

Developing and Validating Instruments for Measurement of Organizational Culture Dimensions for Organizational Development Achievement

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ABSTRACT: In the study of educational administration, there are still many researchers who use quantitative research methods based on Structural Equation Modeling (SEM) to analyze the various relationships between variables in the model formed based on the theory under study. Before data were analyzed with SEM, Exploratory Factor Analysis (EFA) was needed to identify the appropriate items for use in the research instrument. Therefore, this study was undertaken to develop and validate EFA-based process instruments for the measurement of organizational culture dimensions for organizational development achievement. This study has adapted the instruments that have been developed by some previous researchers based on Handy's cultural model developed by Handy (1996), and modified some statements in accordance with current research. According to Awang (2010; 2012), if a researcher adapts the instrument previously developed by the researcher and modifies the statement to fit the current research, they need to re-run the EFA procedure, as the current field of study may be different from previous research or current research population far In contrast to previous studies in terms of socio-economic, racial and cultural status. Therefore, some of the previously constructed items are no longer suitable for current research or there may be different structural items in the current study compared to structures that have been found in previous studies. Therefore, researchers need to recalculate the value of Internal Reliability for the current instrument of the new Cronbach Alpha value. Taking into consideration the recommendation by Awang (2010; 2012), researchers have decided to re-run EFA on items that measure their construction. This study will explain in detail the procedures for carrying out EFA analysis for each construct.

KEYWORDS: Exploratory Factor Analysis (EFA), Structural Equation Modeling (SEM), Kaiser-MeyerOlkin (KMO), Total Variance Explained, Factor Loading.

I. INTRODUCTION

Studies in the field of education are often conducted by researchers, but researchers rarely use the SEM study method to analyze the various relationships between variables in the model formed based on the theory under study. The validity and reliability of item questionnaires can sometimes be debated, as this technique is not appropriate when evaluating. Therefore, to generate the validity and reliability of the item questionnaire, the researcher must first apply the Exploratory Factor Analysis (EFA) process to obtain the items that are truly feasible for use in research instruments. This research will explain in detail the methods to obtain validity and reliability of item questionnaires by using EFA for measurement of organizational culture dimensions for Human Resources Management Development.

Exploratory Factor Analysis (EFA) : EFA is identifying the components that exist within the set of questionnaires that have been established. EFA is a statistical technique that converts a linearly constructed data set into a small construction set that can provide a thorough overview of all the information contained in the original construction (Duntemen, 1989). The goal of EFA is to reduce the dimensions of the original data to some smaller components and can be interpreted more easily and meaningfully (Duntemen, 1989; Lewis-Beck, 1994 & Field, 2006). EFA plays a vital role in this study to examine the interrelationships among the items of four dimensions of organizational culture (Power Culture, Role Culture, Task Culture and People Culture) which are used to compress a group of items into a smaller set of combination factors with a minimum loss of information, and can be interpreted more easily and meaningfully (Field, 2006; Lewis-Beck, 1994; Duntemen, 1989) and hence laid the foundation of structural equation modelling (Hair et al., 2006). The items used in this study have adapted from the instruments that have been developed by some previous researchers, as well as modifying some statements to suit the current research. According to Hoque et al. (2017c), Hoque&Awang (2016b), Hoque &Awang (2016c), Awang (2012) if a researcher adjusts the instruments previously set by the researchers and modifies statements appropriate to current research, then they must conduct the EFA procedure. This is because the current field of study may be different from previous studies, or the current research population is much different from previous studies in terms of socio-economic, racial and cultural status.

Therefore, there may be some items that were previously built, and no longer appropriate for current research. Thus, researchers need to recalculate the value of internal reliability for the current instrument, the new Cronbach Alpha value (Hoque et al., 2018a;Hoque et al. 2017b; Hoque et al., 2017d; Hoque&Awang, 2016b; Awang, 2012). In this study, researcher conducted a pilot study on 100 academic and administrative members from 3 Jordanian public universities and ran an EFA on an item that measures construction by considering recommendations by Awang (2010; 2012) &Hoque et al. (2016, 2017).

II. RESEARCH FINDINGS

Exploratory Factor Analysis (EFA) for Organizational Culture Constructs

Power Culture : Building Power Culture is measured using 9 items labelled as PC1 to PC9. Each item statement is measured using an Interval Scale of 1 to 10. The EFA procedure using Principal Component Analysis (PCA) with Varimax Rotation has been performed on 9 items that measure the construction of Power Culture. The findings from Table 1 show that the Bartlett Test score is significant (P value <0.05). Measure Sampling Adequacy by Kaiser-Meyer-Olkin (KMO) is 0.873 which is above the minimum value of 0.6 (Awang, 2010; 2012 &Hoque et al., 2016; 2017). Both achievements (Significant Bartlett Test, and KMO value> 0.6) reflect observed data for subsequent procedures in EFA (Awang, 2010; 2012 &Hoque et al., 2016; 2017).

Table 1: Value of KMO and Bartlett Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.873
Approx. Chi-Square		563.717
Bartlett's Test of Sphericity	df	36
	Sig.	.000

The Total Variance Explained is important for the researcher to know what percentage of items used can measure the study construction. Table 2 shows the total value of variance estimated by the items used to measure the construction of Power Culture. The reading from Table 2 shows that the construction of power culture measured using 9 items in 1 component can measure the construction of the Motivation of 70.093%. This value is sufficient because it exceeds the minimum requirements of 60% (Awang, 2010; 2012 &Hoque et al., 2016; 2017).

Table 2: The Estimated Amount of Variance

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.156	12.848	70.093	1.156	12.848	70.093

Extraction Method: Principal Component Analysis.

The findings from Table 2 show the construction of Power Culture measured by one component only. From Table 3, the factor loadings also presented a clean and highly interpretable solution: the 9 items loaded significantly on one factor as the study conceptualized – power culture. The Table 3 also reveals that all the nine items were above the generally agreed upon lower limit of 0.60 for research at exploratory factor analysis stage (Awang, 2012). This result indicates that all the nine items are high internal consistency among the items within each factor in the study.

Table 3: Items for component

Items	Component
	1
PC1	.809
PC2	.860
PC3	.863
PC4	.848
PC5	.826
PC6	.760
PC7	.858
PC8	.812
PC9	.803

Another information that should be reported by researchers is the reliability of items that have been built to measure the constructs. Measurement of instrument reliability is estimated through the Cronbach Alpha value. The Cronbach Alpha value of the instrument must exceed a minimum of 0.7 for adoption in this study. Table 4 shows the Cronbach Alpha value is valid for this construct.

Table 4: Instrument Reliability Value

Component	Items	Cronbach's Alpha
1	9	0.904

Role Culture : Building Power Culture is measured using 9 items labelled as RC1 to RC9. Each item statement is measured using an Interval Scale of 1 to 10. The EFA procedure using Principal Component Analysis (PCA) with Varimax Rotation has been performed on 9 items that measure the construction of Role Culture. The findings from Table 5 show that the Bartlett Test score is significant (P value <0.05). Measure Sampling Adequacy by Kaiser-Meyer-Olkin (KMO) is **0.829** which is above the minimum value of 0.6 (Awang, 2010; 2012 &Hoque et al., 2016; 2017). Both achievements (Significant Bartlett Test, and KMO value > 0.6) reflect observed data for subsequent procedures in EFA (Awang, 2010; 2012 &Hoque et al., 2016; 2017).

Table 5: Value of KMO and Bartlett Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.829
Approx. Chi-Square		438.773
Bartlett's Test of Sphericity	df	36
	Sig.	.000

The Total Variance Explained is important for the researcher to know what percentage of items used can measure the study construction. Table 6 shows the total value of variance estimated by the items used to measure the construction of Role Culture. The reading from Table 6 shows that the construction of Role Culture measured using 9 items in 1 component can measure the construction of the Role Culture of 62.945%. This value is sufficient because it exceeds the minimum requirements of 60% (Awang, 2010; 2012 &Hoque et al., 2016; 2017).

Table 6: The Estimated Amount of Variance

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.051	11.680	62.945	1.051	11.680	62.945

The findings from Table 6 show the construction of Role Culture measured by one component only. Thus, the researcher wants to know the item chosen to measure the component. Table 7 shows the distribution of items received to measure the construct of Role Culture. All items have a factor loading exceeding the minimum limit of 0.6 as suggested by Awang (2010; 2012) &Hoque et al. (2016, 2017). Items weighing less than 0.6 should be excluded as they do not contribute to construction of construct (Awang, 2010; 2012 &Hoque et al., 2016; 2017). RC5 and RC6 items have a factor loading of less than 0.6 and are excluded from the questionnaire for further study.

Table 7: Items for component

Items	Component
	1
RC1	.801
RC2	.896
RC3	.736
RC4	.628
RC5	This item is disengaged
RC6	This item is disengaged
RC7	.655
RC8	.825
RC9	.883

Another information that should be reported by researchers is the reliability of items that have been built to measure the construct. Measurement of instrument reliability is estimated through the Cronbach Alpha value. The Cronbach Alpha value of the instrument must exceed a minimum of 0.7 for adoption in this study. Table 8 shows the Cronbach Alpha value for the component of the Role Culture construct. This construct has an Alpha Cronbach value exceeding the value of 0.7 and can be applied in this study (Awang, 2010; 2012). Table 8 shows the component that measure this construction to achieve the required internal reliability.

Table 8: Instrument Reliability Value

Component	Items	Cronbach's Alpha
1	7	0.874

Task Culture : Building Task Culture is measured using 9 items labelled as TC1 to TC9. Each item statement is measured using an Interval Scale of 1 to 10. The EFA procedure using Principal Component Analysis (PCA) with Varimax Rotation has been performed on 9 items that measure the construction of Task Culture. The findings from Table 9 show that the Bartlett Test score is significant (P value <0.05). Measure Sampling Adequacy by Kaiser-Meyer-Olkin (KMO) is **0.900** which is above the minimum value of 0.6 (Awang, 2010; 2012 &Hoque et al., 2016; 2017). Both achievements (Significant Bartlett Test, and KMO value > 0.6) reflect observed data for subsequent procedures in EFA (Awang, 2010; 2012 &Hoque et al., 2016; 2017).

Table 9: Value of KMO and Bartlett Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.900
Approx. Chi-Square	569.049
Bartlett's Test of Sphericity df	36
Sig.	.000

The Total Variance Explained is important for the researcher to know what percentage of items used can measure the study construction. Table 10 shows the total value of variance estimated by the items used to measure the construction of Task Culture. The reading from Table 10 shows that the construction of Task Culture measured using 9 items in 1 component can measure the construction of the Task Culture of 62.324%. This value is sufficient because it exceeds the minimum requirements of 60% (Awang, 2010; 2012 &Hoque et al., 2016; 2017).

Table 10: The Estimated Amount of Variance

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.609	62.324	62.324	5.609	62.324	62.324
Extraction Method: Principal Component Analysis.						

The findings from Table 10 show the construction of Task Culture measured by one component only. Thus, the researcher wants to know the item chosen to measure the component. Table 11 shows the distribution of items received to measure the construct of Task Culture. All items have a factor loading exceeding the minimum limit of 0.6 as suggested by Awang (2010; 2012) &Hoque et al. (2016, 2017). Items weighing less than 0.6 should be excluded as they do not contribute to construction of construct (Awang, 2010; 2012 &Hoque et al., 2016; 2017). TC9 item has a factor loading of less than 0.6 and are excluded from the questionnaire for further study.

Table 11: Items for component

Items	Component
	1
TC1	.826
TC2	.808
TC3	.820
TC4	.835
TC5	.743
TC6	.809
TC7	.773
TC8	.793
TC9	This item is disengaged

Another information that should be reported by researchers is the reliability of items that have been built to measure the construct. Measurement of instrument reliability is estimated through the Cronbach Alpha value. The Cronbach Alpha value of the instrument must exceed a minimum of 0.7 for adoption in this study. Table 12 shows the Cronbach Alpha value for the component of the Task Culture construct. This construct has an Alpha Cronbach value exceeding the value of 0.7 and can be applied in this study (Awang, 2010; 2012). Table 8 shows the component that measure this construction to achieve the required internal reliability.

Table 12: Instrument Reliability Value

Component	Items	Cronbach's Alpha
1	8	.922

People Culture : Building People Culture is measured using 9 items labelled as PPC1 to PPC9. Each item statement is measured using an Interval Scale of 1 to 10. The EFA procedure using Principal Component Analysis (PCA) with Varimax Rotation has been performed on 9 items that measure the construction of People Culture. The findings from Table 13 show that the Bartlett Test score is significant (P value <0.05). Measure Sampling Adequacy by Kaiser-Meyer-Olkin (KMO) is **0.919** which is above the minimum value of 0.6 (Awang, 2010; 2012 & Hoque et al., 2016; 2017). Both achievements (Significant Bartlett Test, and KMO value > 0.6) reflect observed data for subsequent procedures in EFA (Awang, 2010; 2012 & Hoque et al., 2016; 2017).

Table 13: Value of KMO and Bartlett Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.919
Approx. Chi-Square	569.681
Bartlett's Test of Sphericity df	36
Sig.	.000

The Total Variance Explained is important for the researcher to know what percentage of items used can measure the study construction. Table 14 shows the total value of variance estimated by the items used to measure the construction of People Culture. The reading from Table 14 shows that the construction of People Culture measured using 9 items in 1 component can measure the construction of the People Culture of 62.120%. This value is sufficient because it exceeds the minimum requirements of 60% (Awang, 2010; 2012 & Hoque et al., 2016; 2017).

Table 14: The Estimated Amount of Variance

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.591	62.120	62.120	5.591	62.120	62.120
Extraction Method: Principal Component Analysis.						

The findings from Table 14 show the construction of People Culture measured by one component only. Thus, the researcher wants to know the item chosen to measure the component. Table 15 shows the distribution of items received to measure the construct of People Culture. All items have a factor loading exceeding the minimum limit of 0.6 as suggested by Awang (2010; 2012) & Hoque et al. (2016, 2017). Items weighing less than 0.6 should be excluded as they do not contribute to construction of construct (Awang, 2010; 2012 & Hoque et al., 2016; 2017). PPC1 and PPC9 items have a factor loading of less than 0.6 and are excluded from the questionnaire for further study.

Table 15: Items for component

Items	Component
	1
PPC1	This item is disengaged
PPC2	.885
PPC3	.808
PPC4	.832
PPC5	.820
PPC6	.840
PPC7	.780
PPC8	.815
PPC9	This item is disengaged

Information that should be reported by researchers is the reliability of items that have been built to measure the construct. Measurement of instrument reliability is estimated through the Cronbach Alpha value. The Cronbach Alpha value of the instrument must exceed a minimum of 0.7 for adoption in this study. Table 16 shows the Cronbach Alpha value for the component of the Role Culture construct. This construct has an Alpha Cronbach value exceeding the value of 0.7 and can be applied in this study (Awang, 2010; 2012). Table 16 shows the component that measure this construction to achieve the required internal reliability.

Table 16: Instrument Reliability Value

Component	Items	Cronbach's Alpha
1	7	.919

III. CONCLUSION

Overall, the goods requirement in each construction as a whole meets Bartlet Test achievements (significant), KMO (> 0.6), factors loading exceeds the minimum threshold of 0.6 and Alpha Cronbach exceeds the minimum limit of 0.7 for adoption in this study. This reflects that the items not set aside are applicable in this study (Awang, 2010; 2012; Hoque et al., 2016; 2017). After applying EFA, items to build Power Culture are high internal consistency, Role Culture have decreased from 9 to 7, Task Culture items decreased from 9 to 8 and People Culture items decreased from 9 to 7. The total item of the instrument in this study decreased from 36 to 31.

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