Answers to additional business exercises

Chapter 15 Factor Analysis

Follow the instructions throughout Chapter 14 to conduct a principal components analysis, with Oblimin rotation on the 10 agreement items that make up the Staff Satisfaction Survey (Q1a to Q10a). You will see that, although two factors record eigenvalues over 1, the screeplot indicates that only 1 component should be retained.

Run Parallel Analysis using 523 as the number of cases, and 10 as the number of items. The results indicate only 1 component has an eigenvalue which exceeds the equivalent value obtained from a random data set. This result suggests that the items of the Staff Satisfaction Scale are assessing only one underlying dimension (factor).

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.881
Bartlett's Test of Sphericity	Approx. Chi-Square	1626.236
	df	45
	Sig.	.000

Communalities

	Initial	Extraction
q1a	1.000	.523
q2a	1.000	.553
q3a	1.000	.415
q4a	1.000	.730
q5a	1.000	.729
q6a	1.000	.542
q7a	1.000	.491
q8a	1.000	.205
q9a	1.000	.649
q10a	1.000	.490

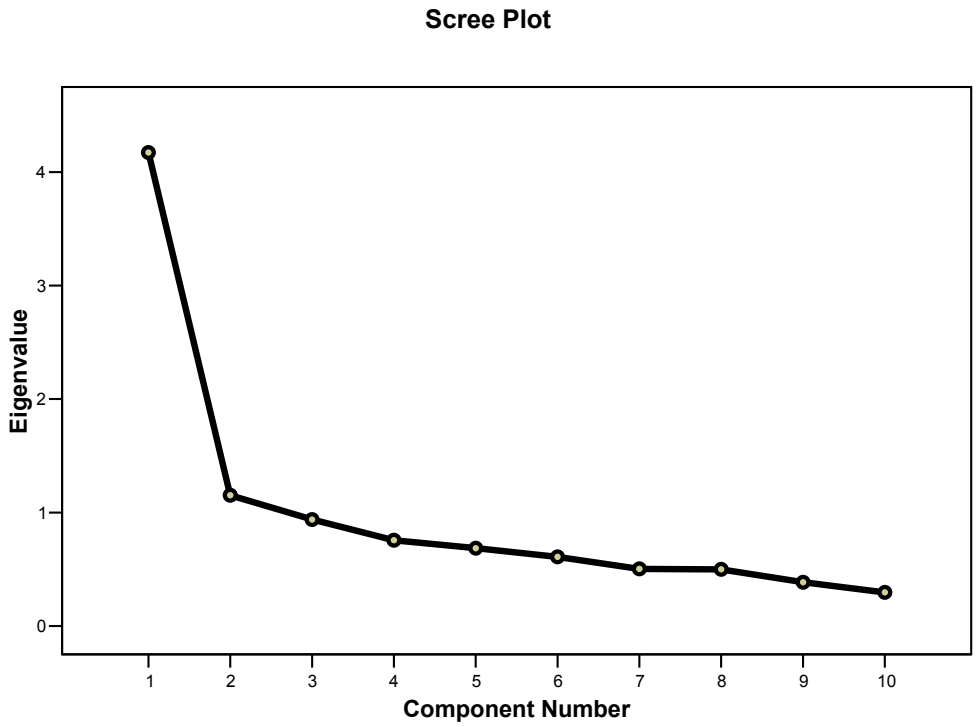
Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.174	41.735	41.735	4.174	41.735	41.735	3.826		
2	1.152	11.523	53.258	1.152	11.523	53.258	2.634		
3	.938	9.384	62.643						
4	.756	7.558	70.201						
5	.686	6.860	77.061						
6	.609	6.093	83.154						
7	.504	5.035	88.189						
8	.499	4.993	93.182						
9	.386	3.860	97.043						
10	.296	2.957	100.000						

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.



Component Matrix [a]

	Component	
	1	2
q5a	.809	
q4a	.765	-.380
q6a	.734	
q9a	.695	-.407
q10a	.693	
q7a	.691	
q3a	.615	
q2a	.533	.519
q8a	.330	.310
q1a	.428	.583

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Pattern Matrix [a]

	Component	
	1	2
q4a	.893	
q9a	.859	
q5a	.846	
q10a	.621	
q6a	.535	.330
q7a	.454	.377
q1a		.763
q2a		.736
q8a		.444
q3a	.337	.426

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Structure Matrix

	Component	
	1	2
q5a	.854	.371
q4a	.849	
q9a	.792	
q10a	.685	.414
q6a	.672	.553
q7a	.611	.566
q2a	.325	.744
q1a		.716
q3a	.515	.566
q8a		.453

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2
1	1.000	.416
2	.416	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Results of Parallel Analysis

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Number of variables:     10
Number of subjects:     523
Number of replications: 100

++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Eigenvalue #     Random Eigenvalue     Standard Dev
++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      1               1.2209               .0343
      2               1.1520               .0230
      3               1.1046               .0226
      4               1.0575               .0172
      5               1.0184               .0172
      6               0.9766               .0190
      7               0.9361               .0189
      8               0.8951               .0185
      9               0.8483               .0213
     10               0.7905               .0301
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Monte Carlo PCA for Parallel Analysis



Include this reference in publications which determined the
number of factors to retain using this software:
   Watkins, M. W. (2000). Monte carlo PCA for parallel analysis
[computer software]. State College, PA: Ed & Psych Associates.
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