



ABW 504D Statistics for Analytics

Assignment Group “39”

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Semester 2
Academic Year 2021-2022
School of Management
Universiti Sains Malaysia

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Introduction

On-line banking services are crucial for long term survival of banks in the world of electronic commerce (Burnham, 1996; Tan & Teo, 2000). Shih & Fang (2004) identified on-line banking as a new type of information system that uses the innovative resources of the Internet and WWW to enable customers to effect financial activities in virtual space. According to Liao et al. (1999) virtual bank is a “non-branch bank” and virtual banking is the provision of services via electronic media such as automated teller machines (ATMs), telephone, personal computers and/or the Internet (Tan & Teo, 2000)

Internetnews.com (2001) reported that according to the U.S. based research house expects local users of online banking will reach 1.1 million by 2004 with the total number of online banking accounts reaching 1.6 million, or 23 percent of all Malaysian Internet users that year. This indicates a potential growth of Internet banking in Malaysia.

Research Problem

Internet is becoming an increasingly important channel for banks to provide banking services to both individual consumers and businesses. Financial services on electronic channels will amount to USD 80 billion by the year 2003, up from both USD 14 billion in 2000 (Ramayah & Koay, 2002). The main purpose of this paper was to gauge the user's intention to use internet banking and identify the main factors that can affect their intention to use internet banking in Penang, Malaysia. Although it has been 5 years since the introduction of internet banking in Malaysia, the uptake is still very low.

The review of the literature shows that there are five potential predictors for the outcome variable. In addition, the effect of gender on the outcome variable is desired. The following theoretical model displays the variables and hypotheses.

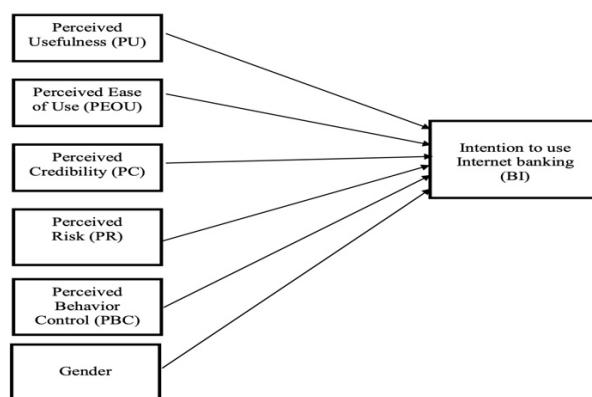


Figure 1: Research Framework

Research Hypotheses

1. H1: Perceived usefulness will be positively related to intention to use Internet banking
2. H2: Perceived ease of use will be positively related to intention to use Internet banking
3. H3: Perceived credibility will be positively related to intention to use Internet banking
4. H4: Perceived risk will be negatively related to intention to use Internet banking
5. H5: Perceived behavioral control will be positively related to intention to use Internet banking
6. H6: Male respondents have higher Intention to use compared to female respondents

Application

1. Import Collected Data To SPSS

Steps :

- Opening the excel sheet from SPSS
- To import data from an Excel spreadsheet into SPSS, first we had to make sure that this Excel spreadsheet is formatted according to these criteria:
 - The spreadsheet should have a single row of variable names across the top of the spreadsheet in the first row.
 - Variable names should include ordinary letters, numbers, and underscores and not include special characters as it would not be a valid variable name because it contains a space).
 - The data should begin in the first column, second row (beneath the variable names row) of the spreadsheet.
 - Missing values for string or numeric variables have blank (empty) cells, or an appropriate predetermined missing value code (such as -999). But this data had no missing values.

The following two figures are the data view of SPSS file after importing collected data to SPSS:

The screenshot shows the IBM SPSS Statistics Data Editor window. The title bar reads "Statistics assignment and project.sav [DataSet1] - IBM SPSS Statistics Data Editor". The main area displays a data grid with 26 rows and 15 columns. The columns are labeled: id, Gender, Age, Years_Organization, Years_Experience, Department, Position, Education_level, PU1, PU2, PU3, PU4, and PUS. The data consists of various numerical values. The status bar at the bottom indicates "Visible: 45 of 45 Variables".

1		1	1	26	2	2	4	2	3	3	2	2	4	4	4
2		2	1	48	17	24	9	5	4	2	2	2	4	4	4
3		3	1	35	5	9	1	3	3	3	3	3	3	2	2
4		4	1	19	1	1	4	1	2	5	5	5	5	4	4
5		5	1	33	6	8	3	3	3	5	5	5	4	4	4
6		6	2	25	1	1	8	2	3	2	2	2	3	2	2
7		7	1	42	3	15	8	3	3	2	2	2	2	5	4
8		8	2	48	16	23	10	4	3	4	3	3	5	4	4
9		9	1	22	2	3	4	1	2	2	2	2	4	4	3
10		10	1	50	15	25	4	4	3	2	2	2	4	4	4
11		11	1	30	3	6	2	2	3	3	3	3	4	4	4
12		12	1	50	15	25	10	5	4	2	2	2	4	4	4
13		13	2	52	7	25	3	4	3	3	3	3	4	4	4
14		14	1	28	5	8	6	1	2	2	2	2	4	4	4
15		15	1	46	6	16	1	4	3	2	2	2	4	4	4
16		16	1	52	17	19	2	4	5	3	3	3	4	3	3
17		17	2	26	3	3	1	2	3	2	2	2	4	3	3
18		18	1	23	3	4	4	1	2	2	2	2	4	3	3
19		19	1	29	4	4	2	2	3	2	2	2	4	3	3
20		20	1	44	10	16	7	4	3	2	2	2	3	3	3
21		21	1	25	3	4	4	1	2	2	2	2	4	3	3
22		22	1	32	2	4	5	3	3	2	2	2	4	4	4
23		23	1	40	10	14	4	3	3	2	2	2	4	4	4
24		24	1	27	3	3	1	2	3	2	2	2	4	3	3
25		25	2	30	2	5	4	2	3	2	2	2	3	4	4
26		26	1	30	3	6	7	2	3	2	2	2	4	3	3

Figure 2: Importing Data "Data View I"

	PBC 3	PBC 4	PR1	PR2	PR3	PR4	PR5	PC1	PC2	BI1	BI2	BI3	BI4	
3	4	4	4	4	3	3	3	3	3	4	4	3	3	
4	5	5	5	5	4	3	4	3	3	4	4	3	3	
5	4	5	5	5	4	4	4	4	5	5	4	3	3	
6	4	4	4	4	3	3	4	4	3	4	4	3	3	
7	5	5	5	5	3	3	3	3	3	5	5	3	3	
8	4	3	3	3	5	5	5	5	5	3	3	4	4	
9	4	4	4	4	4	4	3	4	3	4	4	4	3	
10	4	4	4	4	3	4	4	3	3	4	4	3	3	
11	5	5	5	5	2	2	2	2	2	5	5	3	3	
12	5	5	4	4	5	5	4	4	4	4	4	3	3	
13	4	4	4	4	4	3	4	4	3	4	4	3	4	
14	4	4	4	4	4	3	3	4	3	4	4	3	4	
15	4	4	3	4	4	4	4	4	4	4	4	3	3	
16	4	4	4	4	3	3	3	3	3	5	4	3	3	
17	4	4	4	4	3	3	3	3	3	3	3	3	3	
18	4	4	4	4	4	4	4	4	4	4	4	3	3	
19	3	3	4	4	4	3	4	3	3	4	4	4	4	
20	3	3	3	3	3	2	2	2	2	3	4	4	4	
21	4	4	4	4	2	2	2	2	2	5	5	4	3	
22	5	5	5	5	3	2	3	2	2	4	5	4	4	
23	4	4	4	4	4	4	3	3	4	4	4	3	3	
24	4	4	4	4	3	3	4	4	3	2	2	3	3	
25	4	4	4	4	3	4	5	4	5	4	4	3	4	
26	4	4	4	4	4	4	3	5	4	4	5	3	4	
27	4	4	4	4	4	5	5	4	5	4	4	3	3	

Figure 3: Importing Data "Data View 2"

2. Considering the level of measurement, correctly define each variable, variable label, value label, etc. precisely.

Steps of application:

1. Variables of the study had been defined by names, labels in the variable view in spss.
2. Variables have been defined which is scale, nominal, ordinal. But sometimes we needed to convert the nominal or ordinal into scale in order to be able to measure or use in some tests.
3. Determining the values that shows the measurement instrument , in our case , for the questions of the variables of study a 7 point Likert scale was used (1) strongly disagree , (2) moderately disagree, (3) disagree, (4)Neutral, (5) agree, (6) moderately agree, (7) strongly agree. Determining the values of demographic questions as well such as “Gender, position, education, years of experience”.
4. Computing all the variables that will be used under this case study.

The following two figures are the data variable of SPSS file after importing collected data and defining variables, defining variable labels, value labels to SPSS:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
18	PEU4	Numeric	11	0	Perceives Ease of Use_4	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
19	PEU5	Numeric	11	0	Perceives Ease of Use_5	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
20	PBC1	Numeric	11	0	Perceived Behavior of Control_1	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
21	PBC2	Numeric	11	0	Perceived Behavior of Control_2	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
22	PBC3	Numeric	11	0	Perceived Behavior of Control_3	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
23	PBC4	Numeric	11	0	Perceived Behavior of Control_4	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
24	PR1	Numeric	11	0	Perceived Risk_1	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
25	PR2	Numeric	11	0	Perceived Risk_2	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
26	PR3	Numeric	11	0	Perceived Risk_3	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
27	PR4	Numeric	11	0	Perceived Risk_4	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
28	PR5	Numeric	11	0	Perceived Risk_5	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
29	PC1	Numeric	11	0	Perceived Credibility_1	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
30	PC2	Numeric	11	0	Perceived Credibility_2	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
31	BI1	Numeric	11	0	Behavior Intentions_1	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
32	BI2	Numeric	11	0	Behavior Intentions_2	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
33	BI3	Numeric	11	0	Behavior Intentions_3	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
34	BI4	Numeric	11	0	Behavior Intentions_4	(1, Strongly Disagree)... (7, Strongly Agree)...	None	11	Right	Scale	Both
35	AgeGroup	Numeric	8	0	Age group	(1, below 29)... (7, 60 and above)	None	9	Right	Scale	Both
36	Organization_years_Group	Numeric	8	0	Organization years group	(1, below 5) ... (7, 10 and above)	None	11	Right	Scale	Both
37	Experienceyears_Group	Numeric	8	0	Experienceyears group	(1, Below 5) ... (7, 10 and above)	None	13	Right	Scale	Both
38	Perceived_Usefulness_SUM	Numeric	8	0	PERCEIVED_USEFULNESS_SUM	None	None	17	Right	Scale	Both
39	Perceived_Easeofuse_SUM	Numeric	8	0	Perceived_Easeofuse_SUM	None	None	16	Right	Scale	Both
40	Perceived_Behaviorcontrol_SUM	Numeric	8	0	Perceived_Behaviorcontrol_SUM	None	None	16	Right	Scale	Both
41	Perceived_Risk_SUM	Numeric	8	0	Perceived_Risk_SUM	None	None	12	Right	Scale	Both
42	Perceived_Credibility_SUM	Numeric	8	0	Perceived_Credibility_SUM	None	None	9	Right	Scale	Both
43	Behavior_Intentions_SUM	Numeric	8	0	Behavior_Intentions_SUM	None	None	9	Right	Scale	Both
44	INTENTION	Numeric	8	0	INTENTION	None	None	10	Right	Scale	Both
45	INTENTION_CAT	Numeric	8	0	INTENTION_CAT	(1, Low Intention)...	None	10	Right	Ordinal	Both

Figure 4 : Variable View SPSS

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Input
1	id	Numeric	11	0	id	None	None	11	Right	Nominal	Both
2	Gender	Numeric	11	0	Gender	(1, Female)...	None	11	Right	Nominal	Both
3	Age	Numeric	11	0	Age	None	None	11	Right	Scale	Both
4	Years_Organization	Numeric	11	0	Years of working in organization	None	None	11	Right	Scale	Both
5	Years_Experiance	Numeric	11	0	Yrs of working experience	None	None	11	Right	Scale	Both
6	Department	Numeric	11	0	Department	(1, Sales&purchasing)...	None	11	Right	Nominal	Both
7	Position	Numeric	11	0	Current Position	(1, Technician)...	None	11	Right	Nominal	Both
8	Education_level	Numeric	11	0	Education	(1, Secondary or lower)...	None	11	Right	Ordinal	Both
9	PU1	Numeric	11	0	Percieved Usefulness_1	(1, Strongly Disagree)...	None	11	Right	Scale	Both
10	PU2	Numeric	11	0	Percieved Usefulness_2	(1, Strongly Disagree)...	None	11	Right	Scale	Both
11	PU3	Numeric	11	0	Percieved Usefulness_3	(1, Strongly Disagree)...	None	11	Right	Scale	Both
12	PU4	Numeric	11	0	Percieved Usefulness_4	(1, Strongly Disagree)...	None	11	Right	Scale	Both
13	PU5	Numeric	11	0	Percieved Usefulness_5	(1, Strongly Disagree)...	None	11	Right	Scale	Both
14	PU6	Numeric	11	0	Percieved Usefulness_6	(1, Strongly Disagree)...	None	11	Right	Scale	Both
15	PEU1	Numeric	11	0	Perceives Ease of Use_1	(1, Strongly Disagree)...	None	11	Right	Scale	Both
16	PEU2	Numeric	11	0	Perceives Ease of Use_2	(1, Strongly Disagree)...	None	11	Right	Scale	Both
17	PEU3	Numeric	11	0	Perceives Ease of Use_3	(1, Strongly Disagree)...	None	11	Right	Scale	Both
18	PEU4	Numeric	11	0	Perceives Ease of Use_4	(1, Strongly Disagree)...	None	11	Right	Scale	Both
19	PEU5	Numeric	11	0	Perceives Ease of Use_5	(1, Strongly Disagree)...	None	11	Right	Scale	Both
20	PBC1	Numeric	11	0	Perceived Behavior of Control_1	(1, Strongly Disagree)...	None	11	Right	Scale	Both
21	PBC2	Numeric	11	0	Perceived Behavior of Control_2	(1, Strongly Disagree)...	None	11	Right	Scale	Both
22	PBC3	Numeric	11	0	Perceived Behavior of Control_3	(1, Strongly Disagree)...	None	11	Right	Scale	Both
23	PBC4	Numeric	11	0	Perceived Behavior of Control_4	(1, Strongly Disagree)...	None	11	Right	Scale	Both
24	PR1	Numeric	11	0	Perceived Risk_1	(1, Strongly Disagree)...	None	11	Right	Scale	Both
25	PR2	Numeric	11	0	Perceived Risk_2	(1, Strongly Disagree)...	None	11	Right	Scale	Both
26	PR3	Numeric	11	0	Perceived Risk_3	(1, Strongly Disagree)...	None	11	Right	Scale	Both
27	PR4	Numeric	11	0	Perceived Risk_4	(1, Strongly Disagree)...	None	11	Right	Scale	Both
28	PR5	Numeric	11	0	Perceived Risk_5	(1, Strongly Disagree)...	None	11	Right	Scale	Both

Figure 5: Variable View SPSS

3. Using a histogram, visually inspect if age variable is distributed normally.

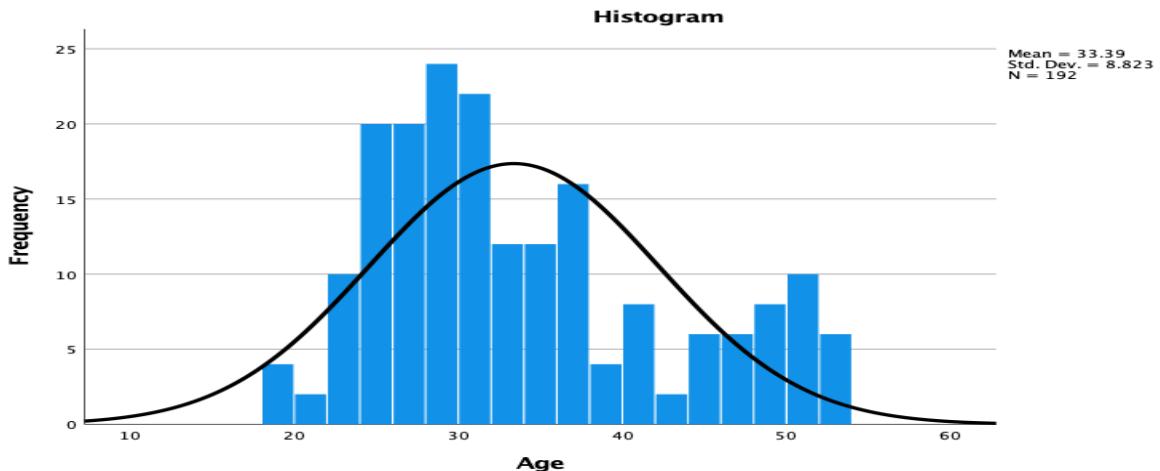


Figure 6: Age - Histogram with Normal Distribution Curve

Table 1: Age Descriptive Statistics

Construct	Mean	Median	Mode	Std.Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis	Minimum	Maximum
Age	33.39	31.00	29 ^a	8.823	0.667	0.175	-0.557	0.349	19	53

Note: Age with Histogram with normal distribution curve shows that the graph is right skewed.

4. Determine the reliability of the main variables used in the study.

Steps of Application: Analyze > Scale > Reliability > Drag and Drop the items of the variable.

The term reliability generally refers to the consistency of a measure. The statistical approach to estimating reliability varies depending upon the purpose of the measure, Cronbach's Alpha test to measure the degree of study variables stability and the following table presents that the stability factor for the sample responsiveness is between 69.3% and 83.3% which means that the responses stable in that questionnaire.

Table 2 Reliability Test

No table of figures entries found.	N of Item	Deleted Items	Cronbach's Alpha
Perceived Usefulness	6	1	.785
Perceived Ease of Use	5	-	.846
Behavioral Intentions	4	-	.621
Perceived behavior of control	4	-	.819
Perceived Risk	5	1	.693
Perceived Creditability	2	-	.833

After applying reliability test in SPSS, the findings are shown in the following points:

Perceived Usefulness

Perceived Usefulness had an overall Cronbach's Alpha equal to .605 for N of 6 , After checking the Item-Total Statistics and deleting the sixth item which represents this statement “On-line banking would be a difficult way to manage my finances” as it is negatively correlated in corrected item -Total correlation column, then the overall Cronbach's alpha increased to be .785, and the following 2 tables show the first one shows the first situation, and the second table shows after deleting the sixth item.

Item-Total Statistics			
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation
Percieved Usefulness_1	16.75	4.188	.863
Percieved Usefulness_2	16.73	4.052	.850
Percieved Usefulness_3	16.73	4.199	.828
Percieved Usefulness_4	15.88	7.377	.064
Percieved Usefulness_5	15.97	7.067	.097
Percieved Usefulness_6	14.46	9.380	-.417
			.785

Figure 8: Perceived Usefulness Reliability item -Total Statistics

Item-Total Statistics			
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation
Percieved Usefulness_1	11.91	5.258	.831
Percieved Usefulness_2	11.89	5.086	.826
Percieved Usefulness_3	11.89	5.212	.816
Percieved Usefulness_4	11.03	8.219	.183
Percieved Usefulness_5	11.13	7.859	.212
			.843

Figure 7: Perceived Usefulness Reliability item -Total Statistics "After Deleting 6th item"

Perceived Risk

Perceived Risk had an overall Cronbach's Alpha equal to .093 for N of 5, After checking the Item-Total Statistics and deleting the fourth item which represents this statement “Advances in Internet security technology provides for safer on-line banking “ as it is negatively correlated in corrected item -Total correlation column, then the overall Cronbach's alpha increased to be

.693 , and the following 2 tables show the first one shows the first situation, and the second table shows after deleting the fourth item.

Item -Total Statistics			
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item -Total Correlation
			Cronbach's Alpha if Item Deleted
Perceived Risk_1	15.44	1.755	.602
Perceived Risk_2	15.40	1.706	.572
Perceived Risk_3	15.74	2.539	.049
Perceived Risk_4	14.63	4.717	-.584
Perceived Risk_5	15.80	2.107	.184

Figure 10: Perceived Risk Reliability item -Total Statsics

Item -Total Statistics			
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item -Total Correlation
			Cronbach's Alpha if Item Deleted
Perceived Risk_1	10.81	3.127	.484
Perceived Risk_2	10.77	3.047	.472
Perceived Risk_3	11.11	3.013	.406
Perceived Risk_5	11.18	2.513	.560

Figure 11: Perceived Risk Reliability item -Total Statsics
"After Deleting 4th item"

Note: The rest of variables of the main study are reliable and their overall Cronbach's Alphas were shown in table 1: Reliability test. They are good and stable enough to conduct analysis on. Therefore, there was no need to delete variables from them.

5. For each variable, compute the sum score

Steps of application: Transform > Compute > Defining Target Variable > Defining label > From Functional Group > Statistical > From Function and special variables > Double click Sum

The following figures shows sum computation of the main variables of the study which are (Behavioral Intentions, Perceived Risk, Perceived Usefulness, Perceived Ease of Use, Perceived Creditability, Perceived Behavior of Control).

Taking into consideration 2 points:

- 1.While computing the sum of Perceived Usefulness and of Perceived Risk, the deleted items have been excluded from the sum computation.
- 2.Reversing coding had been done to 3 items in the questionnaire “PU6, PEU2” As they are negatively worded and “PR4” as it was positively worded different from the whole variable items.

Statisticcis assignment and project.sav [DataSet2] - IBM SPSS Statistics Data Editor

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
21	PBC2	Numeric	11	0	Perceived Behavior of Control_2	{1, Strongly Disagree...}	None	11	Right	Scale	Both
22	PBC3	Numeric	11	0	Perceived Behavior of Control_3	{1, Strongly Disagree...}	None	11	Right	Scale	Both
23	PBC4	Numeric	11	0	Perceived Behavior of Control_4	{1, Strongly Disagree...}	None	11	Right	Scale	Both
24	PR1	Numeric	11	0	Perceived Risk_1	{1, Strongly Disagree...}	None	11	Right	Scale	Both
25	PR2	Numeric	11	0	Perceived Risk_2	{1, Strongly Disagree...}	None	11	Right	Scale	Both
26	PR3	Numeric	11	0	Perceived Risk_3	{1, Strongly Disagree...}	None	11	Right	Scale	Both
27	PR4	Numeric	11	0	Perceived Risk_4	{1, Strongly Disagree...}	None	11	Right	Scale	Both
28	PR5	Numeric	11	0	Perceived Risk_5	{1, Strongly Disagree...}	None	11	Right	Scale	Both
29	PC1	Numeric	11	0	Perceived Credibility_1	{1, Strongly Disagree...}	None	11	Right	Scale	Both
30	PC2	Numeric	11	0	Perceived Credibility_2	{1, Strongly Disagree...}	None	11	Right	Scale	Both
31	BI1	Numeric	11	0	Behavior Intentions_1	{1, Strongly Disagree...}	None	11	Right	Scale	Both
32	BI2	Numeric	11	0	Behavior Intentions_2	{1, Strongly Disagree...}	None	11	Right	Scale	Both
33	BI3	Numeric	11	0	Behavior Intentions_3	{1, Strongly Disagree...}	None	11	Right	Scale	Both
34	BI4	Numeric	11	0	Behavior Intentions_4	{1, Strongly Disagree...}	None	11	Right	Scale	Both
35	AgeGroup	Numeric	8	0	Age group	{1, below 29...}	None	9	Right	Ordinal	Both
36	Organization_years_Group	Numeric	8	0	Organizationyearsgroup	{1, Below 5}...	None	11	Right	Ordinal	Both
37	Experiencyears_Group	Numeric	8	0	Experiencyearsgroup	{1, Below 5}...	None	13	Right	Ordinal	Both
38	Perceived_Usefulness_SUM	Numeric	8	0	PERCEIVED_USEFULNESS_SUM	None	None	12	Right	Scale	Both
39	Perceived_Easeofuse_SUM	Numeric	8	0	Perceives_Easeofuse_SUM	None	None	8	Right	Scale	Both
40	Perceived_Behaviorofcontrol_SUM	Numeric	8	0	Perceived_BehaviorofControl_SUM	None	None	14	Right	Scale	Both
41	Perceived_Risk_SUM	Numeric	8	0	Perceived_Risk_SUM	None	None	8	Right	Scale	Both
42	Perceived_Credibility_SUM	Numeric	8	0	Perceived_Credibility_SUM	None	None	8	Right	Scale	Both
43	Behavior_Intentions_SUM	Numeric	8	0	Behavior_Intentions_SUM	None	None	8	Right	Scale	Both
44	INTENTION	Numeric	8	0	INTENTION	None	None	10	Right	Scale	Both
45	INTENTION_CAT	Numeric	8	0	INTENTION_CAT	{1, Low intention}...	None	10	Right	Ordinal	Both
46											
47											
48											

Data View Variable View

Figure 12: Variable View after computing variables sum

Statisticcis assignment and project.sav [DataSet2] - IBM SPSS Statistics Data Editor

Perceived_Usefulness_SUM	Perceived_Easeofuse_SUM	Perceived_Behaviorofcontrol_SUM	Perceived_Risk_SUM	Perceived_Credibility_SUM	Behavior_I intentions_SUM
15	19	14	18	10	14
14	19	15	18	6	14
14	20	15	14	6	14
24	20	18	18	6	14
23	20	16	18	9	15
11	18	15	15	7	14
15	21	18	16	6	16
19	16	14	16	10	14
13	20	16	16	6	15
14	22	15	15	6	14
17	22	18	14	4	16
14	20	17	17	8	14
17	20	16	16	7	15
14	20	15	15	7	15
14	20	15	15	8	14
16	18	15	14	6	15
13	16	15	14	6	12
13	20	15	16	8	14
13	20	14	16	6	16
12	20	14	11	4	15
13	23	15	12	4	17
14	23	19	16	4	17
14	19	15	15	7	14
13	14	15	15	7	10
13	20	16	15	9	15

Data View Variable View

Figure 13: Data view of sum variables

6. **Describe** the sample profile in terms of **gender** and **department** using **frequency** tables and bar charts.

Steps of Application: Analyze > Descriptive analysis > Frequencies > Drag and Drop > Statistics >charts> Bar charts

The following demographic analysis describe the sample profiles characteristics that show who vote for the questionnaire of the empirical study, the demographic analysis consists of the gender, department.

Table 3: Sample Profile - Gender

Gender	Frequency	Percent
Female	144	75.0
Male	48	25.0
Total	192	100.0

It is concluded that the sample majority are Females presenting 75% of the total sample while Males are presenting only 25% of sample.

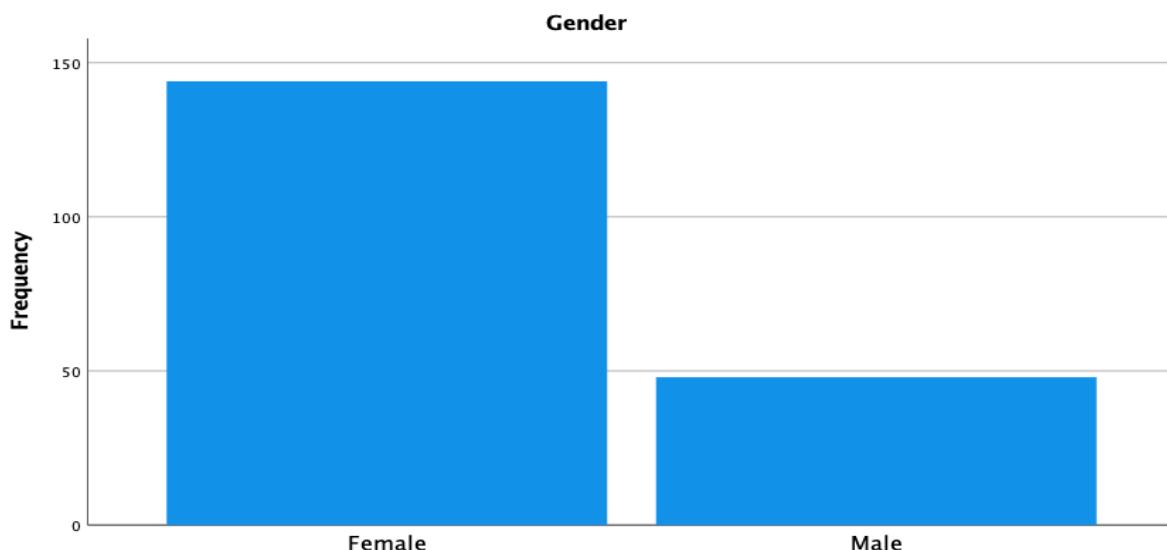


Figure 13: Sample Profile - Gender

Table 4: Sample Profile - Department

Departments	Frequency	Percent
Sales&purchasing	8	4.2
R&D	22	11.5
Subcon management	6	3.1
Production	36	18.8
Test	12	6.3
QA	24	12.5
Material	16	8.3
Engineering	50	26.0
HR	6	3.1
Marketing	12	6.3
Total	192	100.0

It is concluded that 26% of sample are working in Engineering department, 18.8% are working in production, and nearly 12.5% are working in QA, then we have 11.5% are working in research and development, 8.3% are working in material, 6.3% are working in test, 6.3% are working in marketing, 4.2% are working in sales and purchasing, there are only 3.1% are presenting subcon management and finally 3.1% are working in HR.

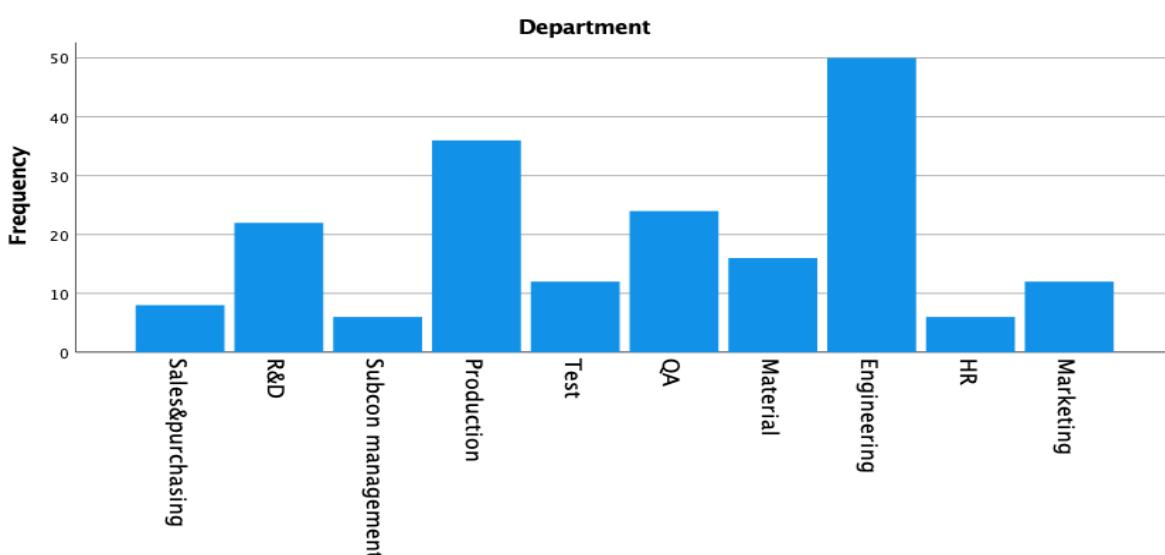


Figure 9: Sample Profile – Department

7. Use a cross-tabulation to describe the gender of the participants in terms of their education level.

Steps of application: Analyze > Descriptive statistics > Cross tabs > Drag gender in Rows and Education in Column > statistics > chi square

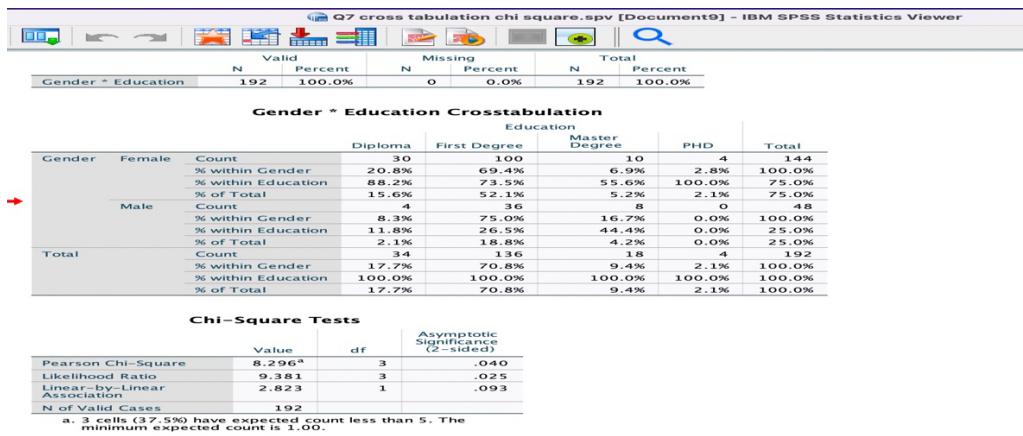


Figure 10:Cross-Tabulation output

Table 5:Gender- Education Cross-tabulation

		Diploma	First Degree	Master Degree	PHD	Total	X ²	P-Value
Gender	Female	30	100	10	4	144	8.296 ^a	0.040
		20.8%	69.4%	6.9%	2.8%	100.0%		
	Male	4	36	8	0	48		
		8.3%	75.0%	16.7%	0.0%	100.0%		

It is concluded that female respondents have different education levels, 69.4% of them have First degree, 20.8% of them have Diploma, 6.9% have master's degree and finally just 2.8% of them have PHD. Male respondents also have different education levels, 75% of them have first degree, 16.7% of them have master's degree, 8.3% of them have Diploma and none of them has PHD education level. While the p-value is significant which means that and chi square equal to 8.296 but chi-square test is invalid between Gender and Education level as it shown in the previous output the percentage of the test is 37.5%.

8. Categorize the intention to use Internet banking variable into 2 categories (A different variable), labeling them as low intention, and high intention.

Steps of Application:

1.Computing mean of Behavioral Intention variable: Transform > compute variable > Defining variable, label “INTENTION” > statistics > double click Mean (BI1, BI2, BI3,BI4).

2.Median Split: Analyze > Frequencies > Median

3.Recode into different variables: Transform > Recode into different variables > Drag and drop Intention (computed variable) > defining name and label INTENTION_CAT > Defining lowest through value “3.5” =1, highest through value “3.51” =2

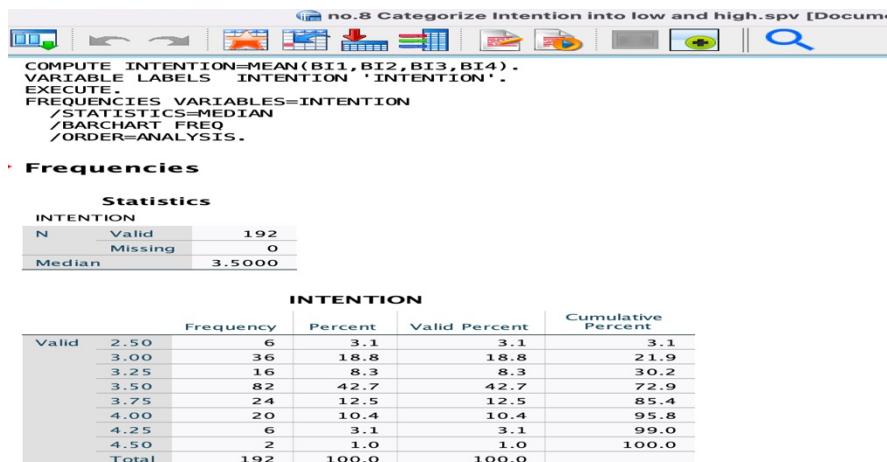
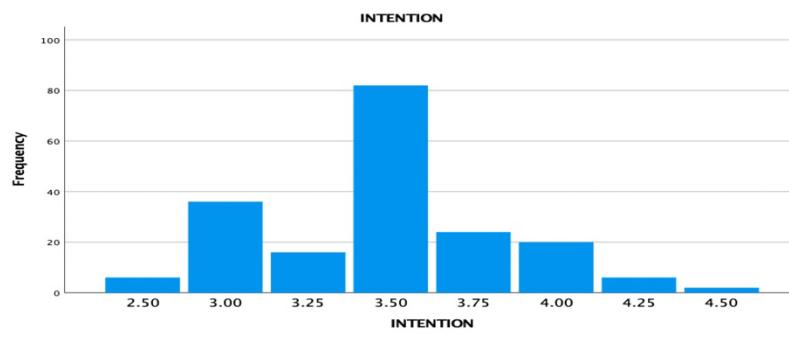


Figure 11: INTENTION MEDIAN



RECODE INTENTION (Lowest thru 3.5=1) (3.51 thru Highest=2) INTO INTENTION_CAT.
EXECUTE.

Figure 12: Recoding INTENTION into INTENTION_CAT

9. Does intention to use internet banking significantly vary by age? Interpret the results of your inferential test.

Steps of application:

1.Computing AgeGroup: Recode into different variables > defining and labeling each category of AgeGroup

2.One-Way ANOVA Test: Analyze > Compare means > One way ANOVA > drag and drop variables > selecting post-hoc test > Descriptive from statistics

3.Hypotheses Development:

H_0 : Intention to use internet banking significantly does not vary by age. $\sigma^2_1 = \sigma^2_2$

H_1 : Intention to use internet banking significantly vary by age. $\sigma^2_1 \neq \sigma^2_2$

Table 6: One-Way ANOVA Test Results

	N	Mean	Std. Deviation	F-Value	P-Value
Below 29	80	3.46	0.397	0.127	0.944
30-39	66	3.47	0.371		
40-50	40	3.50	0.376		
Above 50	6	3.50	0.387		
Total	192	3.47	0.381	3.42	0.944

One way ANOVA test that states that if the p-value is less than 0.05 that means the test is significant and to reject the null hypothesis which states that the dependent variable which is intention to use internet banking does not vary by age and if it is larger than 0.05 that means the test is insignificant and the null hypotheses will be accepted. In this test, it had concluded that, P- Value is equal to 0.944 which is greater than 0.05, **so test is insignificant, and we accept the null hypotheses which means the two variances are equal ,that Intention to use internet banking significantly does not vary by age.**

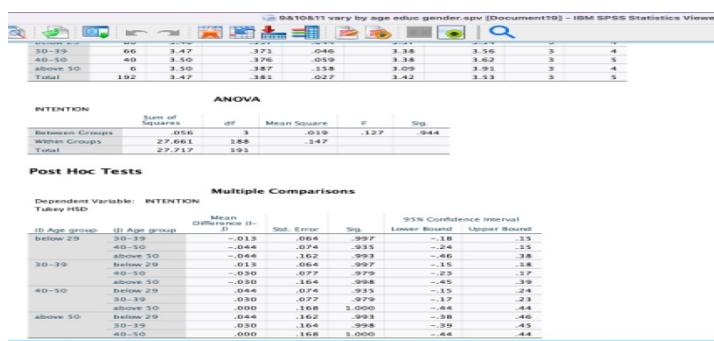


Figure 11:One-Way ANOVA Intention-Age

10. Does intention to use internet banking significantly vary by Gender? Interpret the results of your inferential test.

Steps of application:

1.Analyze > Compare means > Independent samples T Test > Drag and drop Intention into Test variables and Gender in Grouping variable.

2.Hypotheses Development:

H_0 : Intention to use internet banking significantly does not vary by Gender. $\sigma^2_1 = \sigma^2_2$

H_1 : Intention to use internet banking significantly vary by Gender. $\sigma^2_1 \neq \sigma^2_2$

Table 7: T-Test Results

Gender	Female	Male	t-value	p-value
INTENTION	3.4826 (0.4167)	3.4375 (0.2446)	0.7100	0.479

T-Test analysis t states that if the p-value is less than 0.05 that means the test is significant and to reject the null hypothesis which states that the dependent variable which is intention to use internet banking does not vary by Gender and if it is larger than 0.05 that means the test is insignificant and the null hypotheses will be accepted. In this test, it had concluded that, P- Value of t-test for Equality of means is equal to 0.479 which is larger than 0.05, **so test is insignificant, and we accept the null hypothesis which refers to the two variances are equal, which means that Intention to use internet banking significantly does not vary by Gender.**

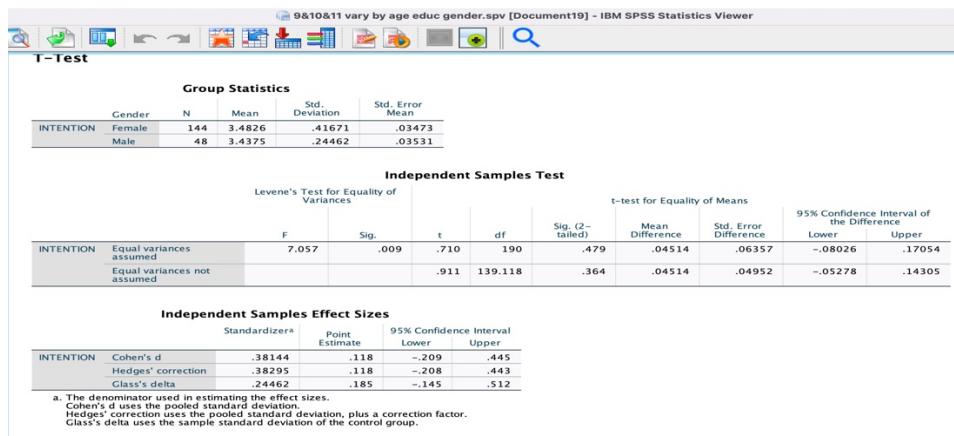


Figure 12: T-Test Output

11. Does intention to use internet banking significantly vary by Education? Interpret the results of your inferential test.

Steps of application:

1.One-Way ANOVA Test: Analyze > Compare means > One way ANOVA > drag and drop variables > selecting post-hoc test > Descriptive from statistics

2.Hypotheses Development:

H_0 : Intention to use internet banking significantly does not vary by Education. $\sigma^2_1 = \sigma^2_2$

H_1 : Intention to use internet banking significantly vary by Education. $\sigma^2_1 \neq \sigma^2_2$

Table 8:One-Way ANOVA Test Results

	N	Mean	Std. Deviation	Std. Error	F-Value	P-Value
Diploma	34	3.59	0.348	0.060	1.52049	0.211
First Degree	136	3.46	0.387	0.033	3.39	0.52
Master Degree	18	3.39	0.366	0.086	3.21	0.57
PHD	4	3.38	0.433	.217	2.69	0.06
Total	192	3.47	0.381	0.027	3.42	0.53

One way ANOVA test that states that if the p-value is less than 0.05 that means the test is significant and to reject the null hypothesis which states that the dependent variable which is intention to use internet banking does not vary by education and if it is larger than 0.05 that means the test is insignificant and the null hypotheses will be accepted. In this test, it had concluded that, P- Value is equal to 0.211 which is greater than 0.05, so test is insignificant, and **we accept the null hypotheses which means the two variances are equal, that Intention to use internet banking significantly does not vary by education level.**

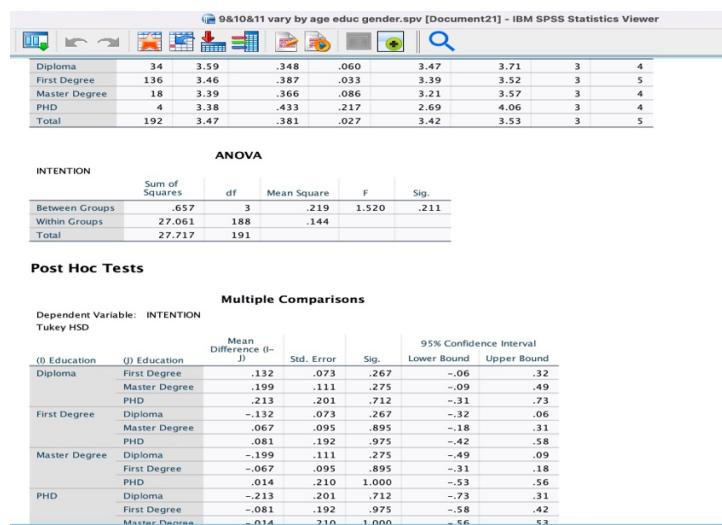


Figure 13:One-Way ANOVA Intention-Education Level

12. Is there a significant relationship between gender and intention to use internet banking (The new variable you created in Action 8: Intention – the 2 categories low and high)? Interpret the results of your inferential test.

Steps of Application:

1.Analyze > Descriptive analysis > Crosstabs > INTENTION_CAT in rows > Gender in columns > chi-square from statistics.

2.Hypotheses Development:

H_0 : There is no statistically significant relationship between gender and intention to use internet banking

H_1 : There is a statistically significant relationship between gender and intention to use internet banking

Table 9: Chi-square Test Result

Construct		Low Intention	High Intention	Total	χ^2	P-Value
Gender	Female	100 (69.44)	44 (30.56)	144	3.516	0.061
	Male	40 (83.33)	8 (16.67)	48		

Chi-square test had been conducted that states that if p-value is less than 0.05, null hypothesis will be rejected, if it is greater than 0.05 null hypothesis will be accepted. It is concluded that female respondents 69.44% of them have low intention while 30.56% of them have high intention. While male respondents 83.33% of them have low intention and 16.67% of them have high intention. the p-value is equal to 0.061 , which means that it is insignificant and chi square equal to 3.516 . therefore, **null hypothesis is accepted, and there is no statistically significant relationship between gender and intention to use internet banking.**

Conclusion

What we have learned from this case study can be discussed in the following points:

- Importing collected data to SPSS.
- How to prepare spss file before starting analysis.
- How to define variables, identify labels, determine roles, level of measurements.
- Reversing coding that have negatively worded in the questionnaire.
- Recoding some variables into different variables.
- Computing needed variables “Sum, Average, Categorized variables”
- Conducting Frequencies using Histogram and bar charts.
- Forming respondents sample profiles based on different demographic variables. such as “Gender, Education”.
- Conducting cross tabulations and chi square analysis
- Applying One way ANOVA, dependent samples t-test
- How to present the outputs of SPSS into excel then word file to be easily understood.
- How to interpret the results of the outputs.

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ABW 504 Statistics for Analytics

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Semester 2
Academic Year 2021-2022
School of Management
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Multiple Regression Model

Table 1:Multiple Regression Model Variables

Variable	Symbol
Intention to use internet banking (BI)	Y (dependent)
Perceived usefulness (PU)	X1 (independent)
Perceived ease of use (PEOU)	X2 (independent)
Perceived Credibility (PC)	X3 (independent)
Perceived risk (PR)	X4 (independent)
Perceived behavior control (PBC)	X5 (independent)
Gender	X6 (independent)

Regression equation:

$$Y = \alpha + \beta_1(X_1) + \beta_2(X_2) + \beta_3(X_3) + \beta_4(X_4) + \beta_5(X_5) + \beta_6(X_6) + \varepsilon$$

Research Hypotheses:

- H1: Perceived usefulness will be positively related to intention to use Internet banking.
- H2: Perceived ease of use will be positively related to intention to use Internet banking.
- H3: Perceived credibility will be positively related to intention to use Internet banking.
- H4: Perceived risk will be negatively related to intention to use Internet banking.
- H5: Perceived behavioral control will be positively related to intention to use Internet banking.
- H6: Male respondents have higher Intention to use compared to female respondents.

Table 2: Summary model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.796 ^a	.633	.621	.938

R square = 0.633

- 63.3 % of the variation of the intention to use internet banking can be explained by the variation of the perceived usefulness, perceived ease of use and perceived behaviour of control.

Table 3: ANOVA a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	280.696	6	46.783	53.168	.000 ^b
	Residual	162.783	185	.880		
	Total	443.479	191			

F- statistics = 53.168

- It shows if there is a linear relationship between all the X variables considered together and Y
- This F tests the null hypothesis that $\beta_1=\beta_2=\beta_k=0$ and the null hypothesis that R square = 0
- The P value of F = 0.00 < 0.05, so we can reject the null hypothesis.

Table 4: Coefficients a

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error				Lower Bound	Upper Bound
1	(Constant)	3.907	.730		5.351	.000	2.466	5.347
	PERCEIVED_USEFULNESS_SUM	.056	.025	.112	2.253	.025	.007	.104
	Perceives_EaseofUse_SUM	.476	.037	.673	12.771	.000	.402	.550
	Perceived_Credibility_SUM	-.116	.065	-.122	-1.793	.075	-.244	.012
	Perceived_Risk_SUM	-.069	.062	-.098	-1.114	.267	-.191	.053
	Perceived_BehaviorofControl_SUM	.122	.058	.158	2.088	.038	.007	.238
	Gender_Dummy	.123	.162	.035	.760	.448	-.196	.442

a. Dependent Variable: Behavior_Intentions_SUM

Table 5: Multiple Regression Model Results

Hypotheses	construct	Unstd.B	Std.Error	Std.Beta	T-value	Sig	LL	UL	Result
H1	PU	0.056	0.025	0.112	2.253	0.025	0.007	0.104	supported
H2	PEU	0.476	0.037	0.673	12.771	0.000	0.402	0.550	supported
H3	PC	-0.116	0.065	-0.122	-1.793	0.075	-0.244	0.012	Not supported
H4	PR	-0.069	0.062	-0.098	-1.114	0.267	-0.191	0.053	Not supported
H5	PBC	0.122	0.058	0.158	2.088	0.038	0.007	0.238	supported
H6	Gender	0.123	0.162	0.035	0.760	0.448	-0.196	0.442	Not supported

According to the predicted value of Beta, which is the slope of the regression line, it's representing the change in the intention to use internet with a unit change in the predictor:

- 1- We can accept the H1, as perceived usefulness has a positive slope equals to 0.056, it's positively related to the intention to use internet banking.
- 2- We can accept the H2, as perceived ease of use has a positive slope equals to 0.476, it's positively related to the intention to use internet banking.
- 3- We will reject the H3, as perceived credibility has a negative slope equals to -0.116, it's negatively related to the intention to use internet banking and **it is insignificant**
- 4- We will reject the H4, as the perceived risk has a negative slope equals to -0.069, it's negatively related to the intention to use internet banking, **but it is insignificant**
- 5- We can accept the H5, as the perceived behaviour of control has a positive slope equals to 0.122, it's positively related to the intention to use internet banking.
- 6- We will reject the H6 as the gender has a slope equals to 0.123 This means that after the effects of all the other variables are considered, males will have 12.3% higher intention to use internet banking than females but **it's insignificant**

Therefore, we can conclude that the regression equation is:

- $Y = 3.907 + 0.056(X1) + 0.476(X2) + 0.122(X5) + \epsilon$

Predictors significance:

The significance of the predictors is determined by the T-value, the P-value, and the confidence interval.

Explain which predictors are significant and why?

- Perceived usefulness coefficient has a p-value equals to 0.025 which is less than 0.05, the confidence interval is [0.007,0.104], and T-value = 2.253 which is greater than the T-critical (1.96) so B1 is significant at 5% level of significance.
- Perceived ease of use coefficient has a p-value equals to 0.00 which is less than 0.05, the confidence interval is [0.402,0.550], and T-value = 12.771 which is greater than the T-critical (1.96) so B2 is significant at 5% level of significance.
- Perceived behaviour of control coefficient has a p-value equals to 0.007 which is less than 0.05, the confidence interval is [0.007,0.238], and T-value = 2.088 which is greater than the T-critical (1.96) so B5 is significant at 5% level of significance.
- The constant has a p-value equals to 0.00 which is less than 0.05, the confidence interval is [2.466,5.347], and T-value = 5.352 which is greater than the T-critical (1.96) so the constant is significant at 5% level of significance.

Explain which predictors are not significant and why?

- Perceived credibility coefficient has a p-value equals to 0.075 which is greater than 0.05, the confidence interval is [-0.244,0.012], and T-value = -1.793 which is less than T-critical (-1.96) so B3 is not significant at 5% level of significance.
- Perceived risk coefficient has a p-value equals to 0.267 which is greater than 0.05, the confidence interval is [-0.191,0.053], and T-value = -1.114 which is less than T-critical (-1.96) so B4 is not significant at 5% level of significance.
- Gender has a p-value equals to 0.448 which is greater than 0.05, the confidence interval is [-0.196,0.442], and T-value = 0.760 which is less than T-critical (1.96) so B6 is not significant at 5% level of significance.

Explain which predictor is the strongest and which predictor is the weakest in the model and why?

- The standardized beta removes all the measurement, so we can compare the effect of the variables directly. The higher the value of the standardized beta of the variable, that variable has a stronger effect on the dependent variable.
- So, the Perceived ease of use is the variable that has the strongest effect on the intention to use internet banking having the highest standardized beta equals to 0.673. The gender has the lowest standardized beta equals to 0.035 but since it is not significant it does not have an effect on the intention to use internet banking. So, the variable having the lowest significant standardized beta is the perceived usefulness and it is equal to 0.112, so this is the variable having the weakest effect on the intention to use internet banking.

Recommendations:

According to the findings we can see that the ease of use of the internet banking has the strongest effect on the intention of using it so we recommend that the practitioners enhance the ease of use of internet banking by Performing server maintenance which can be conducted periodically to be able to maintain the performance of internet banking services so that the quality of services related to speed and ease of access can be maintained. In the long term, it is necessary to consider replacing the server hardware at least once every 10 years so that they can keep up with developments in IT technology.

Also, they should Conduct enrollment of new internet banking features that are in accordance with customer wishes so that the new menu can be in line with customer expectations. this menu can improve customer perceptions of overall internet banking performance and speed. When customers easily use these new features, the customer's perception of internet banking speed will increase. Moreover, they need to regularly evaluate the process speed of each application feature. This is done to find bugs or create a shortcut to the process of each application's features. It is necessary to consider the possibility of process changes to increase speed for each internet banking application feature.

The practitioners need to take care, detect, and decrease the risks related to the internet banking such as fraud, theft and identity stealing by running awareness campaigns to inform clients on cybercriminals' methods. Also, by using modern technologies to make online banking safer and to protect clients 'information. For example, many online banking apps allow customers to log in with their fingerprint rather than with a traditional pin code. This also includes making sure the connection between their website and their customers is safe. Many browsers, such as Google Chrome, Mozilla Firefox, and Internet Explorer show whether your connection to a certain website is secure.