_s^2 (percent)
AUT	.14813	.66439	44.14
CONTRACT	-.14929	-.69779	48.69
TRUST	.00505	.01378	0.02
R_c =0.82771			
ASPECIFY	.05148	.12690	1.61
ENV	-.10425	-.4608	21.23
TUNCERT	-.12143	-.5250	27.56
BUNCERT	.13410	.6184	38.24
FREQ	.13182	.5690	32.37

NB; For emphasis variables with structure coefficients greater than the absolute of 0.45 (i.e. $\left|0.45\right|$) are or is regarded to be relevant or significant
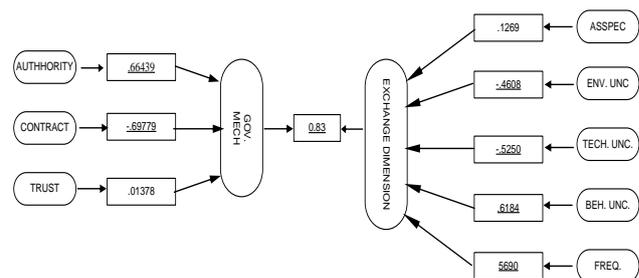

Figure 1: Structural Model of the governance mode between MNOs and content providers.

Considering the results from Table 4 with respect the relationship between the transaction dimensions and governance mechanisms (two variable sets) using the first canonical function, it can be deduced that, the variables AUTHORITY and CONTRACT were the only variables that contributed significantly to or relevant to the dependent set (Governance mechanism). This is due to the fact that from the table 4 these variables had their respective structure coefficient to be greater than $\left|0.45\right|$ and also sharing larger amount of variations within the set. The other side of the equation of the first canonical function from the table 4 above additionally involves the predictor set of variables. The results from the table therefore points out that only the variables environmental uncertainty, technological uncertainty, behavioural uncertainty, and frequency in the predictor set proofed to be relevant or significantly contribute to the predictor set (Transaction

dimensions) with a structure coefficient of -.4608, -.5250, .6184, .5690 which were substantially greater than $|0.45|$ and also share the largest amount of variation within the set.

However, the variable that did not contribute significantly in determining the governance mechanisms was ASSET SPECIFICITY with structure coefficient of (.1269) which is woefully lower than the thresh hold of $|0.45|$.

DISCUSSIONS
The results from both the dependent set and the independent set with respect to the first canonical function gives the indication that in a relationship between MNOs and Content providers the prediction that asset specificity positively influence the preference of authority-base governance was not supported, since it is insignificant or proofed to be irrelevant in this relationship to choose authority base governance mechanism.

The structure coefficient of (.1269) which is woefully lower than the thresh hold of $|0.45|$. The plausible explanation could be that the specificity of assets was low. Therefore, we could not tell the superior predictive ability for asset specificity since it appeared to be irrelevant in this relationship. Thus, Williamson's assertion that asset specificity is the engine or driver of governance choice was not evidenced.

Empirical results did not support the prediction that environmental uncertainty positively influences the preference for authority-base governance mechanisms. The structural coefficient (-.4608) was significant but negative, indicating that environmental uncertainty proofed to be relevant in this relationship but decreases when preference for authority base governance mechanism increases, suggesting that the mobile network operators do not prefer the use of authority-base governance mechanisms when environmental uncertainty exist. However, environmental uncertainty was rather positively related to the preference for contract–base governance mechanisms, showing that as environmental uncertainty increases the preference for contract-base governance increases. This result is consistent with the findings of Folta (1998)that firms decision makers prefer to govern transaction uncertainties with less integrated modes of governance, and also corroborates with the findings that firms that are into alliances are likely to be

governed by contractual agreement under high environmental uncertainty (Osborn & Baughn, 1990).

Also the prediction that behavioural uncertainty positively influences the preference for authority-base governance mechanisms was supported. The empirical results show that the structural coefficient (.6184) of the variable behavioural uncertainty is significant and positive. This indicates that as behavioural uncertainty increases the preference for authority-base governance mechanisms in the relationship increases. The possible explanation is that the presence of performance measurement difficulty under an imbalance of power might give rise to the preference for authority-base governance mechanisms .This result is supported with Meta-analysis findings of Geyskens, Steenkamp, and Kumar (2006) of behavioural uncertainty promoting the choice of hierarchical governance mechanisms. Also, the findings that behavioural uncertainty positively relates to high degree of integration (Anderson & Schmittlein, 1984) lends support to our empirical results. The results is also consistent with the contention of Williamson (1985). However, the results showed that behavioural uncertainty is negatively influencing the preference of contract-base governance mechanism.

Further, the empirical results showed that, the structural coefficient of technological uncertainty (-.5250) is significant but negatively related to the preference for authority-base governance mechanisms. This indicates that, in the relationship between the mobile network operators and the content providers, as technological uncertainty increases the preference for authority-base governance decreases. Thus the result supports the predicted hypothesis that technological uncertainty negatively influences the choice of authority-base governance mechanism. The plausible explanation is that customers have become so sophisticated to the extent that the demand for better services keeps changing, and that if activities are performed internally they might not be able to meet customers increasing demand for better services. The empirical result corroborates with the findings that in the face of technological uncertainty, market governance are preferred over hierarchical governance (Balakrishnan & Wernerfelt, 1986; Geyskens et al., 2006; Schilling & Steensma, 2002).

Finally, the prediction of hypothesis 5 that high level frequency of transaction positively influence the preference the for authority-base governance mechanism is supported. The empirical result showed that, the structural coefficient (.5690) of

frequency is significant and positive, indicating that in a relationship between the mobile network operator and content provider, the more transaction recur the more the preference for authority-base governance mechanisms. But negatively influence the preference for contract-base governance mechanisms. The possible explanation given was that, recurring transaction between partners give rise to a better appreciation and understanding of the objective of transaction, thereby making the preference for authority governance mechanism suitable. This result corroborates with the findings that an increased frequency of transaction will reduce the information asymmetry between the organizations making hierarchical mechanisms more appropriate (Van de Vrande et al., 2006; Van de Vrande et al., 2009), Again, it is as well consistent with the findings of Masters and Miles (2002), when they noted that hierarchical governance mechanisms have the ability to bring down transaction costs by enhancing ongoing negotiating and renegotiating costs with other transactors ,when the source of the costs is associated with repeated negotiations of contracts for recurring needs .Thus, our results support the position of Williamson that, recurring transactions increases the preference for hierarchical governance since it has the ability to recover overhead cost more easily.

7. CONCLUSION AND SUGGESTIONS FOR FUTURE RESEARCH

Our estimated canonical correlation analysis model, with five predictor variables used to measure the extent of influence on the choice of authority-base governance, two of the predictor variables, behavioural uncertainty and recurring transaction proofed to be relevant in the relationship and corroborate with the reasoning of transaction cost theory , that an increase in behavioural uncertainty or transaction frequency give rise to an increase in the preference of authority-base governance mechanisms. The empirical results regarding the predictor variables of environmental uncertainty and technological uncertainty were contrary to the logic of transaction cost theory. Williamson posits that, when environmental uncertainty increases, contracts are more incomplete and thereby causing adaptation problems, and subsequently a rise in the number of unforeseen contingencies. However, because these contingencies are unforeseen, transactors cannot specify them in contracts, which increase the threat of opportunism when adaptations are needed, and therefore give rise for preference of more integrated governance mode. However, our results indicate that

in the relationship between the mobile network operators and content providers, in the presence of environmental uncertainty a less integrated form of governance is preferred. Asset specificity the 'locomotive' dimension of the transaction cost theory as described by Williamson was though positively related to the choice of authority-base governance mechanisms, but however, it proofed not to be relevant in the relationship due to its low structural coefficient of (.1269) making it to have less influence. The plausible explanation is that asset specificity was not categorised into types as proposed by transaction cost theory. It was used as a mono dimensional variable. Perhaps if we had categorised it into physical asset, site assets, human assets, dedicated assets, brand name capital assets, and temporary assets, the results would have been different to corroborate with the position of transaction cost theory, since the relevant investments would have been substantially present. In the relationship between the mobile network operators and content providers, among the six dimensions of asset specificity, only human and dedicated asset specificities were minimally present. The mobile network operators' make heavy investments to enrich the content of their mobile network, in order to serve their large customer base well.

8. SUGGESTIONS FOR FUTURE RESEARCH

Scholars rarely give theoretical accounts on studies around small platform owners like the mobile network operators and their relationship with other actors in the mobile telecommunication network. We believe further research in this domain will reveal interesting findings to enrich or develop new theories relating to relationship governance.
The inability of our findings to corroborate with the logic of transaction cost theory on asset specificity relating positively with authority governance could stem from the way we treated asset specificity in our study. The study treated asset specificity as a mono-dimensional measure of transaction cost theory, we believe if asset specificity is treated as multi-dimensional measure of transaction cost theory, interesting findings could be realised. We therefore suggest further studies in this regards.

REFERENCES

[1] Anderson, E., & Oliver, R. L. (1987). Perspectives on behavior-based versus outcome-based salesforce control systems. the Journal of Marketing, 76-88.

[2] Anderson, E., & Schmittlein, D. C. (1984). Integration of the sales force: An empirical examination. The Rand Journal of Economics, 385-395.

[3] Balakrishnan, S., & Wernerfelt, B. (1986). Technical change, competition and vertical integration. Strategic management journal, 7(4), 347-359.

[4] Barthelemy, J., & Quélin, B. (2002). Competence, specificity and outsourcing: impact on the complexity of the contract: Groupe HEC.

[5] Barthélemy, J., & Quélin, B. V. (2006). Complexity of outsourcing contracts and ex post transaction costs: an empirical investigation. Journal of Management Studies, 43(8), 1775-1797.

[6] Bormann, F., Flake, S., & Tacken, J. (2007). Convergent online charging for context-aware mobile services. Paper presented at the Advanced Information Networking and Applications Workshops, 2007, AINAW'07. 21st International Conference on.

[7] Coase, R. H. (1937). The nature of the firm. economica, 4(16), 386-405.

[8] de Reuver, M., & Bouwman, H. (2012). Governance mechanisms for mobile service innovation in value networks. Journal of Business Research, 65(3), 347-354.

[9] Dyer Jeffrey H., H. S. (1998). Relational View : Cooperative Strategies and Sources of Interorganizational Competitive Advantage

[10] The academy of management review, 23(4).

[11] Eisenhardt, K. M. (1985). Control: Organizational and economic approaches. Management science, 31(2), 134-149.

[12] Folta, T. B. (1998). Governance and uncertainty: The trade-off between administrative control and commitment. Strategic management journal, 1007-1028.

[13] Frisanco, T., Tafertshofer, P., Lurin, P., & Ang, R. (2008). Infrastructure sharing and shared operations for mobile network operators from a deployment and operations view. Paper presented at the Network Operations and Management Symposium, 2008. NOMS 2008. IEEE.

[14] Geyskens, I., Steenkamp, J.-B. E., & Kumar, N. (2006). Make, buy, or ally: A transaction cost theory meta-analysis. Academy of management journal, 49(3), 519-543.

[15] Ghazawneh, A., & Henfridsson, O. (2013). Balancing platform control and external contribution in third-party development: the boundary resources model. Information Systems Journal, 23(2), 173-192.

[16] Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing theory and Practice, 19(2), 139-152.

[17] Henson, R. K. (2001). Understanding internal consistency reliability estimates: A conceptual primer on coefficient alpha. Measurement and evaluation in counseling and development, 34(3), 177.

[18] Iansiti, M., & Levien, R. (2004). The keystone advantage. Harvard Business School Press, Boston.

[19] Mahoney, J. T., & Pandian, J. R. (1992). The resource-based view within the conversation of strategic management. Strategic management journal, 13(5), 363-380.

[20] Masters, J. K., & Miles, G. (2002). Predicting the use of external labor arrangements: A test of the transaction costs perspective. Academy of management journal, 45(2), 431-442.

[21] Osborn, R. N., & Baughn, C. C. (1990). Forms of interorganizational governance for multinational alliances. Academy of management journal, 33(3), 503-519.

[22] Peppard, J., & Rylander, A. (2006). From value chain to value network:: Insights for mobile operators. European Management Journal, 24(2-3), 128-141.

[23] Poppo, L., & Zenger, T. (2002). Do formal contracts and relational governance function as substitutes or complements? Strategic management journal, 23(8), 707-725.

[24] Powell, W. W., & DiMaggio, P. J. (2012). The new institutionalism in organizational analysis: University of Chicago Press.

[25] Schilling, M. A., & Steensma, H. K. (2002). Disentangling the theories of firm boundaries: A path model and empirical test. Organization science, 13(4), 387-401.

[26] Thompson, B. (1993). The use of statistical significance tests in research: Bootstrap and other alternatives. The Journal of Experimental Education, 61(4), 361-377.

[27] Van de Vrande, V., Lemmens, C., & Vanhaverbeke, W. (2006). Choosing governance modes for external technology sourcing. R&d Management, 36(3), 347-363.

[28] Van de Vrande, V., Vanhaverbeke, W., & Duysters, G. (2009). External technology sourcing: The effect of uncertainty on governance mode choice. Journal of business venturing, 24(1), 62-80.

[29] Williamson, O. E. (1979). Transaction-cost economics: the governance of contractual relations. The journal of Law and Economics, 22(2), 233-261.

[30] Williamson, O. E. (1985). The economic intstitutions of capitalism: Simon and Schuster.

[31] Williamson, O. E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. Administrative science quarterly, 269-296.

[32] Williamson, O. E. (1999). Strategy research: governance and competence perspectives. Strategic management journal, 1087-1108.

[33] Zhang, J., & Liang, X.-J. (2011). Business ecosystem strategies of mobile network operators in the 3G era: The case of China Mobile. Telecommunications policy, 35(2), 156-171.