

Creating and Standardizing a New Scale for Competency Mapping: A Study on Professional Social Workers

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Abstract

This study presents the creating and standardizing a new scale for competency mapping, employing a mixed research method encompassing qualitative and quantitative techniques. A structured scale was developed and administered to 665 social workers in Maharashtra through online distribution, following a rigorous data screening process. Statistical analyses, including Kaiser-Meyer-Olkin tests, correlation analyses, Bartlett's tests of Sphericity, and assessments of multicollinearity and heteroscedasticity, confirmed the suitability of the dataset. Further assessment of reliability, validity, and standardization of the scale revealed prominent levels of reliability and validity, supported by Cronbach's alpha values, average variance extracted, and composite reliability coefficients. Factor analysis identified three competency clusters. While the findings contribute significantly to competency mapping practices, further research is warranted to explore the joint and individual contributions of these competency clusters on a larger scale, utilizing confirmatory factor analysis or structural equation modelling. Overall, this study underscores the importance of standardizing competency assessment tools.

Keywords: standardization, new scale, competency, competency mapping, validity, reliability

1. Introduction

McClelland, D. C. (1973) argues against the prevailing emphasis on intelligence testing, proposing a transition towards evaluating competencies. In today's world, most organizations worldwide have embraced "Competency-based Strategic Human Resource Management" for HR Processes, while many countries are implementing "Competency-based Education" at all levels. Competencies encompass various characteristics of a person, which lead to superior performance both in life and work. Competency Mapping involves a matching process where an individual's characteristics are aligned with the requirements of the job, organization, individual aspirations, and societal development. This research will offer valuable insights to the scientific community. The author of the research paper identified sixteen job-specific or domain-departmental or horizontal competencies, ten organizational development-specific or generic-administrative or vertical

competencies, and fifteen personal-social progression-specific or psycho-social or spherical competencies. [1], [2], [3]. The objective of the present work is to standardize a New Scale. There is an unavailability of suitable scale, so the researcher developed a Competency Scale.

2. Methodology

2.1 Developing a Scale and Data Screening: A structured scale was designed for primary data collection, including 45 statements related to independent and dependent variables, rated on a seven-point Likert scale. A pilot study involving 90 social workers identified questionnaire errors and enhanced scale reliability. Data from 713 social workers in Maharashtra were collected online, with eligibility ensured through an initial question. Forty-eight non-social workers were excluded, resulting in 665 valid respondents. Statistical analysis was conducted using JMP version 17.

2.1.1 Kaiser-Meyer-Olkin (KMO): It is a Measure of Sampling Adequacy, The test measures

sampling adequacy for each variable in the model and for the complete model. It indicates the degree to which each variable in a set is predicted without error by the other variables.

- 2.1.2 Correlation: To determine the strength of the relationship among the items, there must be evidence of the Significant coefficient of correlation (> 0.3) in the correlation matrix. The value of correlation coefficients nearer to +1 or -1 be interpreted as very high positive or negative correlation and nearing zero is considered as very low [4].
- 2.1.3 Bartlett’s Test of Sphericity: The test computes the probability that the correlation matrix has significant correlations among at least some of the variables in a dataset, it is a prerequisite for factor analysis.
- 2.1.4 Multicollinearity: Detecting high correlations among independent variables. Problematic if Tolerance < 0.1 and Variance Inflation Factor (VIF) > 10 .
- 2.1.5 Heteroscedasticity: Identifying unequal variance across levels of an independent variable. Breusch-Pagen test (Non graphical test) – Significance < 0.05 means heteroscedasticity and Sig > 0.05 means homoscedasticity.
- 2.2 Assessment of Reliability, Validity and Standardization of a Scale:
 - 2.2.1 Cronbach’s Alpha, Average Variance Extracted (AVE) and Composite Reliability: Cronbach’s alpha is a measure of internal consistency. It is also considered to be a measure of scale reliability. In general, Cronbach’s alpha value of more than 0.7 is considered acceptable. A high level of alpha shows that items in the Scale are highly correlated [5].

The value of AVE and CR ranges from 0 to 1, where a higher value indicates higher reliability level. AVE is more than or equal to 0.5 confirms the convergent validity. The average variance extracted is the sum of squared loadings divided by the number of items. Composite reliability is a measure of internal consistency in scale items [6].

- 2.3 Extraction of Latent Factors or Competency Clusters using Factor Analysis (Factorial Validity): Two major steps are undertaken in relation to the Principal Axis Factoring method

such as Factor extraction, and Factor rotation and interpretation. The details are provided in a separate research paper authored by the researcher.

- 2.4 Standardization of Scale: The raw scores were transformed into standardized scores (z-scores). Z-scores are a crucial tool in statistical analysis for standardizing scores.

3. Result & Discussion

- 3.1 Developing a Scale and Data Screening:

- 3.1.1. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, with an overall value of 0.978 for this study. The lowest and highest KMO value is 0.968 and 0.985, respectively.

- 3.1.2 Correlation: There is evidence of Maximum – 0.6605 to Minimum – 0.3633, Correlation which is significant at < 0.0001 level (2-tailed).

- 3.1.3 Bartlett’s Test of Sphericity values of Chi Square and DF are 19804.55 and 820 respectively as well as Chi Square is significant at $< .0001$ level for this study. This suggests that there are significant differences between the observed correlation matrix and the identity matrix, indicating that the variables are correlated to some degree. There is sufficient evidence to support the presence of correlations among the variables

- 3.1.4 Multicollinearity: Here, in the context of this study, there is no multicollinearity

Table 1. Multicollinearity

Model		Coefficients ^a						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.271	.148		-1.829	.068		
	Normalized_F1_Domain-departmental	.276	.044	.244	6.231	.000	.284	3.527
	Normalized_F2_Generic-administrative	.443	.045	.401	9.833	.000	.262	3.822
	Normalized_F3_Personal-social	.301	.045	.258	6.739	.000	.297	3.363

a. Dependent Variable: Normalized_Dependent_Variable

3.1.5 Heteroscedasticity: Here, in the context of this study, homoscedasticity is observed.

Table 2. Heteroscedasticity & homoscedasticity

ANOVA ^a						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	.146	3	.049	.069	.976 ^b
	Residual	463.586	66	.701		
	Total	463.732	66			

a. Dependent Variable: Sq_Res

b. Predictors: (Constant), Normalized_F3_Personal_social, normalized_F1_Domain_departmental, Normalized_F2_Generic_administrative

3.2 Assessment of Reliability, Validity and Standardisation of a Scale:

3.2.1 Cronbach’s alpha value for full set is 0.9767 for this study. The lowest and highest Cronbach’s alpha value is 0.9760 and 0.9764, respectively.

Overall, Cronbach’s alpha value for full set of Domin-departmental, Generic-administrative, and Personal-social competency clusters is 0.9461, 0.9285 and 0.9487, respectively.

3.2.2 Average Variance Extracted (AVE) and Composite Reliability (CR): Here, in the context of this study, indicate there is reliability and Convergent Validity.

Table 7. Average Variance Extracted (AVE) and Composite Reliability (CR)

Sr. No.	Competency Cluster	AVE	CR
1	Domain Departmental	0.5258641945	0.946569729
2	Generic Administrative	0.5659997499	0.9287619258
3	Personal Social	0.5545867461	0.9491314598

3.3 Extracting Latent Factors or Competency Clusters using the Factor Analysis: Factor Extraction: Employed extraction method such as Principal Axis Factoring and rotation method such as Promax rotation with Kaiser Normalization to extract Latent factors. The details are provided

in a separate research paper authored by the researcher

3.4 Standardization of Scale: The raw scores get transformed into standardized scores (z-scores) so that we can compare the scores with different measures.

4. Conclusion

This study presents the standardization of a new scale for competency mapping among social workers, employing a mixed research method encompassing qualitative and quantitative techniques. A structured scale was developed and administered to 665 social workers in Maharashtra through online distribution, following a rigorous data screening process. Statistical analyses, including Kaiser-Meyer-Olkin tests, correlation analyses, Bartlett's tests of Sphericity, and assessments of multicollinearity and heteroscedasticity, confirmed the suitability of the dataset. Further assessment of reliability, validity, and standardization of the scale revealed prominent levels of reliability and validity, supported by Cronbach's alpha values, average variance extracted, and composite reliability coefficients. Factor analysis identified three competency clusters, providing insights into the underlying factors driving performance among social workers. While the findings contribute significantly to competency mapping practices, further research is warranted to explore the joint and individual contributions of these competency clusters on a larger scale, utilizing confirmatory factor analysis. Overall, this study underscores the importance of standardizing competency assessment tool for mapping practices.

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