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Exploratory Factor Analysis on Employees' Competence Construct: Evidence from Nigerian Basic Educational System

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Abstract

This study is an attempt to provide a reliable instrument for measuring employees' competence through Exploratory Factor Analysis (EFA), specifically in the context of Nigeria basic education. The study explores EFA to ascertain whether the dimensionality of items measuring employees' competence has changed from previous studies, as the current study differs in terms of social and cultural status. Many studies have used various instruments to measure competency. This study laid emphasis on four (4) selected dimensions of competency namely self-competency, team competency, communication competency, and ethical competency which are suited to the target population. Hence, this study examines the EFA of employees' competence using 20 items in measuring four (4) dimensions of competency. The researcher employed a cross-sectional design with a structured survey in carrying out the study and data was collected randomly from 116 respondents working in Kebbi State Universal Basic Education System Administration (UBESA). From the analysis conducted under EFA, the said instrument has met all EFA requirements and proved that 20 items with 4 dimensions of competency containing five (5) items for each dimension are a reliable instrument. The Cronbach Alpha test which verifies the internal reliability of the said instrument also met the threshold of above 0.7 for each dimension of the competency construct.

Keywords: Exploratory Factor Analysis, Employees' Competence, Basic Educational System, Nigeria.

1.0 INTRODUCTION

Competence is regarded as a set of demonstrable features and skills that enables and enhances efficiency and entire job performance. Thus, competency is a sequence of skills, abilities, knowledge behaviors, and experiences, that leads to vigorous individuals' performance towards organizational activities (Chan & Yeung, 2020). Competency is measurable and can often be developed through effective training. Several scholars termed competence as a mixture of both theoretical and practical knowledge, behavior, values, and cognitive skills utilized in improving employees' job performance; or as the quality or a state of being well qualified or adequately having the required ability to execute a specific responsibility (Maaleki, 2018). Moreover, competency is also utilized as a description of essential requirements of human elements in a particular organization or even community (Maaleki, 2018). Hence, competency models can simply be applicable to the entire employees in a specific organization. Also, competencies are said to be what individuals required to be successful in carrying out their job responsibilities (Chan et al., 2017; Mulder, 2001; Robinson et al., 2007). Consequently, Hellriegel & Slocum, (2011) has identified several competencies which includes; self-competency, team competency, communication competency, and ethical competency as key competencies capable of influencing behavior of employees, teams as well as the effectiveness of an organization (Otoo, 2018).

1.1 Background

The Universal Basic educational system was introduced in Nigeria in 2004 for the purpose of providing free education to its citizens between the age of six to fourteen. The program was introduced to drastically reduce the percentage of out-of-school kids (children) in the country (Claudia, 2017). In addition, the program is driven towards enhancing the quality of basic and other levels education in the society. Based on this, the government established the Universal Basic Education Commission (UBEC) at federal level, while State Universal Basic Education Boards in each of the thirty-six (36) states across the country to ensure adequate implementation of the program (UBE Act., 2004).

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1.2 Motivation for the Study

The implementation of basic education program in Nigeria has remained ineffective due to the fact that, Nigeria has been described as the country with highest percentage of children (11 million) who are not in school globally (Biodun, 2022; UNICEF, 2018). Consequently, the growing number of children who are out-of-school in the country stands as symptom of inadequate implementation of the basic educational program introduced by the government, suggesting employees' incompetence towards ensuring adequate implementation of the program (Jennifer, 2018; Sammuel, 2018). This serves as the key motivation for the researcher to consider embarking on this study by examining several components of competency, taking into consideration that competencies are mechanisms for addressing behavioral expectation of a particular job as well as the technical skills of the job (Sani et al., 2022).

1.3 Objective and Scope of the Study

The main aim of this study is to test the reliability of the instrument for measuring employees' competence through Exploratory Factor Analysis (EFA). This study was carried out in Kebbi State Basic Educational system in Northwestern region of Nigeria. The study targeted both managerial and non-managerial employees working in Kebbi State Basic Educational system.

2.0 LITERATURE REVIEW

2.1 Self-Competence

This dimension is considered as employees' ability to withstand changes, and have self-determination, self-discipline, ready to develop oneself, as well as ability to initiate actions (Salman & Ganie, 2020). It has been emphasized that, self-competence is capable of increasing employees' abilities, efficiency and general performance in a stressful situations (Elbaz et al., 2018). Thus, self-competence emerged as a result of successful manipulation of employees' environment from realizing specified objectives (Salman & Ganie, 2020). Self-competence can be termed as liable upon which the communication between fairly objective outcomes and the actual attempts towards sustaining them. Hence, increase in the level of self-competence amongst employees has a great tendency of ensuring the attainment of organizational goals (Elbaz et al., 2018).

2.2 Team competence

This dimension is regarded as employees' abilities, knowledge, and skills to develop, support as well as lead a particular team in the attainment of organizational success (Potnuru & Sahoo, 2016). In addition, team competence is been considered as demonstration of required positive behavior and other attitudes by employees within a particular team with the aim of attaining both individuals and firms' objectives (Salman & Ganie, 2020). Team competence has the ability of producing more cooperative and creative teams, enhance team participation towards ensuring success of a given organization (Potnuru & Sahoo, 2016). Team competence has gained more attention across several institutions towards advancing effective strategies aimed at enhancing employees team competence and overall performance (Salman & Ganie, 2020).

2.3 Communication competence

This dimension is seen as employees' ability to make selection amongst different communicative behaviors in such a manner that he/she may effectively achieve the set objectives in case of any encounter while sustaining line and face of the employees within the limit of a given condition (Wiemann, 1997). Similarly, communication competence is considered as a combination of five major skills that consist social relaxation, empathy, interaction management, behavioral flexibility, support and affiliation. Thus, communication competence is also regarded as set of skills acquired by individuals which are considered necessary and helpful towards accomplishing specific job responsibilities (Hoy & Miskel, 2010). Hence, employees who happens to be competent in terms of communication are said to have the ability of sending messages as well as listening and providing feedback effectively.

2.4 Ethical competence

This dimension is described as employee's ability to utilize suitable decision making and problem-solving skills when facing some challenges and moral hitches (Sunstein, 2005). Again, it is considered as institutional ability to make use of suitable mechanisms in addressing moral challenges. Hence, ethical competence is said to be an importance of transparent and fair approach by adopting the highest standard of honesty, ethical behavior, integrity, and professionalism in the entire organizational activities (Kavathatzopoulos et al., 2012). It could be regarded as employee's ability to utilize appropriate organizational procedures towards managing moral challenges.

3.0 METHODS

3.1 Pre-test

Pre-test is the popular method used in research to verify the appropriateness of questionnaire by experts in a particular field of study so as to make sure that the research questions intended to use by a researcher are suitable before any proceedings in data collection (Zikmund et al., 2013). This test is very important as it allows for the assessment of the suitability and understanding of the questions intend to use by the researcher (Curtarelli & Van Houten, 2013). In this study, questionnaires were adapted, modified and customized by the researcher in order to suit the current research population towards achieving the reliability of the instrument measuring employees' competence.

3.2 Validity

The content and criterion validity of this study were considered by academic expert views from the same field of study as well as the opinions from the management from state universal basic education. The face validity which tends to offer information about whether an instrument offers sufficient coverage of the given topic. For the content and criterion validity of this research work, the opinions, and suggestions by five (5) expert's views from both academia and the management from

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state universal basic education have been taken into consideration to ensure the suitability of the instruments. Overall, the experts found some questions to be double-barrel and ambiguous. Accordingly, their remarks were considered by the researcher in redrafting the survey instrument.

3.3 Data Reduction Procedure (EFA Analysis)

The use of Exploratory Factor Analysis (EFA) procedure for every construct by the researcher has been strongly emphasized in the quest to ascertain whether the dimensionality of items has changed from prior researches (Awang, 2012, 2015). The EFA is regarded as a technique used by modern researchers to organize, identify, and reduce the number of given items in an exact questionnaire into a précised construct. In this study, 116 samples were utilized which is suitable for the conduct of analysis in this research work. The technique for conducting EFA was executed on employees' competence construct with Principal Components Analysis (PCA) and Kaiser-Meyer-Olkin (KMO) is used in determining the Bartlett's Test and the sampling adequacy to find out the significance of the constructs. The KMO test shall indicate the presence of any multicollinearity in the given items (Chua, 2009) with the value from 0 to 1. Thus, the most appropriate items to be used for the EFA analysis is when the value of the KMO test exceeds 0.6 (Awang, 2012).

4.0 RESULT AND DISCUSSION

This construct has been measured with the use of twenty (20) items in the research questionnaire. The EFA result in Table 1, clearly indicates the descriptive statistics for each of the given items measuring the employee's competence construct. The competency construct was measured with the use of internal scale (Likert) (Awang et al., 2016; Bahkia et al., 2019; Rahlin et al., 2019), ranging from one (1) (strongly disagreed) to ten (10) (strongly agree). The mean, as well as the standard deviation of the score for each item is revealed in Table 1.

Table 1. Mean and Standard Deviation for Items Measuring Employees Competence

Serial Number	Items Code	Mean	Std. Deviation
1	SC1	9.10	.727
2	SC2	8.84	.787
3	SC3	9.09	.764
4	SC4	8.92	.759
5	SC5	9.01	.752
6	CC1	9.24	.706
7	CC2	8.70	.906
8	CC3	8.82	.809
9	CC4	8.98	.746
10	CC5	9.04	.751
11	TC1	8.40	.893
12	TC2	8.71	.969
13	TC3	8.64	.762
14	TC4	8.83	.868
15	TC5	9.03	.932
16	EC1	8.75	.922
17	EC2	8.89	.800
18	EC3	8.93	.788
19	EC4	8.78	.800
20	EC5	9.05	.767

The EFA with the application of the extraction method of Principal Component Analysis (PCA) and varimax (variation maximization), rotation was carried out on these twenty (20) items measuring the employees' competence construct. The results in Table 2, clearly shows the Bartletts' Test of Sphericity is significant since the P-Value is less than 0.05 (significant). Furthermore, the measure of sampling adequacy by Kaiser-Meyer-Olkin (KMO = 0.817) is excellent since it has exceeded the required threshold value of 0.6 (Awang, 2010; Rahlin et al., 2019). These two results (the KMO value greater than 0.6 and the Bartlett's Test P-value less than 0.05) signify that the data is adequate and suitable to proceed with the data reduction process in EFA (Awang, 2010; Bahkia et al., 2019; Rahlin et al., 2019).

Table 2. KMO and Bartlett's Test Score for Employee Competence Construct

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.817
Bartlett's Test of Sphericity	Approx. Chi-Square	1238.292
	df	190
	Sig.	.000

The scree plot in Figure 1, clearly indicates four (4) dimensions or components which was derived from the twenty (20) items measuring the employees' competence construct. In other words, the EFA procedure has grouped the twenty (20) items measuring the construct into four (4) components where each component/dimension has particular number of items (Awang et al., 2018).

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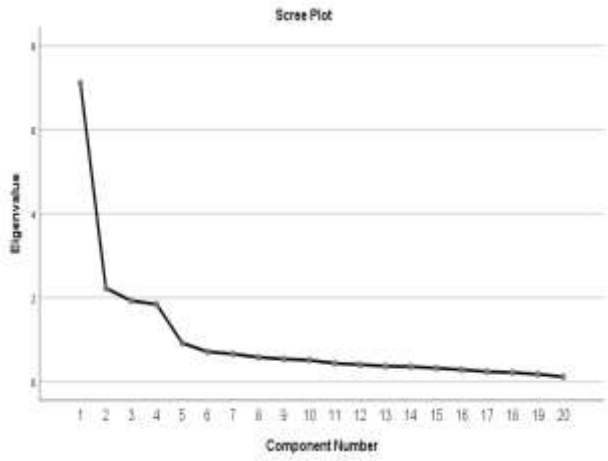

Figure 1. Scree Plot shows clearly four components emerged from the EFA procedure

4.1 Total Variance Explained for Employees Competence Construct

The results presented in Table 3, indicates that there are four components emerged from the EFA technique based on the computed eigenvalue greater than 1.0. The eigenvalues are 7.110 for component 1, 2.230 for component 2, 1.929 for component 3 and 1.845 for component 4. The total variance explained for the construct is 65.568%. In other words, these twenty (20) items that has been grouped into four components are measuring about 65.568% for the employees' competence construct. The total variance explained is acceptable since it has exceeded the minimum requirement of 60% (Awang, 2010; Bahkia et al., 2019; Rahlin et al., 2019). In other words, the items intended to measure the given construct should be able to measure at least a minimum of 60% of a given construct.

Table 3. The Total Variance Explained for Employees Competence Construct

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**7.110**	35.549	35.549	3.566	17.832	17.832
2	**2.230**	11.150	46.699	3.237	16.186	34.019
3	**1.929**	9.645	56.343	3.229	16.147	50.166
4	**1.845**	9.225	**65.568**	3.080	15.402	**65.568**
Extraction Method: Principal Component Analysis.						

Likewise, Table 4, shows the four (4) components emerged and their respective items code emerged from the EFA process. Hence, the factor loading for each of the items should be above 0.6 so as to be retained (Awang, 2010; Bahkia et al., 2019; Rahlin et al., 2019). Thus, any item that fails to achieve the minimum requirement for loading factor of 0.6 should be deleted (Awang, 2010; Bahkia et al., 2019; Rahlin et al., 2019). Table 4 shows the items code as well as their respective factor loading. Hence, no item has been deleted since all the factor loadings are above 0.6 as required.

Table 4. Factor Loadings for Each Component

Rotated Component Matrix				
	Component			
Items Code	1	2	3	4
SC1			.784	
SC2			.689	
SC3			.805	
SC4			.766	
SC5			.751	
CC1				.742
CC2				.730
CC3				.698
CC4				.806
CC5				.747
TC1	.744			
TC2	.818			
TC3	.791			
TC4	.821			
TC5	.795			
EC1		.725		
EC2		.728		
EC3		.770		
EC4		.783		
EC5		.752		

The study renamed component 1 as self-competence, component 2 as team competence, component 3 as communication competence and component 4 as ethical competence.

4.2 Internal Reliability for Employees Competence Construct

Lastly, the study must compute the value of Cronbach's Alpha which reflects the internal reliability for the retained items in measuring their latent construct. The internal consistency or internal reliability signifies how strong the given items hold together in their respective components in measuring their particular construct. Hence, the value of Cronbach's Alpha should be above 0.7 for the items to attain the internal reliability (Awang, 2012). Thus, Table 5 shows the Cronbach Alpha for each component of employees' competence construct.

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Table 5. The Internal Reliability for Employees Competence Construct

Component	No of Items	Cronbach's Alpha
Self-Competence	5	0.860
Team Competence	5	0.828
Communication Competence	5	0.894
Ethical Competence	5	0.894
Total	**20**	**0.902**

In addition, the Cronbach value in Table 5, shows that the items have good and suitable internal reliability for measuring each component of the employees' competence construct (Cronbach > 0.7). The Cronbach's Alpha for the whole twenty (20) items is 0.902.

5.0 CONCLUSION

The current study have added value to the employees' competence construct measurement, specifically in the context of Nigerian Basic Educational system. The EFA result formed a specific configuration which tends to extract four (4) major components of employees' competence, which can essentially be measured by twenty (20) items suggested in this study. The items have attained high Cronbach's Alpha value, the Bartlett Test met the required value (significant), the KMO is above 0.6, and the factor loading is above the required threshold value of 0.6 indicating that these elements are suitable in this research work (Awang, 2012). Thus, the current study validation confirmed that the validated instrument is stable and consistent across several samples, and recommended to be utilized in future studies.

6.0 CONTRIBUTION

The current study advances the logical evidence regarding employees' competence. In addition, this investigation endeavored to bridge the research gap in the bulk of literature (Nana & Otoo, 2018; Otoo, 2018), which determined the need to improve the knowledge and comprehensiveness of employees' competence in a workplace. Specifically, it has described how future studies could assess employees' competence in relation to several organizations, as well as in various countries by testing its suitability across dialects and cultures.

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