Configuration Manual

MSc Research Project
Master Of Science Fintech (MSCFTD1)

Robert Alex Pereira
Student ID: 22192328

School of Computing
National College of Ireland

Supervisor: Sean Heeney & Noel Cosgrave

National College of Ireland

MSc Project Submission Sheet

School of Computing

Student Name: Robert Alex Pereira……..

Student ID: 22192328……..……

Programme: Msc Fintech (MSCFTD)…… **Year:** 2023-24….

Module: MSc Fintech Research/Practicum Part 2……..……

Supervisor: Sean Heeney ……

Submission Due Date: 12th August 2024……

Project Title: Comparative Study of Online Payment versus Offline (Traditional) Payment with Emphasis on UPI in India and Changing Payment Regulations.

Word Count: ……1396…… **Page Count**…13……

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.
ALL internet material must be referenced in the bibliography section. Students are required to use the Referencing Standard specified in the report template. To use other author's written or electronic work is illegal (plagiarism) and may result in disciplinary action.

Signature: Robert Alex Pereira……

Date: 12th August 2024……

PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

Attach a completed copy of this sheet to each project (including multiple copies)	□
Attach a Moodle submission receipt of the online project submission, to each project (including multiple copies).	□
You must ensure that you retain a HARD COPY of the project, both for your own reference and in case a project is lost or mislaid. It is not sufficient to keep a copy on computer.	□

Assignments that are submitted to the Programme Coordinator Office must be placed into the assignment box located outside the office.

Office Use Only	
Signature:	
Date:	
Penalty Applied (if applicable):	

Configuration Manual

Robert Alex Pereira
Student ID:22192328

1 Introduction

This is configuration module is submitted along with research paper as part of MSC fintech Practicum module. This manual describes the detail steps followed for the research topic "Comparative Study of Online Payment versus Offline (Traditional) Payment with Emphasis on UPI in India and Changing Payment Regulations'. This manual walks through the step-by-step technical analysis process of this research. It includes the hardware, software and specific techniques implemented. This manual aims that the results of this research can be verified and be reproduced for the study purpose.

2 Specification of the System

2.1 Hardware specification

Operating System	Windows 11 Home Single Language
System Type	64-bit operating system, x64-based processor
Processor	12th Gen Intel(R) Core(TM) i5-1235U 1.30 GHz
RAM	16 GB
Storage	Windows SSD 474GB

2.2 Software and tools

Operating System	Windows 11 Home Single Language
Gmail Account	For access to Google products like Google Form and Google Sheet; used to distribute the survey link to valid respondents.
Google Drive	Required for the storage of files and data responses.
Google Form	Primary tool for survey building in questionnaire format and tracking survey progress.
Microsoft Excel	MicrosoftÂ® Office 21 (64-bit)
IBM SPSS Statistics	IBM SPSS Statistics 29.0.2.0 for data analysis and result generation.

3 Installation and working of Software

3.1 IBM SPSS Statistics 29.0.2.0

In this project along with Excel IBM SPSS statistic module is used for the detail analysis of the survey data.
This module is available for download on linke below and the process in fig.1 and 2
https://myibm.ibm.com/products-services/manage/512201808/downloads

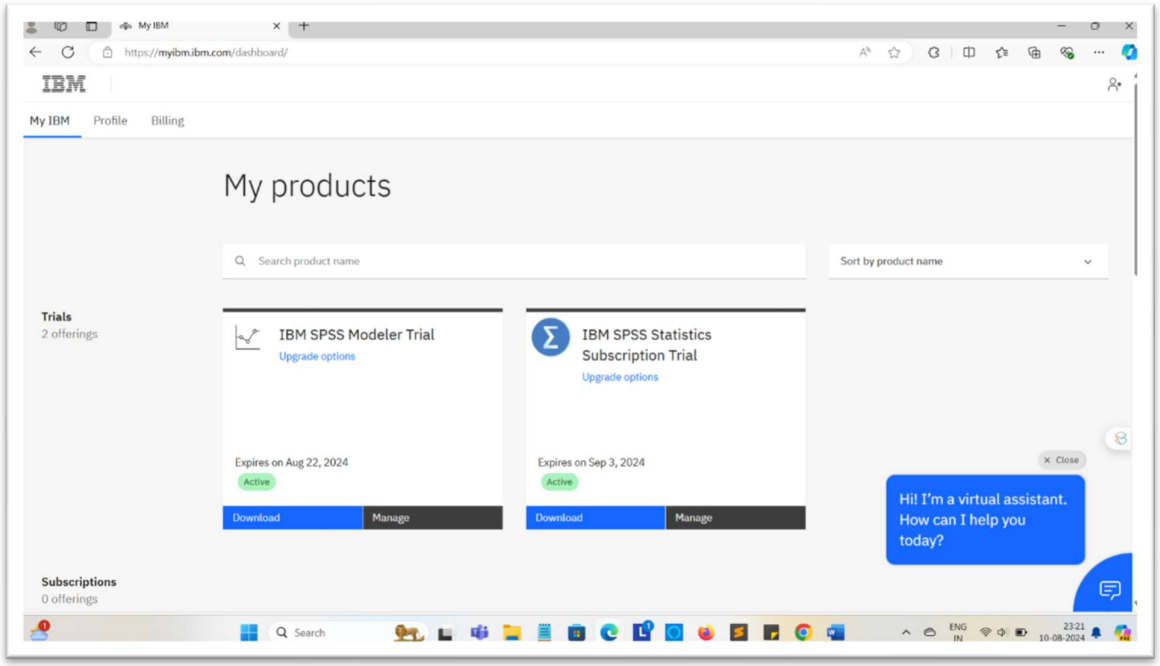


Fig 1 My IBM login and download option

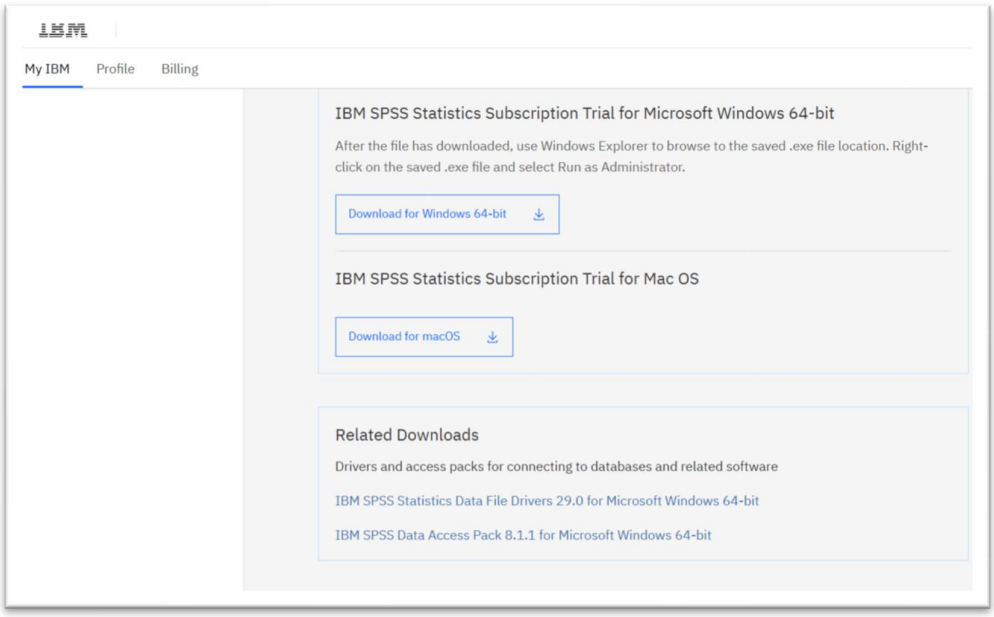


Fig 2 IBM SPSS statistic module download as per system configuration 64-bit

After installation of the IBM SPSS the data is imported from excel and anaysis done. The process of the anaysis is mentioned below in specific order. The output file is shared along with dataset with this reserch paper.

All the outputs are been verified and performed using SPSS.

4 Data Source

In this steps of process the various data source links and analysis techniques are specified.

4.1 Secondary data

4.1.1 data source

- RBI transactional data link. *https://rbidocs.rbi.org.in/rdocs/content/docs/PSDDP04062020.xlsx* ***and*** *rbidocs.rbi.org.in*
- *NPCI Open Data : Monthly Metrics (npci.org.in)* ***And*** *RETAIL-PAYMENTS-STATISTICS-2023Q1 (1) (npci.org.in)*

4.1.2 Data cleaning and analysis in excel:

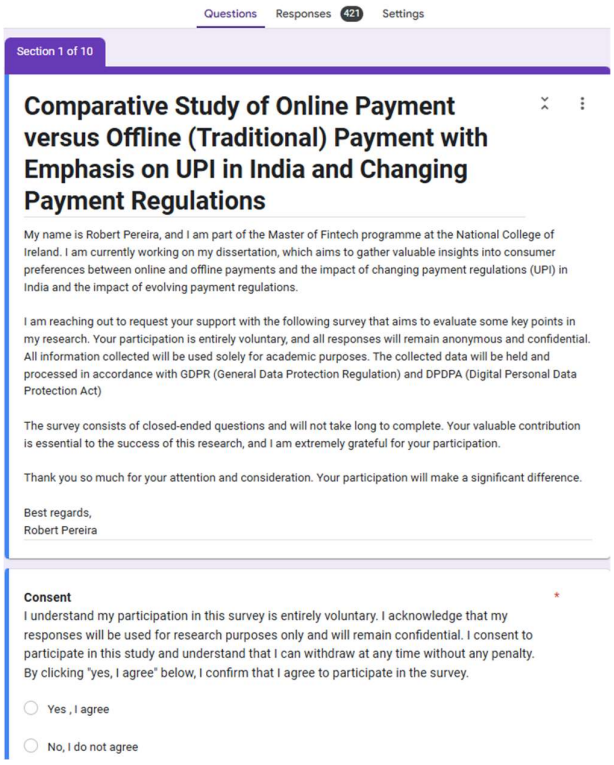
For the analysis of the growth and trends of the UPI over other payment methods data is collected from the above sources and imported in Excel. This data is cleaned for missing values where ther were no transactions. Using the Pivot table data is summarized and categorized under Online and offline payment.

4.2 Primary Data

4.2.1 Primary data Source

This study is made both on primary and secondary data. To collect the primary data the Google form is used, the detail survey is been conducted. this form was distributed on social media and emails. Responses received from this survey are been stored in google drive. The dataset and the google form are been submitted along with the research paper in artefact.

https://docs.google.com/forms/d/e/1FAIpQLSfHMPnUlSgRNMMtHjk_m9xMwwZeX5M6oEpfWVa7kuN220RprA/viewform?usp=sf_link



4.2.2 Data cleaning for analysis

Survey data was saved in google sheet linked to the survey, this data is been downloaded into the excel sheet and saved for the further analysis. The Excel dataset is been submitted along with this paper.

4.2.3 data import in IBM SPSS

The data without missing values as the data questions were marked compulsory to avoid the missing values. Excel data is been imported to IBM SPSS. Fig 3A and 3B

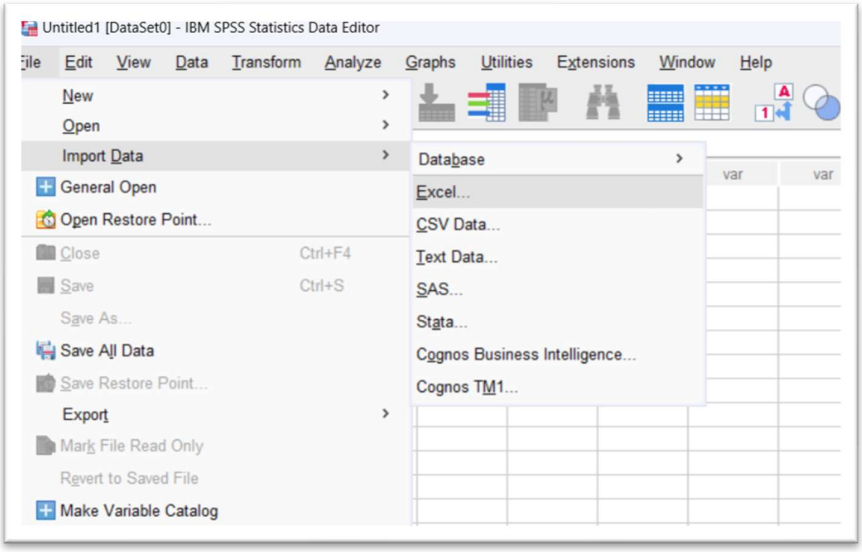
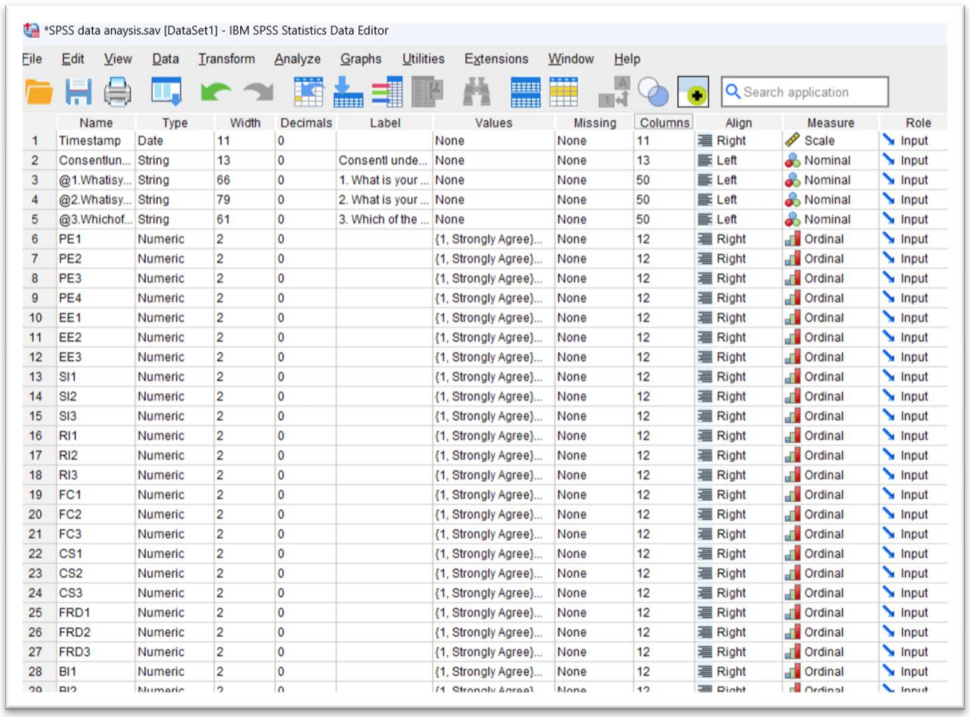


Fig 3 A Data import in SPSS



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Timestamp	Date	11	0		None	None	11	Right	Scale	Input
2	Consentlun...	String	13	0	Consentl unde...	None	None	13	Left	Nominal	Input
3	@1.Whatisy...	String	66	0	1. What is your ...	None	None	50	Left	Nominal	Input
4	@2.Whatisy...	String	79	0	2. What is your ...	None	None	50	Left	Nominal	Input
5	@3.Whichof...	String	61	0	3. Which of the ...	None	None	50	Left	Nominal	Input
6	PE1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
7	PE2	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
8	PE3	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
9	PE4	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
10	EE1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
11	EE2	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
12	EE3	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
13	SI1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
14	SI2	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
15	SI3	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
16	RI1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
17	RI2	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
18	RI3	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
19	FC1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
20	FC2	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
21	FC3	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
22	CS1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
23	CS2	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
24	CS3	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
25	FRD1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
26	FRD2	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
27	FRD3	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input
28	BI1	Numeric	2	0		{1, Strongly Agree}...	None	12	Right	Ordinal	Input

Fig 3 B Data import in SPSS

5 Data Analysis techniques used for Evaluation

5.1 Excel

Excel is used for the Transactional data analysis downloaded from the secondary data sites. The pivot table is exercised to group the data into the online and offline , the SUM, Average, VLOOKUP, Percentage functions were used to analysis the data and to draw insights added into the research paper. The graphs were anaysied as in fig 4 and 5

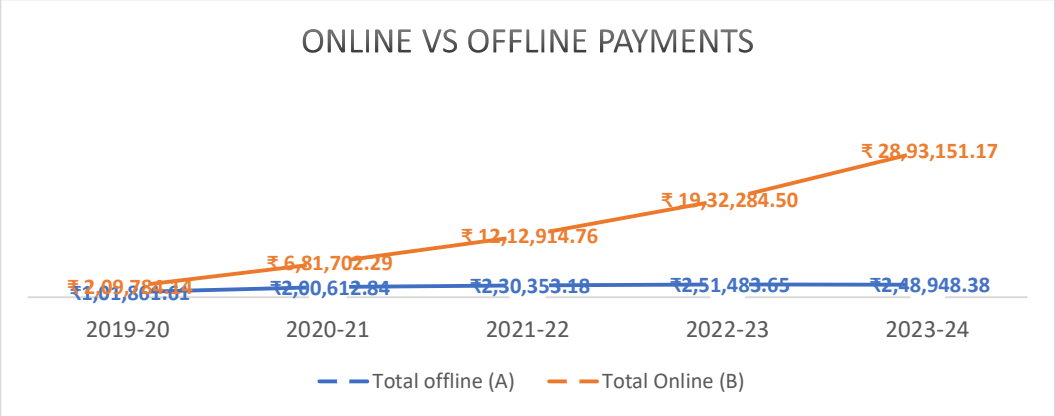


Fig 4 Online vs offline*datasource NPCI

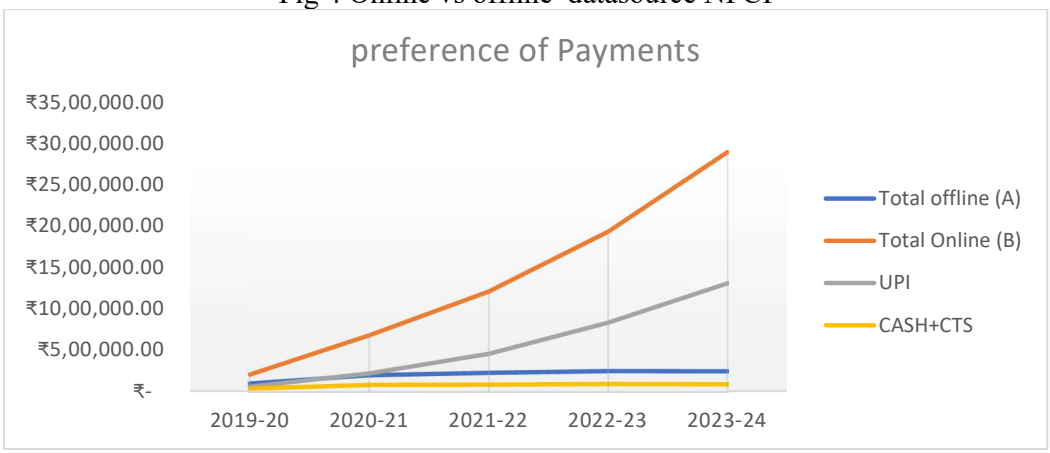


Fig 5 payment preference*datasource NPCI

The pie chart was generated based on the pivot data generated. The chart was generated both by comparing the volume of the transactions and the mode of different transactions. Result evaluated in research paper.

5.2 IBM SPSS

The inbuilt modules of the IBM SPSS were used for the below analysis.

5.2.1 Demographic Analysis

From analysis module in SPSS, descriptive Statistics > crosstabs Fig. were used for the demographic analysis.

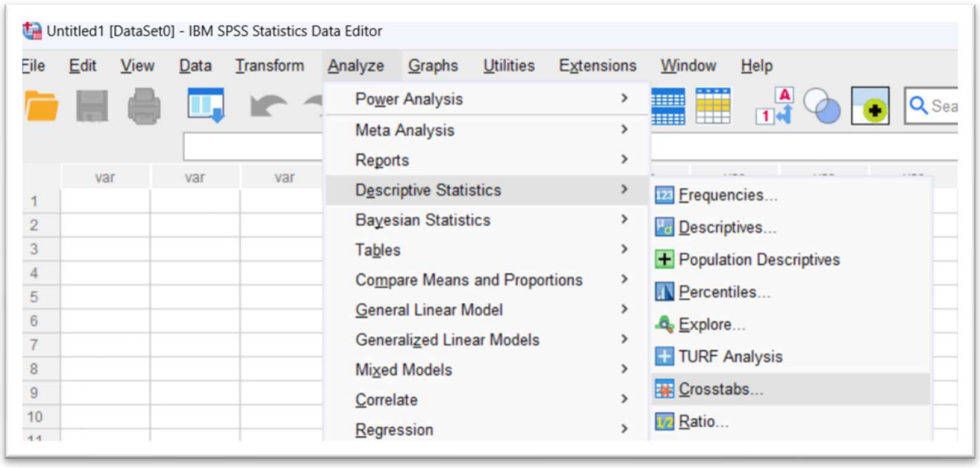


Fig 6 crosstabs for descriptive anaysis

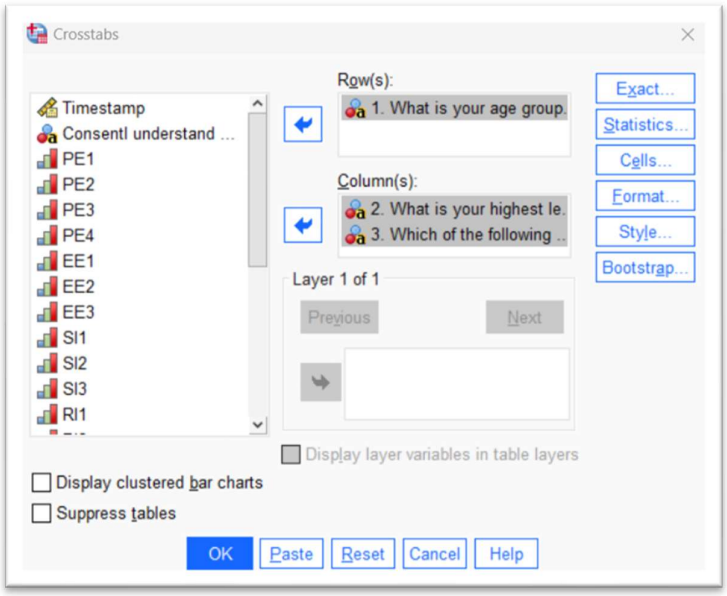


Fig 7 selection of cross tab constraint

As per fig 7 for discriptive anaysis AGE was primary whereas Education and income was considered secondary for the evaluation. This anaysis was condicted to evaluate which age group is more active on UPI preference and how AGE and the education vs income differes for the prefernce between online and offline.

5.2.2 Descriptive Statistics

Descriptive statistics like
mean, Standard deviation, Skewness, kurtosis was generated using Analyze> Descriptive Statistics > Descriptives > selecting variables from PE1 to BI2> Ok Fig 8
This analysis was done to check the statistics reliability of the data.

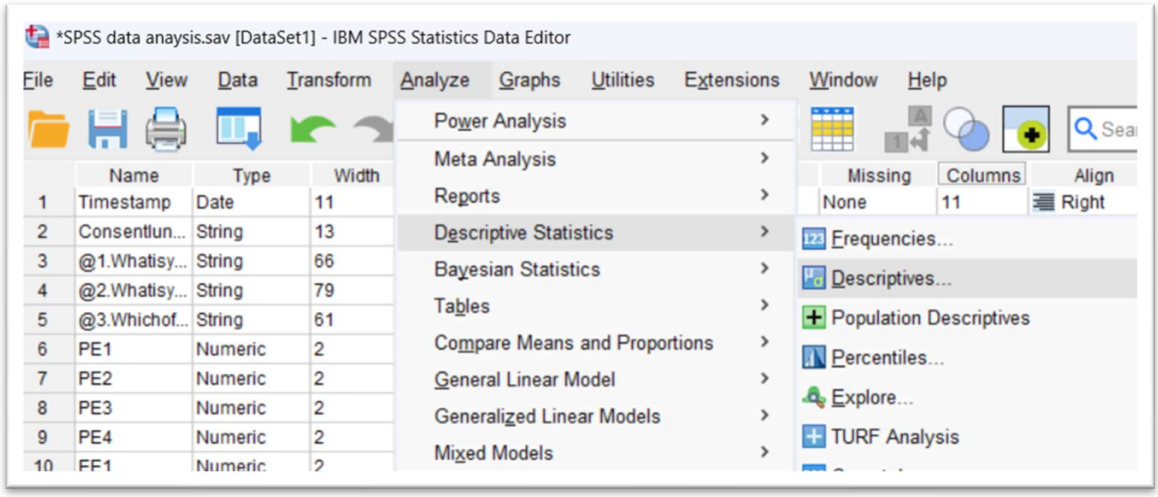


Fig 8 Descriptive Statistics

5.2.3 Frequency analysis

Frequency analysis was conducted to check the total number of responses and their distribution in different components for the further analysis.
Analyza > Descriptive Statistics > Frequency > variable selection > Ok

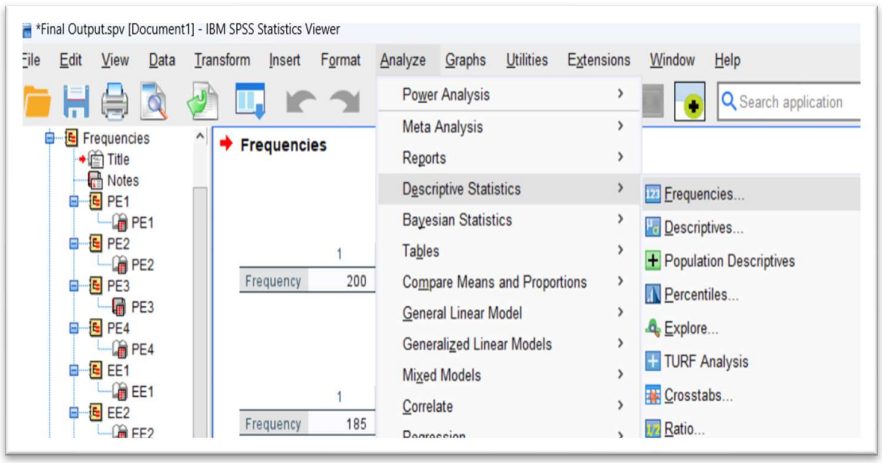


Fig 9 Frequency anaysis option

Individual frequency of each component is generated Fig 10, however to evaluate the result, the data is combined in Excel and the table reported in research paper.

Frequency Table

PE1

	Valid					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Frequency	58	105	100	111	47	421

PE2

	Valid					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Frequency	55	109	105	110	42	421

PE3

	Valid					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Frequency	59	107	94	117	44	421

PE4

	Valid					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
PE4	58	108	100	113	42	421

Fig 10 individual Frequency table.

5.2.4 Reliability Analysis using Cronbach's Alpha

To calculate the reliability of Cronbach Alpha Ananlyze > Scale > variable selection> statistics> Item & Scale if item is deleted(checkbox) is selected Fig 11. This will give us reliability score and table if item deleted. Fig 12

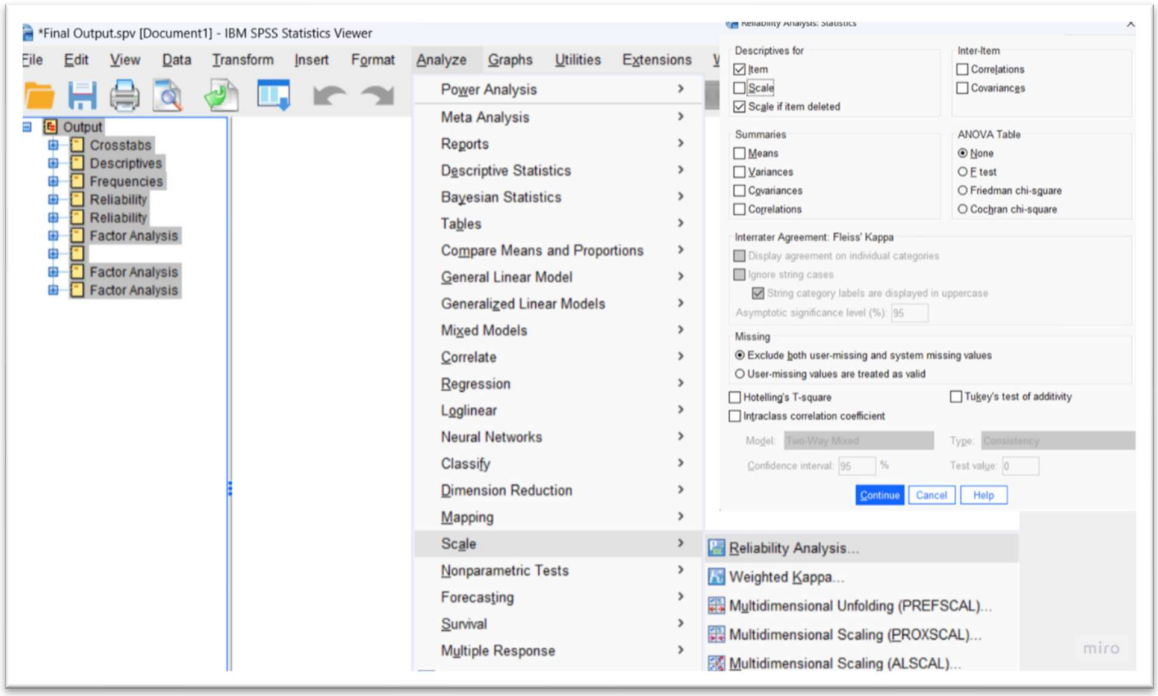


Fig 11 Cronbach's reliability selection

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PE1	60.63	185.405	.515	.324	.824
PE2	60.52	184.398	.545	.372	.822
PE3	60.51	182.022	.604	.424	.820
PE4	60.48	182.365	.570	.375	.821
EE1	60.47	183.464	.563	.393	.822
EE2	60.17	194.148	.364	.185	.830
EE3	60.34	197.568	.272	.119	.834
SI1	60.25	195.850	.339	.220	.831
SI2	60.27	194.454	.340	.185	.831
SI3	60.30	196.368	.292	.170	.833
RI1	60.27	196.148	.308	.171	.832
RI2	60.31	195.516	.327	.189	.832
RI3	60.17	195.652	.308	.201	.833
FC1	60.22	194.574	.340	.193	.831
FC2	60.29	196.661	.293	.127	.833
FC3	60.28	195.746	.324	.145	.832
CS1	60.17	195.093	.334	.178	.831
CS2	60.25	194.327	.358	.200	.831
CS3	60.28	196.084	.307	.175	.833
FRD1	60.20	194.547	.341	.204	.831
FRD2	60.29	195.845	.318	.162	.832
FRD3	60.23	194.666	.348	.172	.831
BI1	60.28	195.210	.343	.181	.831
BI2	60.23	193.211	.385	.253	.830

Fig 12 Cronabach relaiability if item deleted.

5.3 Factor analysis

For this research factor analysis was primary analysis method is described in the research paper. The analysis is conducted using SPSS inbuilt statistics module. Fig 13 displays the detail step by step analysis conducted.

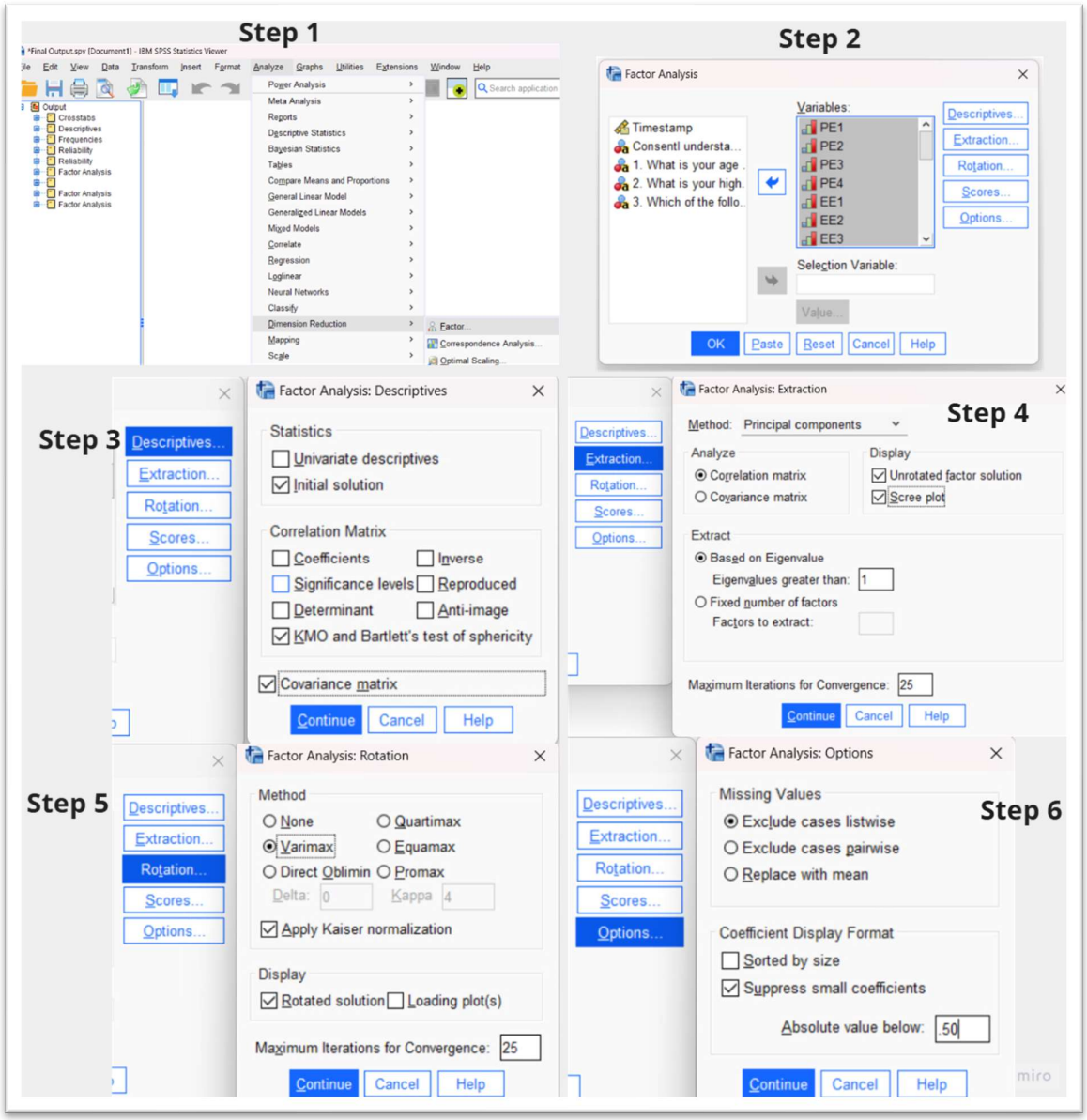


Fig 13 SPSS Factor anaysis process

5.3.1 KMO and Bartlett's test for sample adequacy and Homogeneity of variables.

- IBM SPSS> **Analyze > Dimension Reduction > Factor**.

- In the Factor Analysis dialog box Fig 13 under the **Descriptives** option, select **KMO and Bartlett's test** to assess sample adequacy and homogeneity of variables. Click **OK** this will generate the table with detail results.

5.3.2 Communalities

- After running the Factor Analysis, in the output window, locate the **Communalities** table, which shows the shared variance of each variable with all other variables. Fig 14
- Ensure that the extraction values are reasonably high (above 0.4) to confirm that the variables are well-represented by the factors.

Communalities

	Initial	Extraction
PE1	1.000	.969
PE2	1.000	.966
PE3	1.000	.966
PE4	1.000	.970
EE1	1.000	.971
EE2	1.000	.972
EE3	1.000	.970
SI1	1.000	.972
SI2	1.000	.972
SI3	1.000	.973
RI1	1.000	.974
RI2	1.000	.972
RI3	1.000	.971
FC1	1.000	.977
FC2	1.000	.980
FC3	1.000	.978
CS1	1.000	.968
CS2	1.000	.970
CS3	1.000	.969
FRD1	1.000	.970
FRD2	1.000	.965
FRD3	1.000	.970
BI1	1.000	.976
BI2	1.000	.977

Extraction Method: Principal Component Analysis.

Fig 15 communalities

5.3.3 Total Variance Explained

- In **Extraction tab** Select **Eigenvalues greater than 1** under the method for factor extraction.
- The **Total Variance Explained** table will appear in the output, showing the eigenvalues and the percentage of variance explained by each factor. Fig 16

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.046	16.858	16.858	4.046	16.858	16.858	3.874	16.141	16.141
2	3.357	13.986	30.844	3.357	13.986	30.844	2.935	12.230	28.371
3	3.111	12.963	43.807	3.111	12.963	43.807	2.919	12.162	40.532
4	2.936	12.234	56.042	2.936	12.234	56.042	2.916	12.151	52.684
5	2.865	11.937	67.979	2.865	11.937	67.979	2.913	12.136	64.819
6	2.683	11.179	79.158	2.683	11.179	79.158	2.907	12.111	76.930
7	2.472	10.298	89.456	2.472	10.298	89.456	2.904	12.100	89.031
8	1.850	7.708	97.164	1.850	7.708	97.164	1.952	8.134	97.164
9	.063	.260	97.425						
10	.056	.234	97.659						
11	.055	.228	97.887						
12	.052	.215	98.102						
13	.046	.192	98.294						
14	.046	.191	98.485						
15	.044	.185	98.669						
16	.043	.181	98.851						
17	.040	.168	99.019						
18	.040	.167	99.185						
19	.037	.155	99.340						
20	.035	.146	99.486						
21	.034	.141	99.627						
22	.032	.135	99.762						
23	.031	.128	99.889						
24	.027	.111	100.000						

Extraction Method: Principal Component Analysis.

Fig 16 Total Variance explained

5.3.4 Scree Plot

- **Factor Analysis** > **Extraction** > check the **Scree plot** option under the Display section.
- The Scree Plot will appear in the output along with all the details, which has helped in determining the number of factors to retain by identifying the point where the plot levels off.

5.3.5 Rotated Component Matrix

- **Factor Analysis** > **Rotation** section, and select a rotation method Varimax to achieve a clearer factor structure.
- The **Rotated Component Matrix** will appear in the output, showing the loadings of each variable on the rotated factors, helping in the interpretation of the factors. Fig 17

Component	1	2	3	4	5	6	7	8
PE1	.983							
PE2	.980							
PE3	.982							
PE4	.983							
EE1					.985			
EE2					.985			
EE3					.985			
SI1				.985				
SI2				.983				
SI3				.984				
RI1			.986					
RI2			.985					
RI3			.985					
FC1		.986						
FC2		.989						
FC3		.986						
CS1						.982		
CS2						.983		
CS3						.983		
FRD1							.981	
FRD2							.978	
FRD3							.978	
BI1								.985
BI2								.986

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]
a. Rotation converged in 5 iterations.

Fig 17 Rotation componant matrix

5.3.6 Average Variance Extracted (AVE) and Composite Reliability (CR)

Example

Select Factor Loadings from Rotation Component Matrix grouped s in Fig 17, For **Component 1**, the loadings are:

- PE1: 0.983
- PE2: 0.980
- PE3: 0.982
- PE4: 0.983

Step 1: Calculate the AVE (Average Variance Extracted)

The AVE is calculated using the formula:

$$\text{AVE} = \frac{\sum(\text{Factor Loading}^2)}{\text{Number of Items}}$$

- Square the loadings:
  - PE1: $0.983^2 = 0.966289$
  - PE2: $0.980^2 = 0.960400$
  - PE3: $0.982^2 = 0.964324$
  - PE4: $0.983^2 = 0.966289$
- Sum of squared loadings:
  - $0.966289 + 0.960400 + 0.964324 + 0.966289 = 3.857302$
- Number of items = 4

So, the AVE is:

$$\text{AVE} = \frac{3.857302}{4} = 0.9643255 \approx 0.964$$

Step 2: Calculate the CR (Composite Reliability)

The CR is calculated using the formula:

$$\text{CR} = \frac{(\sum \text{Factor Loadings})^2}{(\sum \text{Factor Loadings})^2 + \sum(1 - \text{Factor Loadings}^2)}$$

- Sum of loadings:
  - $0.983 + 0.980 + 0.982 + 0.983 = 3.928$
- Square of the sum of loadings:
  - $3.928^2 = 15.428784$
- Sum of $1 - \text{Factor Loading}^2$ (error variance):
  - $1 - 0.966289 = 0.033711$
  - $1 - 0.960400 = 0.039600$
  - $1 - 0.964324 = 0.035676$
  - $1 - 0.966289 = 0.033711$
- Sum of error variances:
  - $0.033711 + 0.039600 + 0.035676 + 0.033711 = 0.142698$

So, the CR is:

$$\text{CR} = \frac{15.428784}{15.428784 + 0.142698} = \frac{15.428784}{15.571482} = 0.9918$$

As per example the AVE and CR values are calculated using Excel function of SUM.

6 Conclusion

This Manuel is part of the research conducted and the result produced, this Manuel will assist to replicate the results evaluated. This process flow will assist to enhance the technical knowledge and give more understanding of the research paper. Further, future changes in the version and the technological advancement may affect the validity of these results. These results with all the specification mentioned will be replicated similarly.