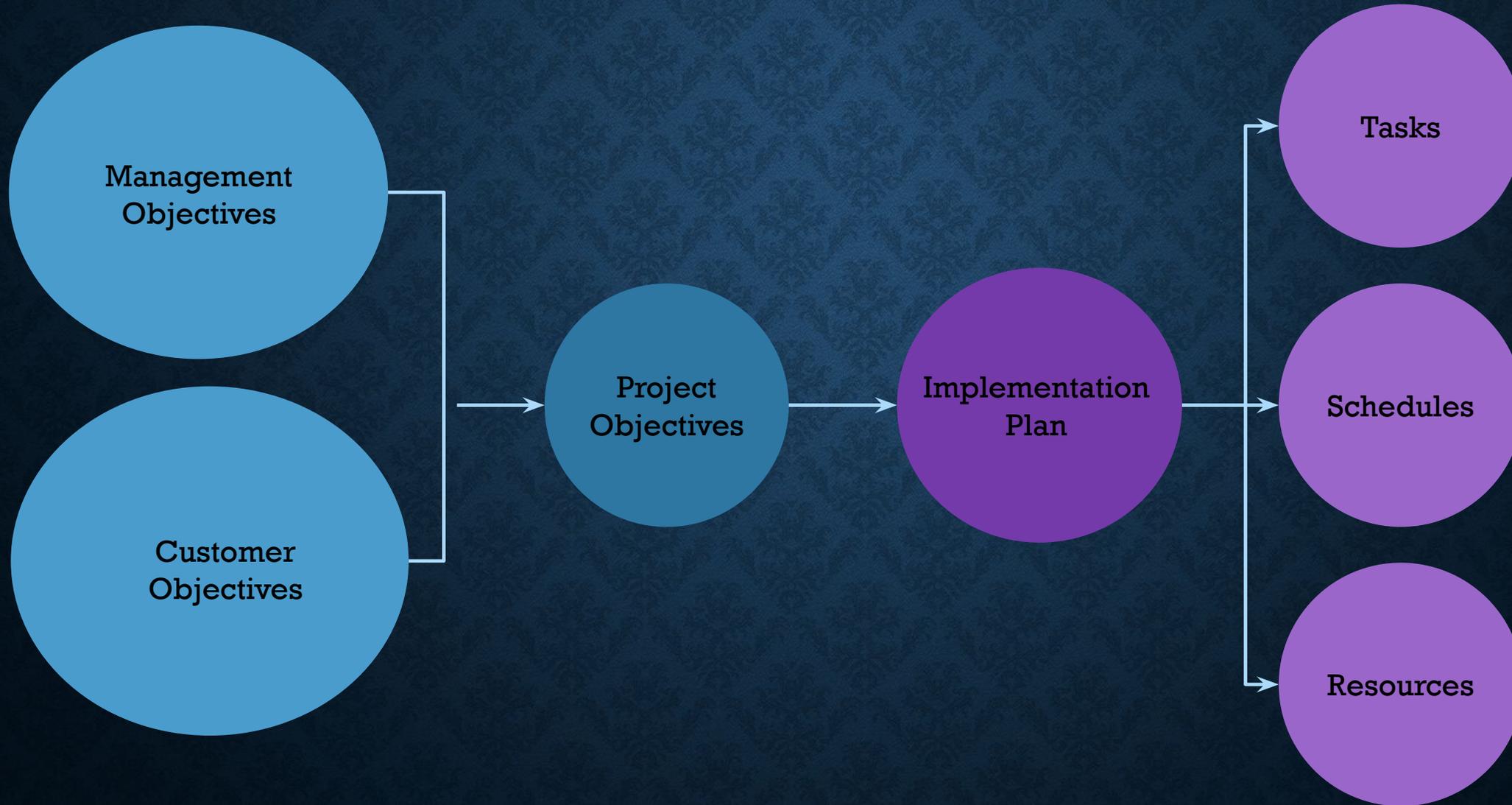# FACTOR ANALYSIS

PRESENTATION BY-
SAIF S
FMS/MBA/21-23/039

INTRODUCTION

- Factor analysis is a technique that is used to reduce a large number of variables into fewer numbers of factors.

- It reduces attribute space from a large no. of variables to a smaller no. of factors

- Factor analysis is a way to condense the data into few variables.

Operation

OBJECTIVES OF THE PRESENTATION

❑ To explain the Methodologies of FA and its approaches.

❑ To demonstrate its FA's mechanism.

❑ How FA enables researchers to investigate concepts that cannot easily be measured directly

Objective of Factor Analysis

MARKET ANALYSIS

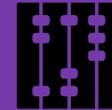Factor analysis has been used to develop things such as perception maps, advanced SWOT analyses, etc..

TECHNICAL ANALYSIS

It is a multivariate statistical technique for data reduction. It has many applications in Management & Researches

FINANCIAL ANALYSIS

FA attempts to simplify complex & diverse relationships that exist among a set of observed variables

ECONOMIC ANALYSIS

FA is a powerful data reduction technique that enables researchers to investigate concepts that cannot easily be measured directly.

PSYCHOLOGICAL ANALYSIS

To capture some psychological states of customers

PROCESS OF FACTOR ANALYSIS

S 1: Selecting & Measuring a set of variables in a given domain.

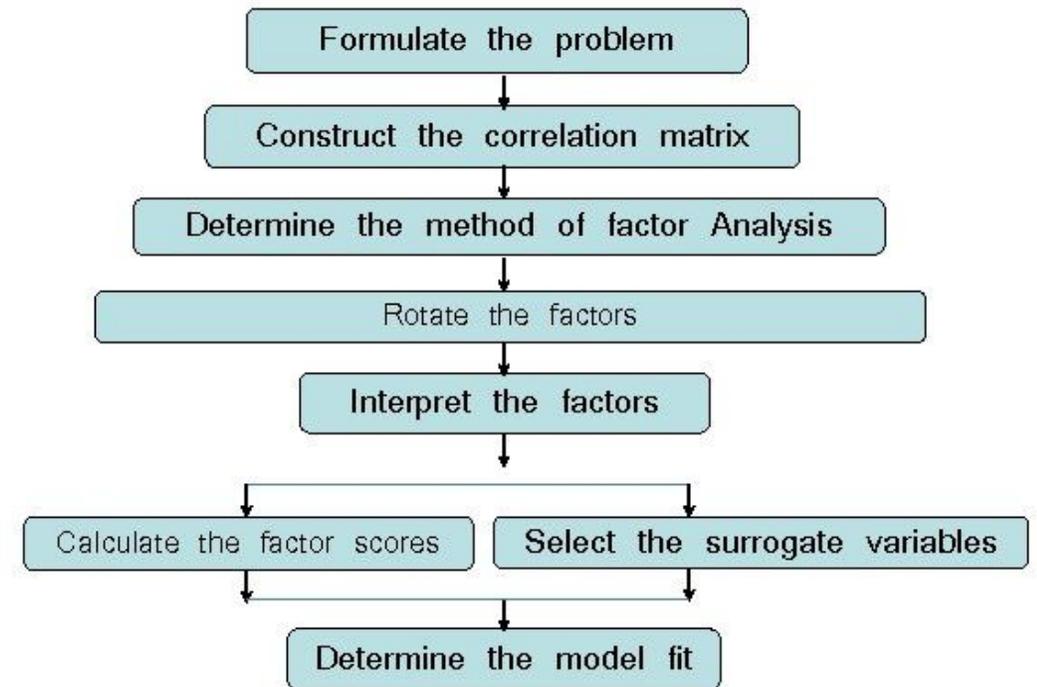S 2: Data screening in order to prepare the correlation matrix.

S 3: Factor Extraction.

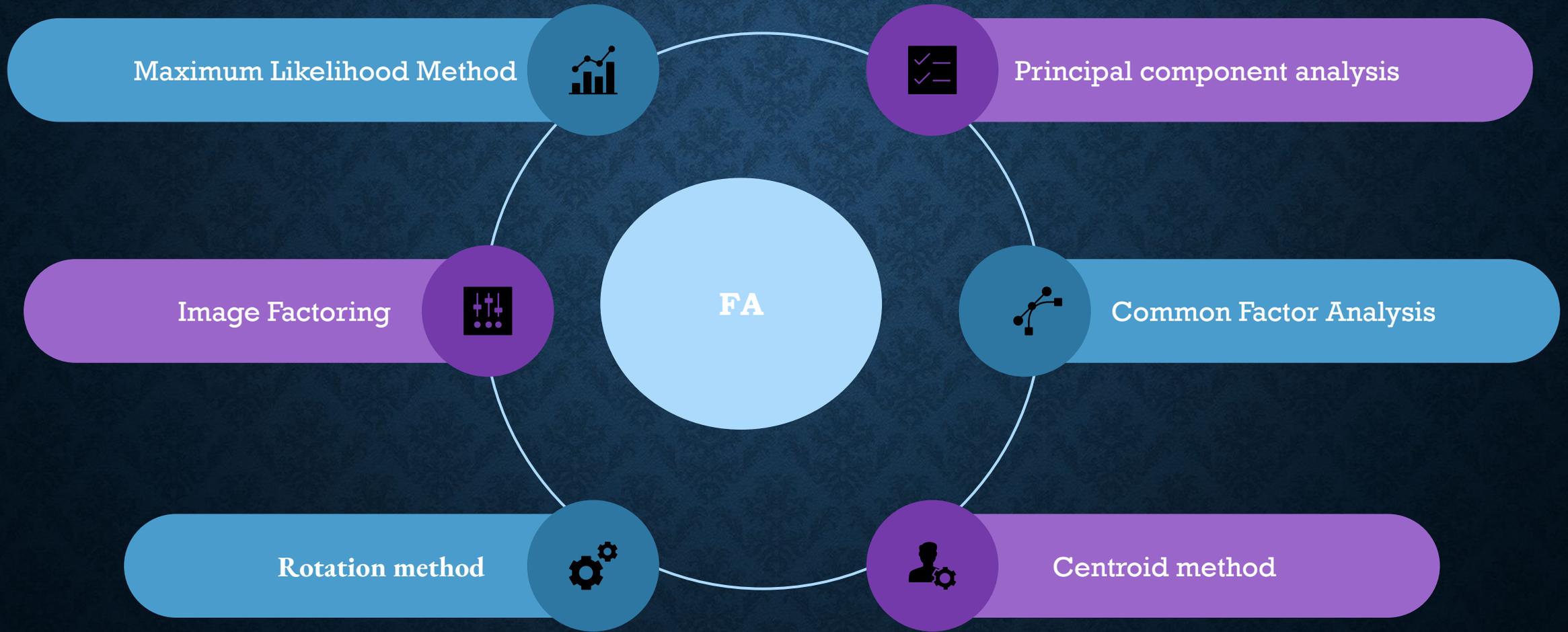S 4: Factor Rotation to increase interpretability.

S 5: Interpretation.

S 6: Validation and Reliability of the measures.

eight-step process:

Formulate the problem

Construct the correlation matrix

Determine the method of factor Analysis

Rotate the factors

Interpret the factors

Calculate the factor scores

Select the surrogate variables

Determine the model fit

Methods of Factor Analysis

Maximum Likelihood Method

Principal component analysis

Image Factoring

FA

Common Factor Analysis

Rotation method

Centroid method

EXAMPLE WITH THE CASE STUDY

Suppose, a number of supervisors are asked to rate the relevance of six personality characteristics to effective job performance by subordinates. The characteristics assessed are organized, systematic, careless, creative, intellectual, and imaginative.
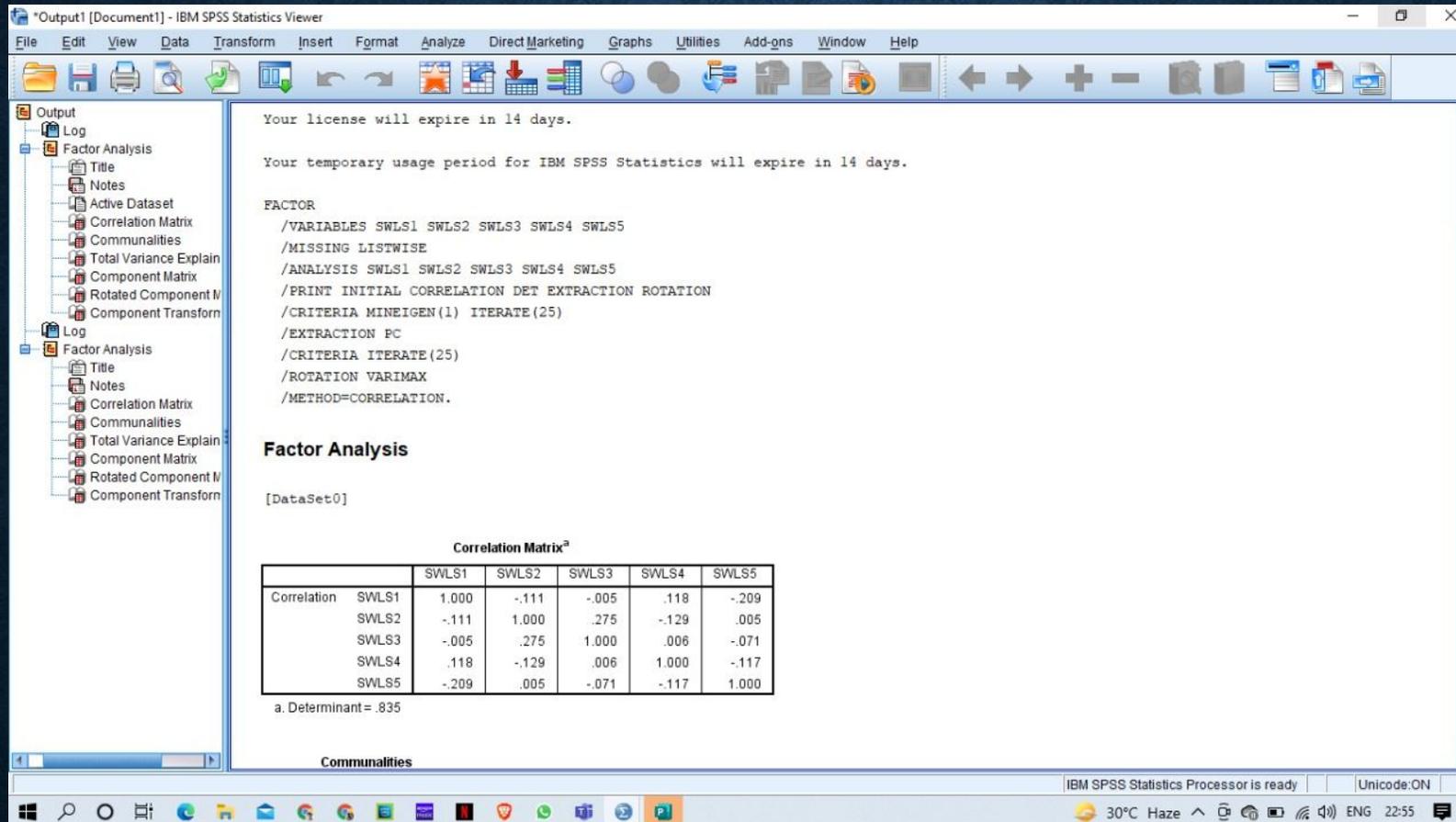
Variable	1	2	3	4	5	6
1.Organized	1.00					
2.Systematic	.72	1.00				
3.Careless	-.63	-.55	1.00			
4.Creative	.00	.00	.00	1.00		
5.Intellectual	.00	.00	.00	.56	1.00	
6.Imaginative	.00	.00	.00	.48	.42	1.00

Table: Hypothetical Correlation Matrix Observed Variables

Observed Variable	Factor 1 Conscientiousness	Factor 2 Intellect	Communality(h^2)	Uniqueness ($1-h^2$)
1.Organized	.90	0.00	.81	.19
2.Systematic	.80	0.00	.64	.36
3.Careless	-.70	0.00	.49	.51
4.Creative	.00	.80	.64	.36
5.Intellectual	.00	.70	.49	.51
6.Imaginative	.00	.60	.36	.64
Sum of squared loadings	1.94	1.49		
Proportion of variance	1.94/6 =.32	1.49/6=.25	.32+.25=.57	1-.57=.43

Table: Factor pattern Matrix with Communalities and Uniqueness for Hypothetical Data

Spss Link With Demonstration
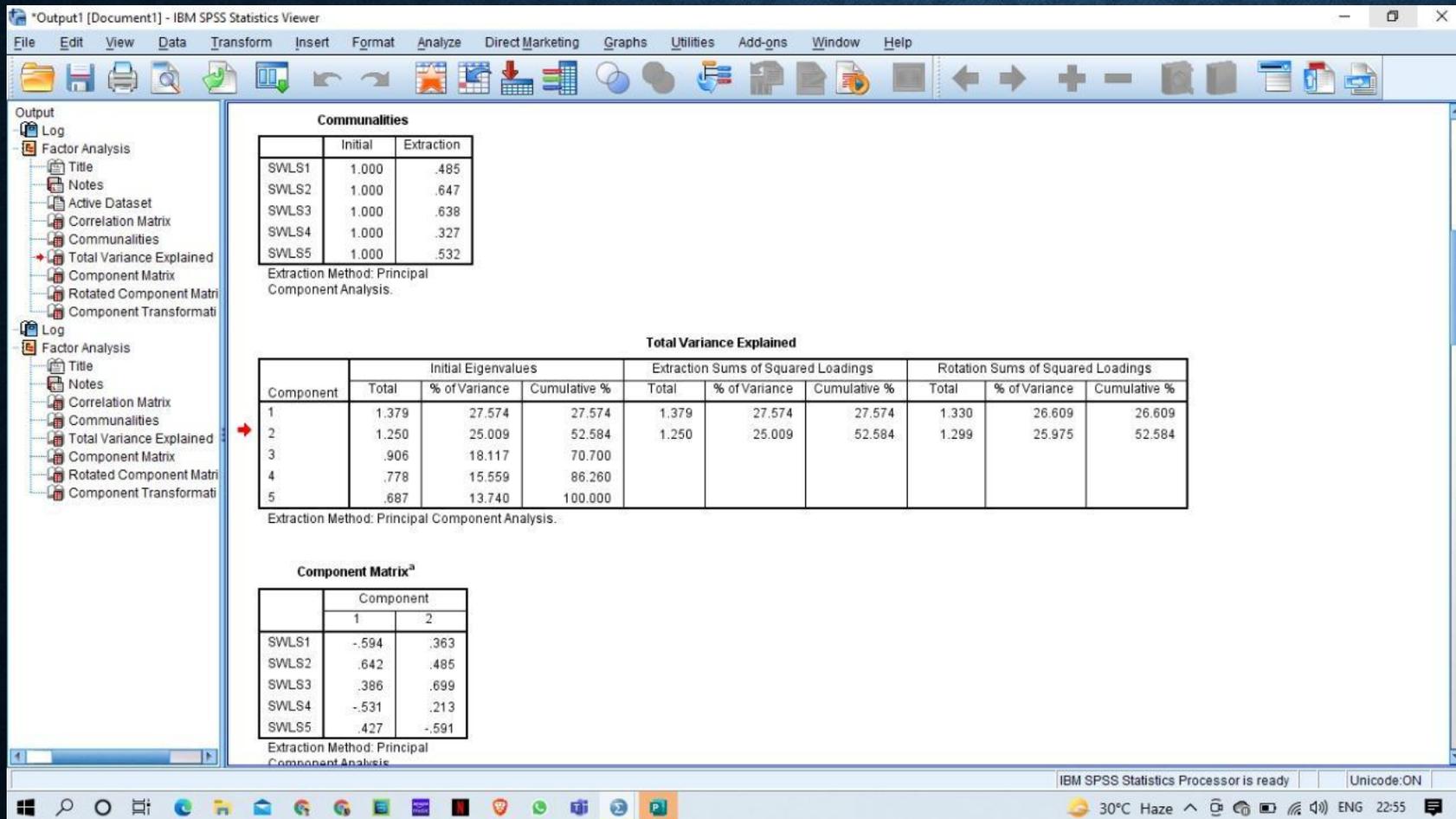

TWO MAIN ANALYSIS

(i)   Principal Component Analysis

(ii) Common Factor Analysis

Five Variable listed based on the personality and relationship is analyzed among them. Correlation among similar variable shows 1 diagonally.

- Total Variance contains Initial Eigenvalues & 5 variables.

- Variable 1 & 2 shows Eigenvalue more than 1.

- Data reduced from 5 variable to 2.

- % of variance can be seen near 63% which is considered good.

- Sum of Eigenvalues= No of Components

- Two Components can be seen in Component Matrix.

- Rotated Component Matrix comes into play when there is more than one component.

- As we have two component we can see Rotated Component Matrix

Conclusion

It helps to make sense of large data with interlinked relationships.

To determine the extent to which each variable in the dataset is associated with a common theme or factor.

To definitively understand how many factors are needed to explain common themes amongst a given set of variables.
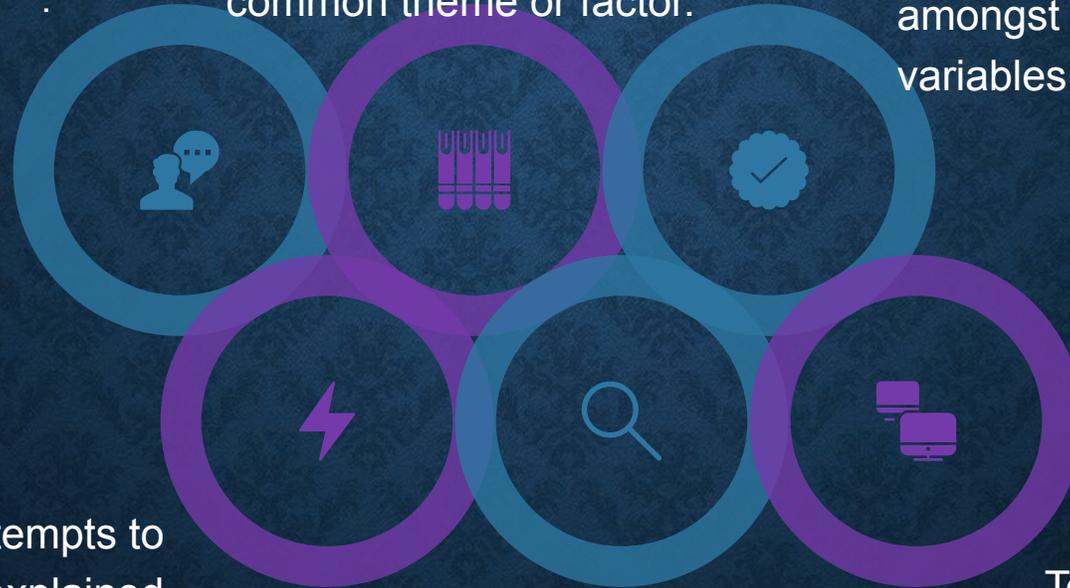
Factor analysis attempts to discover the unexplained factors that influence the co-variation among multiple observations.

To provide an interpretation of the common factors in the dataset

To point out relationships that may not have been obvious

THANK YOU