

Performance Management Antecedents and Public Sector Organizational Performance: Data Screening and Preliminary Analysis

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Abstract

The emerging trend globally in the public sector organizations is seen to perfectly revolve around the New Public Management (NPM). The importance of the NPM in the public sector has obviously reinforces the significance of the performance management system; and consistently extend its boundaries in leaps and bounds. Besides, the influence of the performance management antecedents in improving public sector organizational performance and effective service delivery has been critically espoused by the extant literature within the realm of the public sector accounting, management control and management accounting. In Nigeria, government ministries, departments and agencies (MDAs) are specifically targeted for improved performance through the instrumentality of the performance management arrangements. This study has been one of the series of attempts by the researchers and the public sector experts towards identifying the influence of the performance management antecedents on the public sector organizational performance in Nigeria, taking into cognizance, the role of the performance audit. Specifically, the study covers the preliminary analysis and the data screening exercise which are necessary for the conduct of multivariate data analysis. A total of 322 responses drawn from the MDA-wide survey were used for the analysis. Overall, the result of the analysis revealed that, the data of the study is confirmed clean and amenable for further multivariate analysis.

Keywords: Performance Management, Public Sector, Data Screening, Preliminary Analysis

Introduction

The significance of the data screening exercise is essentially an indispensable stage for conducting multivariate data analysis (Chatfield & Collins, 2013). Data screening constituted a careful stage for consideration in the social and management science research studies (Hair, Hult, Ringle & Sarstedt, 2013). The analytical importance of data screening exercise and preliminary analysis has been largely expressed by quite a number studies (Badara & Zabedah, 2014; Maiyaki & Mouktar, 2011; Gorondutse & Hilman, 2014). Thus, it is crucially important to check for possible errors in data entry and other likely mistakes in order to rectify and

correct the identified errors (Pallant, 2001). To illustrate this point further, the data screening exercise poses major challenge to researchers, but however, its vital role on the quality and meaningful analysis cannot be over-emphasized (Gorondutse & Hilman, 2014). Therefore, it is observed that, the strength of the studies' evocative conclusion depends to a greater or larger extent on the researchers' ability to conduct a thorough and meaningful data screening and preliminary exercise (Maiyaki & Mouktar, 2011; Shehu & Mahmood, 2014).

Incidentally, researchers from across broad spectrum of disciplines tend to be less-inclined especially in observing the data screening and preliminary analysis processes because of the weight of cumbersome and overwhelming steps involved in it (Shehu & Mahmood, 2014; Badara & Zabedah, 2014; Hair et al, 2013). However, it is generally acknowledged that, preliminary screening, though difficult and time-consuming, could streamline the validity and significance of the results and findings of the study (Malo, Hanley, Cerquozzi, Pelletier & Nadon, 2006). Preliminary analysis also indicated the direction and suitability of the type of data analysis needed and best-fitted at a particular point in time (Hair et al, 2013; Maiyaki & Moukhtar, 2011). Equally important is that, in conducting the preliminary analysis, certain errors that were ordinarily hidden especially when dealing with large volume of data could be identified and sorted out (Kura, Shamsudin & Chauhan, 2014; Badara & Zabedah, 2014).

Furthermore, it is noted that, the data screening and preliminary analysis processes enables the researcher to explore and catch early glimpse on the interrelationship between the research variables (Tabachnick & Fidell, 2007). Similarly, by conducting data screening and preliminary analysis, the underlying assumptions governing the conduct of multivariate analysis will be suitably observed and effectively clarified (Pallant, 2001; Kura, Shamsudin & Chauhan, 2014), thus, when conducting further in-depth analysis, the screened data will be amenably fitted (Hair et al, 2010; Tabachnick & Fidell, 2007). The data screening is usually carried out using available statistical softwares like SPSS.

Hence, it is against this background that, this study intends to carefully explore the steps involved in the data screening exercise towards ascertaining the relationship between performance management antecedents and the public sector organizational performance.

Literature Review

Performance management refers to the professed ability of an organization to coordinate the attention of the institutional members on a common objective and galvanize them towards the attainment of that objective (Obong'o, 2009; Balogun, 2003). Performance management antecedents are often taken as fundamental mechanisms in the public sector especially towards achieving effective organizational performance (Verbeeten, 2008; Van thiel & Leeuw, 2002). For instance, a process is regarded as effective if it originated from a well thought-out pedestal and also produce result that is in tandem with the established objectives (Ussahawanitchakit & Intakhan, 2011). Therefore, public sector organizational performance is synonymous with efficiency, effectiveness and resourcefulness in the public sector service delivery (Verbeeten, 2008; Ittner & Larcker, 2001).

Performance management practice has been highlighted as the significant instrument of the new public management order which could propel the public agencies to achieve efficiency (Verbeeten, 2008). Notwithstanding, robust empirical studies are quite scant on the

performance management especially in the developing countries (Taticchi, Tonelli & Cagnazzo, 2010; Abubakar, Saidin & Ahmi, 2016; Esu & Inyang, 2009). Arguably again, the volume of findings and empirical outcomes on the performance management differs considerably even in the developed countries (Taticchi, Tonelli & Cagnazzo, 2010). To illustrate this point further, Folz, Abdelrazek and Chung (2009) noted that, performance management antecedents attract studies from few researchers in the developing countries despite the fact that, performance management poses vital relevance and broad coverage in the developing countries' public sector arrangement (Abubakar, Saidin & Ahmi, 2016; Mendonca & Kanungo, 1990). Performance management antecedents encompasses performance measurement, goal orientation, performance reporting, accountability and institutional culture (Verbeeten, 2008; Kagaari, Munene & Ntayi, 2010; Verbeeten, 2015 & Spekle, 2015; Schatteman, 2008, Sanger, 2012; Goh, 2012).

Specifically, performance measurement has been confirmed by the pool of literatures to be a vital element in the public sector management control that objectively exerts influence on the public sector organizational performance (Goh, 2012; Antipova & Antipova, 2014; Speklé & Verbeeten, 2014). Performance measurement has become a high priority in the public sector, thus, the attention of oversight agents and public managers has gradually been shifted to how much value a particular program or project provides to the public (Obong'o, 2009). This has added more flavor and significance to the performance management system (Jääskeläinen & Roitto, 2016).

Again, goal orientation has been another significant component of the performance management that exerts fundamental influence on the public sector organizational performance. Studies are abound on the link between goals and performance in the public sector (Kagaari, Munene & Ntayi, 2010; Latham, Seijts & Slocum, 2016). For instance, Rodgers and Hunters (1991) found that, goal orientation and performance are positively related. Similarly, Porter (2005) established from the findings of his study that, goal orientation is a vital element that improves performance.

Equally important is that, institutional culture is an important antecedent of the performance management. Institutional culture improves public agencies' capacity to perform (Nica, 2013; Lee & Yu, 2004). Similarly, good institutional culture triggers the observance of good institutional direction and equally promotes best practice in the public sector (Lee & Yu, 2004). The relationship between organizational performance and institutional culture has been explored by a number of studies, but this relationship need to be empirically tested by studies due to the inconsistencies obtained in the previous empirical studies (Giordano & Tommasino, 2013; Lee & Yu, 2004).

Yet still, performance reporting is an appropriate factor for accomplishing good organizational performance (Marcuccio & Steccolini, 2009; Yongvanich & Guthrie, 2006). Reporting is essential for better comprehension of the public agencies' results and outcomes (Moynihan et al, 2012). For instance, efficiency in the conduct of business of governance tends to be a good pointer of performance, but it could arguably be seen only if it is appropriately reported (Curristine & Flynn, 2013; Yongvanich & Guthrie, 2006). Therefore, performance reporting being an antecedents of the performance management has been grossly under-researched in the context of developing countries (Imam, 2000; Moynihan et al, 2012). This implies that,

empirical studies are imperative in investigating this relationship within the context of the public sector (LeRoux & Wright, 2010; Van de Walle & Cornelissen, 2014).

Accountability is also a strong element in the public sector performance management. Accountability connotes high responsibility in reflecting public expectation when given a stewardship (Bovens, 2007; Giannetto, 2015). In the public sector, good accountability presupposes efficient utilization of public resources (Giannetto, 2015). Accountability improves performance and promote efficiency (Kim, 2009). Empirical studies on the relationship between accountability and performance is a critical requirement in various context of the public sector arrangement (Kim, 2009; Giannetto, 2015).

Methodology

Data for this research study were obtained by administering survey questionnaires on the directors of finance, administration and general services of the state ministries, departments and agencies (MDAs) in Nigeria. Stratified sampling method was employed in obtaining the sample size of the study. Therefore, the six geo-political regions of Nigeria were used as individual stratum. Specifically, out of the 551 survey questionnaires distributed, a total of 328 were successfully retrieved from the MDAs. Eventually, 322 were found to be useful for the purpose of data analysis. This implies that, 6 were rejected. Hence, the 322 retrieved and useful questionnaires were keyed into SPSS version 20 for eventual preliminary and mainstream analysis.

Results and Discussions

As earlier highlighted, 558 questionnaires were distributed, and 328 were retrieved. This is translated into 59.5% response rate. It is also noted that, 6 questionnaires were found to be incorrectly filled, as such they were eventually excluded for the purpose of the mainstream data analysis. Therefore, the valid response rate of the study stood at 58.4%. Hence, this response rate is quite appreciable because Hair et al (2010) recommended that, 30% response rate is acceptable.

Descriptive Statistics

The descriptive statistics of this study revealed that, 45.7% comes from the ministries, while 29.8% and 24.5% comes from the departments and agencies respectively. Again, with regards to the position occupied by the respondents in the organizations, 30.7% constituted the directors, 14.9% deputy directors, 20.2% represents assistant directors and 33.9% represent other officers below the rank of assistant directors.

For the experience of the officers on a particular position, the descriptive statistics revealed that, 44.7% of the respondents spends between 2-5 years on their present position, 31.4% spent more than 5 years on their position, while 23.9% spent less than 2 years on their position. This implies that, significant percentage of the responses comes from the experienced officers whom are more versatile and amenable to offer the most objective perception.

Equally still, the descriptive analysis of the age of the respondents revealed that, 59% of the respondents exceeds 45 years of age. 21.1% of the respondents are between the age of 41-45 years, 14.9% constituted the respondents between the age bracket of 35-40 years, while

the paltry 5% of the responses originated from the respondents of less than 35 years of age. This has clearly shown that, majority of the respondents achieved a fundamental milestone in their career progression.

On the gender of the respondents, the descriptive analysis revealed that, 76.4% of the respondents were male while 23.6% were female. The analysis therefore suggests that, the survey instrument was filled mostly by male.

Missing Data

In the survey studies, missing data or missing value occurs when respondents fail to answer some questions deliberately or otherwise (Schafer & Graham, 2002). Missing values and blank responses creates problem in data analysis, therefore, the researcher is always expected to determine and replace them where necessary (Tabachnick & Fidell, 2007; Schafer & Graham, 2002). For instance, among the 19,320 data points in the study under review, 26 data points are missing at random. Overall, the missing data represents only 0.135% of the entire data points. In particular, 26 missing data are evenly spread among the entire variables of the study. In practice, there is absence of universally accepted standards for replacing missing data. But a quite number of researchers have agreed that, missing values of 5% or less are tolerated as non-significant and should be replaced by mean substitution (Tabachnick & Fidell, 2007; Hill, 1997; Raymond, 1986). Hence, the 26 identified missing data in this study are replaced by mean substitution.

Assessment of Outliers

Careful assessment and treatment of outliers is one of the crucial aspects of the data preliminary screening. Outliers refers to the points which are different from or inconsistent with the rest of the data (Montgomery, Peck, & Vining, 2015). Many statistical analysis are sensitive to outliers, such that, it is imperative to identify and make decisions about them (Tabachnick & Fidell, 2007). Multivariate analysis also requires that, outliers should be detected and treated accordingly (Hair et al, 2010). It is worthy to note that, outliers are divided into two categories vis-à-vis univariate and multivariate outliers. Although, approach differs on the detection and treatment of outliers (Badara & Saidin, 2014), for the purpose of this study, standardized values (Z-score) approach was employed. Thus, any case with a Z-score value that is greater than ± 3.29 were to be eliminated (Tabachnick & Fidell, 2007). Specifically, no univariate outlier was identified in the data under review. In other words, all the cases have standardized values of less than ± 3.29 . Equally still, multivariate outliers were investigated using Mahalanobis Distance (D^2). Thus, the degree of freedom in the χ^2 table with $p < 0.05$ is 79.08. Consequently the MAH_1 column was sorted for any value exceeding 79.08. This observation established that, no value exceeding the threshold. Hence, this implies that, no multivariate outlier was found in the data set.

Normality Test

Test of normality is one of the crucial assumptions in conducting multivariate analysis (Hair et al, 2010). Normality is defined as the distribution of the study data towards a particular variable and its corresponding to normal distribution (Draper & Smith, 2014). Tabachnick & Fidell (2007) asserts that, normality test deals with the nature of the data, the study variables and their possible association with normal distribution. In drawing a valid inference while conducting empirical study, normality assessment is a significant if not necessary step (Hair

et al, 2010). By conducting normality test, the statistical significance of the results will be improved (Izquierdo, Olea & Abad, 2014).

However, there are basically two methods of assessing normality namely: graphical and numerical methods. Specifically, for the purpose of establishing normality in this study, graphical method was employed which involves assessing the histogram and normal probability. The reason for using graphical method in this study is not far-fetched, because Field (2009) argue that, when the data set involves 200 or more cases, then, it is easier to assess normality using histogram. Besides, it is observed in this study, the data follows the pattern of normal distribution, because all the data points and bars plotted on the histogram shown a normal curve. This is evidently established in the figure 4.1 below. Hence, normality assumptions were not violated in this study.

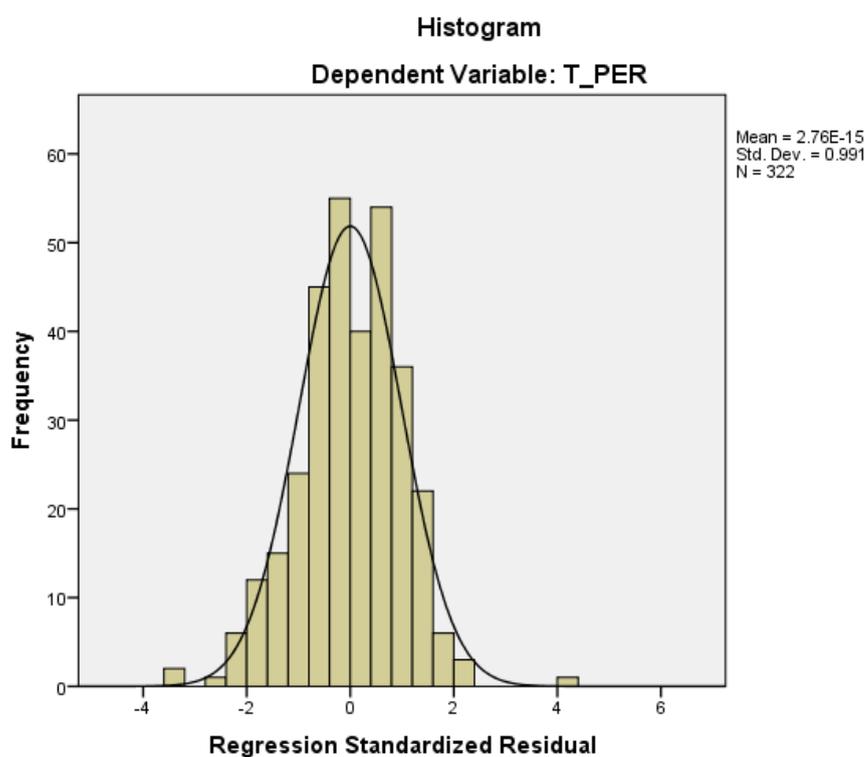


Figure 4.1: Histogram

Multicollinearity

Absence of multicollinearity is an essential assumption of multiple regression. Assessment of multicollinearity is one of the preliminary analysis deemed to be conducted in regression analysis. However, in statistical analysis, independent variables are expected to be correlated with the dependent variable (Hair et al, 2010). But when one independent variable is extremely correlated with one or more other independent variables, then multicollinearity occurs (Field, 2009; Montgomery, Peck & Vining, 2015). Keith (2014) noted that, multicollinearity occurs due to the high correlations between the independent variables or when one predictor variable is at linear combination with other predictor variables. Therefore, when multicollinearity occurs, the standard error of the variables' coefficients tend to increase which by implication renders some study variables (independent) statistically insignificant (Tabachnick & Fidell, 2007). Therefore, this arguably affects in a significant way the predictive

power of the study model (Hair et al, 2010; Tabachnick & Fidell, 2007). Specifically, independent variables are deemed highly correlated if the correlations between them reaches 0.90 and above (Hair et al, 2010; Tabachnick & Fidell, 2007). This implies that, if the independent variables are excessively interrelated, they contains similar and possibly unwanted information, hence, one of the variables need to be dropped because not all of them are required in one analysis (Maiyaki & Moukhtar, 2011, Gorondutse & Hilman, 2014).

In this study, multicollinearity was examined by employing Pearson correlation in assessing the association between the variables. Thus, the extent of interrelationship between the independent variables is depicted in the table below.

Table 4.1
Correlation Analysis

Constructs	1	2	3	4	5	6
GO	1					
PM	.742**	1				
PR	.732**	.871**	1			
AC	.556**	.560**	.600**	1		
IC	.644**	.705**	.697**	.663**	1	
PA	.502**	.596**	.619**	.543**	.694**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Note: GO=Goal orientation, PM=Performance Measurement, PR=Performance Reporting, AC=Accountability, IC=Institutional Culture, PA=Performance Audit.

From the table above, it is established that, none of the correlation exceeds 0.90 minimum threshold as recommended by Tabachnick and Fidell (2007); Hair et al (2010). This clearly points that, multicollinearity is not an issue in this study.

Similarly, multicollinearity could also be examined through the assessment of VIF, tolerance value and condition index. VIF value that is 5 and above, tolerance value that is considered less than 0.20 and condition index that is greater than 30 are considered and marked as cases of multicollinearity (Keith, 2014; Hair et al, 2010; Tabachnick & Fidell, 2007). It is therefore worthy to note that, in this study no variable falls within such ranges and thresholds. Therefore, this has further confirmed that, multicollinearity has been thoroughly checked and found to be absent in this study. The following table indicated the figures of the Variance Inflated Factor (VIF), tolerance value and the condition index.

Table 4.2

Tolerance, Variance Inflated Factor (VIF) and Condition Index

Constructs	Collinearity Statistics		Condition Index
	Tolerance	VIF	
GO	.391	2.558	10.830
PM	.225	4.436	24.349
PR	.220	4.548	12.688
AC	.511	1.956	16.587
IC	.327	3.059	19.050
PA	.476	2.100	20.961

Finally, from the above table, the values for VIF, tolerance and condition index are extracted. It has been established that, all the values have fulfilled the conditions, and none is found to be a case of multicollinearity.

Non-Response Bias Test

Sometimes, in survey research, respondents chosen as the sample might be unable or unwilling to participate in the study (Field, 2009; Pallant, 2010), this situation gives rise to non-response bias. Non-response bias in a survey refers to the situation where the differences exist between the respondents who decided to answer the questionnaires and those who do not (Davern, 2013). Hawkins (1975) noted that, non-response refers to the inability of the researcher to get the data needed from some of the sampled subjects that otherwise forms part of the study target.

Although, it is important to test the non-response in a survey study, some researchers argue that, it does not necessarily influence the significance of the survey results (Collier & Bienstock, 2007). However, in dealing with non-response bias, Armstrong and Overton (1977) stressed that, trend extrapolation method is the best approach in examining the non-response bias. Thus, in line with Armstrong and Overton (1977) suggestions, this study adopted the time trend extrapolation approach. This implies that, the study response is divided into two group vis-à-vis early response and late response. Furthermore, an independent T-test was conducted between the groups to examine the non-response bias. The following table reveals the result of the non-response bias.

Table 1.3

Results of Independent-Samples T-test for Non-Response Bias

Variables	Group	N	Mean	Levene's Test for Equality of Variance	
				F	Sig
Public sector Organizational Performance	Early Response	211	3.35	.044	.835
	Late Response	111	3.39		
Goal Orientation	Early Response	211	3.37	.228	.633
	Late Response	111	3.52		
Performance Measurement	Early Response	211	3.12	.214	.644
	Late Response	111	3.22		
Performance Reporting	Early Response	211	3.14	.052	.820
	Late Response	111	3.24		
Accountability	Early Response	211	3.59	2.988	.085
	Late Response	111	3.66		
Institutional Culture	Early Response	211	3.38	1.460	.228
	Late Response	111	3.56		
Performance Audit	Early Response	211	3.27	.140	.708
	Late Response	111	3.37		

The table indicates that, there is absence of non-response bias because, the assumed equal variance level of significance of the study variables are noticeably greater than 0.05 recommended level of significance in the Levene's test of equality of variance (Pallant, 2010; Field, 2009; Collier & Bienstock, 2007).

Conclusion

From the result of the above preliminary analysis, it is clearly established that, 26 missing values found in the data set were duly replaced by mean substitution. Specifically, it is worthy to note that, mean substitution is suitable for replacement if the missing values in the data set are 5% or less (Tabachnick & Fidell, 2007). Similarly, the univariate and multivariate outliers were examined using Z-score and Mahalanobis Distance (D^2) respectively, but none was found in the data set. Equally still, the normality test was conducted to determine the pattern of the data in relation to the normal curve distribution. The data specifically indicates that, normality is assumed, thus, no noticeable skewness or kurtosis is found which could otherwise leads to the distortion of the normal distribution curve (Tabachnick & Fidell, 2007).

With regards to the multicollinearity issue, the Pearson correlation reveals that, the relationship between the exogenous variables does not exceeded the recommended threshold. This implies that, there is absence of multicollinearity among the exogenous variables. Finally, the non-response bias test indicates that, there is no significant difference between the early and the late response in the survey, hence, non-response bias is non-existent.

From the foregoing, it is confirmed that, the data for this study is suitable and readily fitted for further stages of the multivariate analysis like multiple and hierarchical regression. Having conducted the data screening exercise and the preliminary analysis, all the assumptions are apparently and deservedly fulfilled.

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