Psychometric Analysis of Role Conflict and Ambiguity Scales in Academia

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Abstract

A comprehensive Psychometric Analysis of Rizzo et al.'s (1970) Role Conflict & Ambiguity (RCA) scales were performed after its distribution among 600 academic staff working in six universities of Pakistan. The reliability analysis includes calculation of Cronbach Alpha Coefficients and Inter-Items statistics, whereas validity was determined by running Exploratory and Confirmatory Factor Analyses. The reliability analysis revealed that RCA scales possessed sufficient internal consistencies, i.e. ($\sum \alpha= 0.85$ & $r= 0.61$). On the other side, Factor Analysis revealed that mean factor loadings for all items ranged up to 0.85, which resulted in three-factor model fit for role conflict and two-factor model fit for role ambiguity. The overall results confirm that RCA scales possess good psychometric properties, thus it could used for assessment of role conflict and ambiguity among academic staff in Pakistan.

Keywords: role conflict, role ambiguity, academic staff, reliability, validity

1. Introduction

The prevalent transitions in the nature and functioning of universities have brought a paradigm shift in working lives of academic staff throughout the world (Teichler, Arimoto, & Cummings, 2013). Now the academicians are expected to perform various types of academic and non academic roles at different levels, due to which they are subjected to role related demands that hamper their working performance. For this reason, in the last two decades, the study of role demands has received increased attention and researchers have identified different kinds of role demands, among which the role conflict and ambiguity are the dominant types of role demands in teaching profession. It is because academicians are subjected to incompatible and inconsistent demands from students, parents and management side, which could not be reconciled; as a result they experience role conflicts. Furthermore, academicians sometimes do not have clear information about the nature of different tasks, responsibilities and goals assigned to them, resultantly they face role ambiguity (Gold & Roth, 2013).

The wide recognition of role demands as workplace hazard has led the researchers to develop scales for its measurement. These scales include for example Rizzo, House, and Lirtzman's (1970) Role Conflict and Ambiguity scale, House and Rizzo's (1972) Role Conflict and Ambiguity scale, House, Schuler, and Levanoni's (1983) Role Conflict and Ambiguity scale, Tompson and Werner's (1997) Role Conflict Scale and Zohar's (1997) Role Hassles Index, etc. Among these all scales, Rizzo et al.'s (1970) RCA scales have been most extensively used because it was one of the first reliable and valid scale being developed for the measurement of role demands. This scale measures both role conflict and ambiguity (Fields, 2002). Previous researchers had reported good psychometric properties of this scale, e.g. Conley and Woosley (2000) have reported Cronbach's alpha value of 0.83 for role conflict and 0.72 for role ambiguity, with mean factor loading up to 0.80 items of role conflict and ambiguity. Similarly, Day and Chamberlain (2006) have reported mean Cronbach's alpha value up to 0.85 for RCA scales. The Rizzo et al.'s (1970) RCA scales also possesses good model fit, e.g. Kelloway and Barling (1990) and Netemeyer, Johnston, and Burton (1990) found that both the two-factors and three-factors models demonstrated better fit for RCA scales.

Despite its wide recognition, there is less evidence for the test of Rizzo et al.'s (1970) RCA scales in the academia of Pakistan. Therefore, the current study has tested RCA scales among the academic staff in Pakistan

for determining its psychometric properties. Specifically, the RCA scales were distributed among 600 academic staff working in six universities of Pakistan, who were selected through a multi stage sampling process. After data collection, detail psychometric analysis of RCA scales was performed. Initially its reliability was determined through Cronbach's alpha calculation and later on inter-items statistics were performed to check its internal consistency. Furthermore, the construct validity was determined through Exploratory and Confirmatory factor Analyses. The reliability analyses revealed that RCA scales possessed sufficient internal consistencies, i.e. ($\sum\alpha= 0.85$ & $r= 0.61$). On the other side, Factor Analysis revealed that mean factor loadings for all items ranged up to 0.85, which resulted in three factors model fit for role conflict and two factors model fit for role ambiguity. The results of study showed that RCA scales possessed good psychometric properties after its administration among academic staff in Pakistan, therefore, it could be used a reliable and valid scale of measuring role conflict and ambiguity among academic staff in Pakistan.

2. Methodology

2.1 Scale Selection

The current study has utilized 20 items of Rizzo et al.'s (1970) RCA scales, where 12 items represented three dimensions of role conflict and 08 items represented two dimensions of role ambiguity. The three dimensions of role conflict included, 1) conflict between respondent's internal strengths and assigned roles; 2) conflict between time and resources possessed by respondent and the assigned roles; 3) conflict due to in compatible organizational demands. Whereas two the dimensions of role ambiguity included, 1) predictability of the outcomes; 2) clarity of information. The responses to these items were assigned five points Likert scale.

2.2 Population and Sample

The current study has utilized a multi stage sampling process. In first stage, three geographical regions of Pakistan, i.e. North Punjab, Federal Area Islamabad and Central Khyber Pakhtunkhwa, were selected as clusters. These clusters represented the total population of study. Three clusters were selected because it was neither physically nor financially possible to collect data from whole Pakistan. The Table 1 shows the detail of selected universities.

Table 1. Universities selected universities

Regions	No of Universities	No of Academic staff
Federal Area Islamabad	16	2300
North Punjab	07	675
Central Khyber Pakhtunkhwa	13	1770
Total	36	4745

After presenting universities in the three clusters, in the second stage, six universities were randomly selected, as shown in Table 2. It was ensured that both public and private universities were equally selected; moreover universities with more number of academic staff were selected because it can give better representation of the total population.

Table 2. Randomly selected universities

Universities/HEIs	Nature	Type	No of Staff
Federal Area Islamabad			
International Islamic University, Islamabad	General & Islamic studies	Public	263
Riphah International	General & Medical	Private	265
North Punjab			
UET, Taxila	Engineering	Public	173
University of Wah, Wah	General*	Private	115
Central Khyber Pakhtunkhwa			
University of Peshawar, Peshawar	General	Public	251
SUIT, Peshawar	Science & Technology	Private	190
Total			1257

*Note: The General universities contain department of Social Sciences, Natural Sciences & Engineering Technology.

In the last stage a sample of 600 (69+107+177+247 = 600) was obtained from the total population of 1257. Firstly the population was divided into male and female strata on basis of gender. Such strata were further divided into Professor, Associate Professor, Assistant Professor and Lecturer on job position basis. After the stratification, a Simple Random Sample of 600 was obtained, as the number of academic staff was already known and they had equal likelihood of being chosen. The Table 3 shows the population and sample distributions.

Table 3. Population and sample description

Universities/HEIs	Prof (N)	Prof (n)	Asso Prof (N)	Asso Prof (n)	Asst Prof (N)	Asst Prof (n)	Lec (N)	Lec (n)
Riphah International, Islamabad	35	*22*	28	*10*	89	*36*	113	*46*
International Islamic University	22	*12*	42	*30*	93	*37*	106	*43*
University of Wah	08	*05*	13	*06*	38	*20*	56	*36*
UET, Taxila	28	*10*	38	*25*	63	*26*	44	*30*
University of Peshawar	32	*15*	44	*29*	48	*30*	127	*51*
SUIT, Peshawar	09	*05*	17	*07*	62	*28*	102	*41*
Total	134	*69*	182	*107*	393	*177*	548	*247*

2.3 Statistical Analysis

The psychometric properties of of Rizzo et al.'s (1970) RCA scales was determined by folliwng statistical analyses:

(1) Item total Correlations

(2) Cronbach's Alpha Coefficient

(3) Inter-item Correlations

(4) Exploratory Factor Analysis

(5) Confirmatory Factor Analysis

2.4 Procedure

The data was collected through personal distribution of questionnaires. The faculty member's addressees were obtained from the official websites of the selected universities. Within a period of six months total 492 questionnaires were filled. The filled questionnaires were initially screened for missing data and later on the normality analyses were performed. Finally total 400 questionnaires were selected for further analyses.

3. Results

3.1 Reliability Analysis

The reliability of Rizzo et al.'s (1970) RCA scales was determined by performing the folliwng statistical analysis:

(1) Item-total Correlations

(2) Cronbach's Alpha Coefficient

(3) Inter-Scale Correlations

The Table 4 shows the Item-total Correlations and Cronbach's Alpha Coefficients. The Item-total Correlations range from 0.42 to 0.78, whereas the Cronbach's Alpha Coefficients range from 0.78 to 0.95. It means that the all items possess sufficient internal consistency.

Table 4. Items total correlations & Cronbach's Alpha Coefficient

Items	Items Total Correlations	Cronbach's Alpha
Role Conflict		
01	0.63	0.85
02	0.54	0.83
03	0.64	0.90
04	0.64	0.78
05	0.78	0.84
06	0.74	0.84
07	0.77	0.83
08	0.64	0.81
09	0.63	0.78
10	0.56	0.94
11	0.64	0.84
12	0.61	0.83
Role Ambiguity		
01	0.63	0.80
02	0.42	0.95
03	0.58	0.91
04	0.52	0.85
05	0.47	0.83
06	0.66	0.90
07	0.50	0.78
08	0.62	0.88
Total	$\sum 0.61$	$\sum 0.85$

The reliability was further checked by the Inter-scale correlations. For this purpose, the correlations between scores on sub scales of RCA scales were obtained. The Table 5 shows that the scores on sub scales are significantly correlated with each other, which prove that the RCA scales possess good internal consistency.

Table 5. Inter-Scale correlations

	RC01	RC02	RC03	RA01	RA02
RC01	01				
RC02	0.45	01			
RC03	0.52	0.38	01		
RA01	0.48	0.42	0.54	01	
RA02	0.61	0.55	0.46	0.63	01

Note: RC01= Intra-Role Conflict; RC02= Role Conflict due to time; RC03= Role Conflict due to expectations; RA01= Role Ambiguity due to lack of predictability; RA01= Role Ambiguity due to lack of information.

3.2 Validity Analysis

The validity is related with the accuracy of the scale. A valid scale should have the ability to detect any difference in measurement (Webb, 2008). In the current study, the construct validity was checked through Exploratory and Confirmatory Factor Analyses.

3.2.1 Exploratory Factor Analysis

In order to know the convergent validity, a Principal Component Analysis technique was used, with Varimax Rotation and extraction done on Eigen values greater than 01. The Kaiser-Meyer-Olkin test of measure of sample adequacy was also computed, as recommended up to value of 0.60, indicating that data will be suitable for the Principal Component Analysis (Kaiser, 1974). Moreover, the factors loadings equal to 0.50 or greater than were considered to be significant. The Table 6 shows the results of Principal Component Analysis. It is apparent that factor loadings ranged from 0.50 to 0.84. Likewise the communalities also ranged from 0.45 to 0.87. The Kaiser-Meyer-Olkin measure of sample adequacy was within acceptable range. Similarly the total Eigen values for all the 20 items was above 01. Such results suggest sufficient evidence of convergent validity for Rizzo et al.'s (1970) RCA scales.

Table 6. Exploratory factor analysis

Items	Factor loadings		
	Component 01	Component 02	Component 03
01	0.84		
02	0.82		
03	0.78		
04	0.62		
05	0.58		
06	0.59		
07	0.56		
08	0.55		
09	0.54		
10	0.50		
11		0.82	
12		0.80	
13		0.67	

14	0.62	
15	0.55	
16	0.53	
17	0.55	
18		0.85
19		0.84
20		0.68

Kaiser-Meyer-Olkin value: 0.94

Total Eigen value: 10.21

Percentage (%) of variance explained: 51.06

Communalities ranged from 0.45 to 0.87

3.2.2 Confirmatory Factor Analysis

The further test of Construct Validity was done through Confirmatory Factory Analysis, with Maximum Likelihood Estimation. The fit indexes included:

- Chi-square (X^2)
- Normed Chi-square (X^2/df)
- Root Mean Square Error Of Approximation (RMSEA)
- Goodness-Of-Fit Index (GFI)
- Comparative Fit Index (CFI)

The Table 7 shows that for Role Conflict the one factor (12 items) and two factors (06items+06item) models had poor fit, however the three factors model (04item+04item+04items) was much more consistent and it also demonstrated good fit, i.e. X^2/df = 2.08, RMSEA = 0.052, CFI=0.98 and GFI=0.97 and RMR= 0.009. Therefore the three factor model for Role Conflict was accepted. Similarly, the one factor model (08 items) model for Role Ambiguity demonstrated poor fit, but the two factors model (04items+04items) demonstrated better fit, i.e. X^2/df = 1.39, RMSEA = 0.031, CFI=0.99 and GFI=0.99 and RMR= 0.005. The Figure 1 shows path diagram for Role Conflict and Figure 2 shows the path diagram for Role Ambiguity.

Table 7. Confirmatory factor analysis

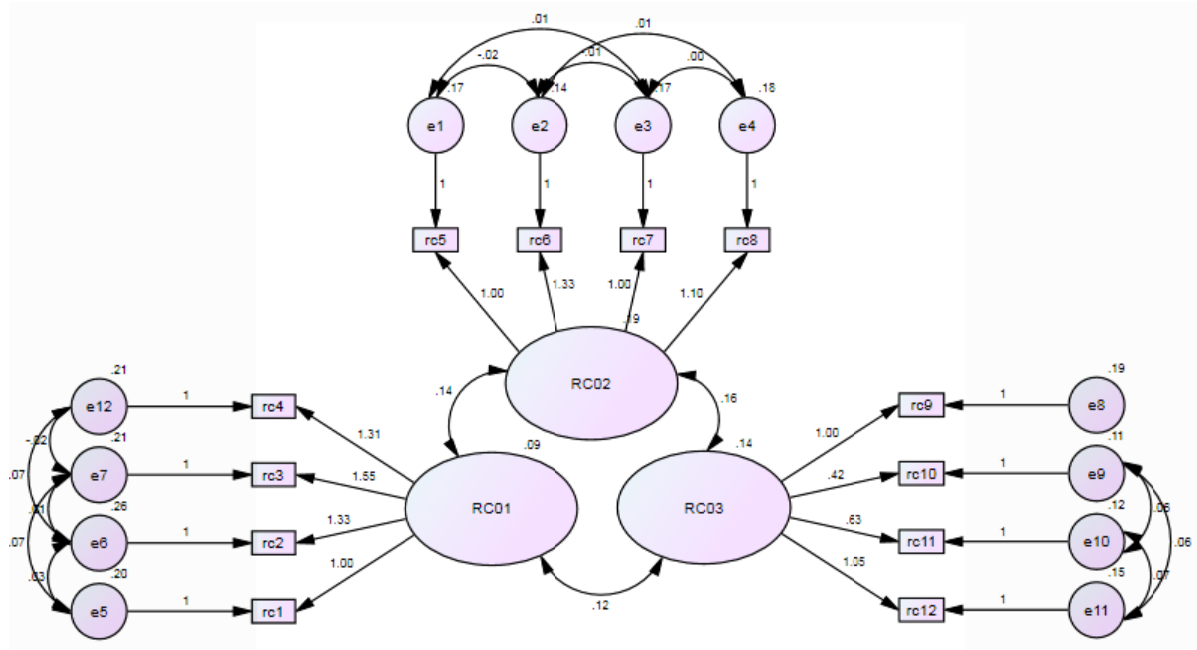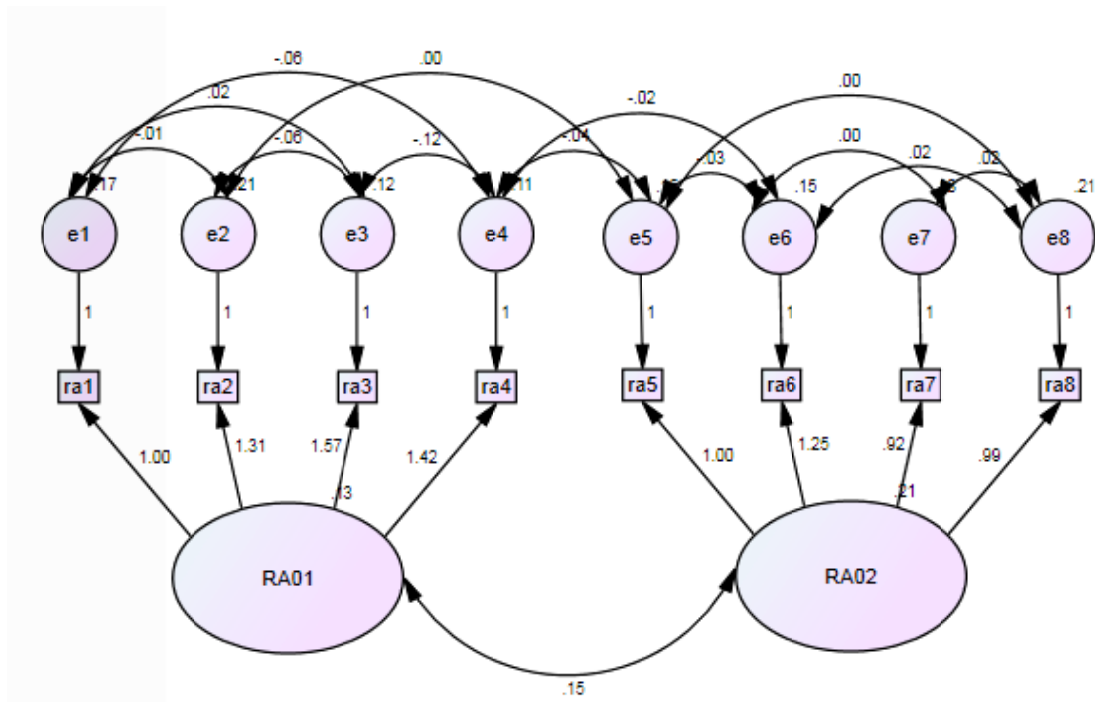|	Role Conflict						
Models	X^2	**df**	X^2/df	**RMR**	**CFI**	**GFI**	**RMSEA**
One factor	128.6	22	5.84	0.127	0.42	0.55	0.232
Two factors	112.4	30	3.74	0.099	0.78	0.82	0.102
Three factors	79.4	38	2.08	0.009	0.98	0.97	0.052
	Role Ambiguity						
One factor	24.1	4	6.02	0.017	0.97	0.98	0.112
Two factors	8.3	6	1.39	0.005	0.99	0.99	0.031

Figure 1. Three factors Role Conflict model

Figure 2. Two factors Role Ambiguity model

4. Discussion

Rizzo et al.'s (1970) RCA scales are globally known as valid and reliable instruments for the measurement of Role Demands. The review of previous studies shows that these scales have yielded most reliable and valid results in various work settings across different cultures. For example González-Romá and Lloret (1998) determined its validity among two European samples; Conley and Woosley (2000) obtained valid results after utilization of RCA scales among school teachers in United States and Wu and Norman (2006) used it for

measurement of role conflict and ambiguity among nurses in china and obtain valid results. More recently researchers like Lawrence and Kacmar (2012), Kath, Stichler, Ehrhart, and Sievers (2013) and Faucett, Corwyn, and Poling (2013) have found Rizzo et al.'s (1970) RCA scales as valid and reliable instruments in their studies. In continuations to the findings of previous studies, the current study has also found Rizzo et al.'s (1970) RCA scales as highly reliable and valid one, after its administration among university teachers in Pakistan. The reliability statistics showed that 20 items of RCA scales had mean Cronbach's Alpha Coefficient of 0.85 and mean Item-total Correlation up to 0.61, which is proof of its internal consistency. Likewise the validity statistics showed that the factor loadings ranged up to 0.85. Likewise the communalities also and KMO values were also within the acceptable ranges. Such results provided sufficient evidence of convergent validity of RCA scales. Finally the results of Conformatory Factor Analysis showed that three factors model for Role Conflict and two factors model for Role Ambiguity were much more consistent with data. The results of current study suggest that RCA scales are reliable and valid tools for the measurement of Role Demands in academia of Pakistan. It is expected that the findings of current study will stimulates further research on the measurement of Role Demands in teaching and other professions within Pakistan. The future researchers should especially work on the translation of RCA scales into the local languages of Pakistan, so that it could be administered among employees working in various sectors resultantly more precise results regarding validity and reliability of RCA scales will be obtained.

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