National College of Ireland

Configuration Manual

MSc Research Project
MSc in Fintech

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MSc Project Submission Sheet

School of Computing

Student Name:	Pancham Devidas Nalawade
Student ID:	X21225753
Programme:	MSc in Fintech **Year:** 2022-23
Module:	Research Project
Supervisor:	Victor Del Rosai
Submission Due Date:	14/08/2023
Project Title:	Public Perception of Decentralized Finance in Ireland: MSc in Fintech Research Project
Word Count:	516 **Page Count** 7 Pages

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:	Pancham
Date:	14/08/2023

PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

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

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Configuration Manual

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Hardware / Software	Version	Description
MacBook Air M1	MacOS Ventura 13.0	Workstation for conducting the research
Tally Forms	2023	Web-based application for developing online questionnaire
Python	Python 3	Language used for statistical computing and graphics
Google Collab	Web-based platform	Interactive environment for Python programming and analysis

Data Gathering

STEP 1: Survey Design: A comprehensive survey questionnaire was designed, using Tally forms. 44 NCI computing students from the class of 2022-23 were surveyed via convenience sampling.
Below is the link for the survey.

https://tally.so/r/3xjE4v

Data Pre-processing & Transformation

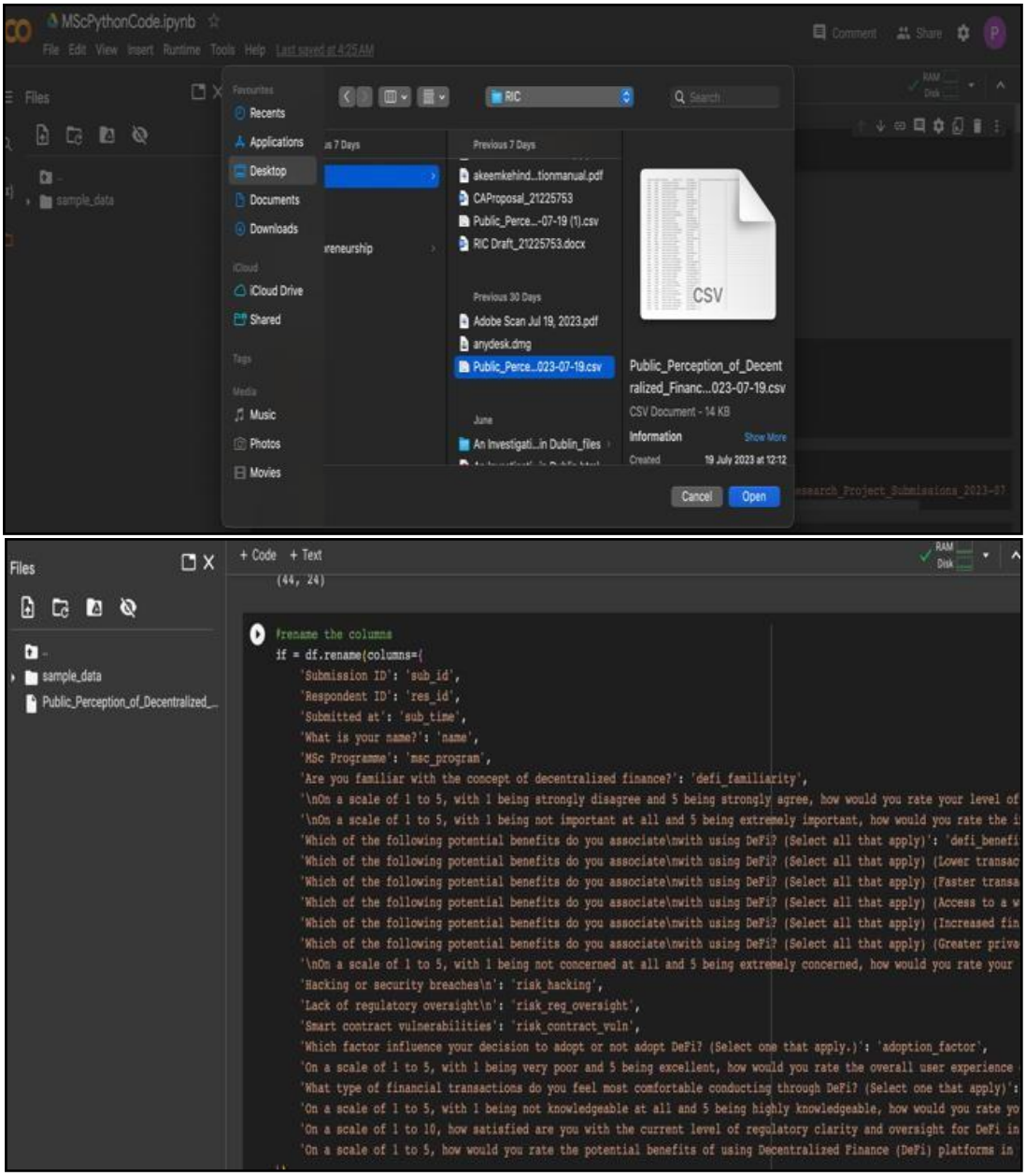
STEP 2 : Load the data set and read the csv file "Public_Perception_of_Decentralized_Finance_in_Dublin_MSc_in_Fintech_Research_Project_Submissions_2023-07-19.csv" into a DataFrame named 'df'

STEP 3: Get the number of rows and columns in the data frame.

STEP 4: Rename the columns

STEP 5: Understand your data

STEP 6: Check for missing values



Exploratory Data Analysis (EDA

STEP 7: Visualize the count of respondents who perceive each specified benefit of using Decentralized Finance (DeFi) in Ireland, using a bar chart.

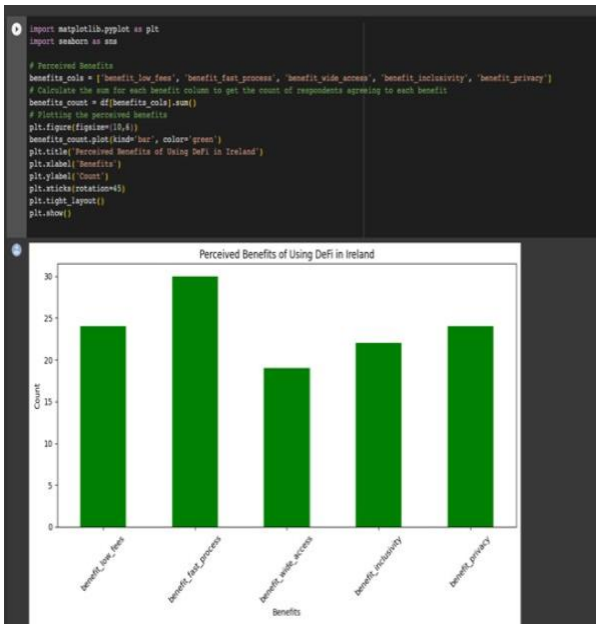
STEP 8: Visualize the count of perceived risks associated with using DeFi in Ireland by plotting a bar chart for specified risk categories.

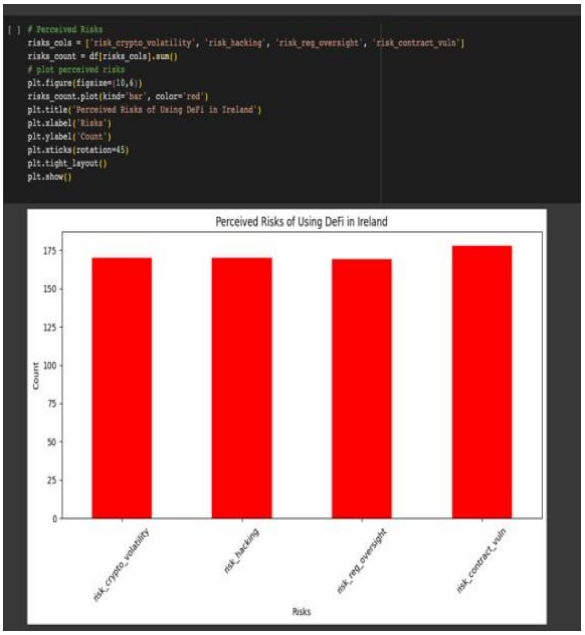
STEP 9: Plot a vertical count plot displaying the frequency of various factors influencing DeFi adoption, ordering the factors by their occurrence count.

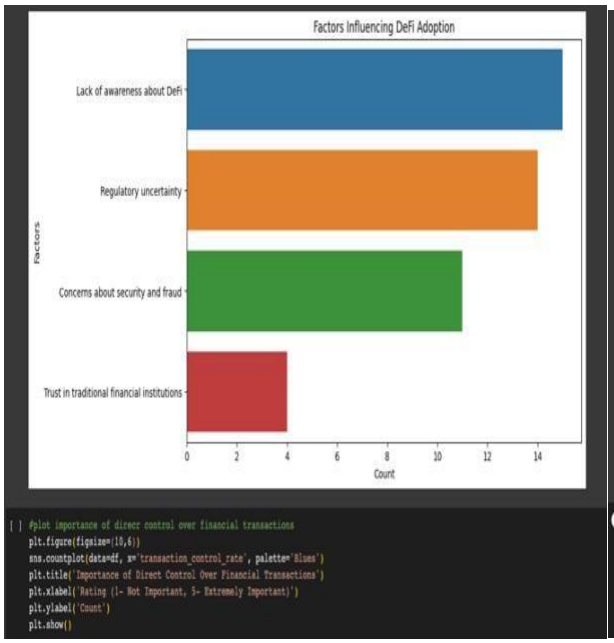
STEP 10: Plot the distribution of respondents' ratings on the importance of having direct control over financial transactions, using a count plot.

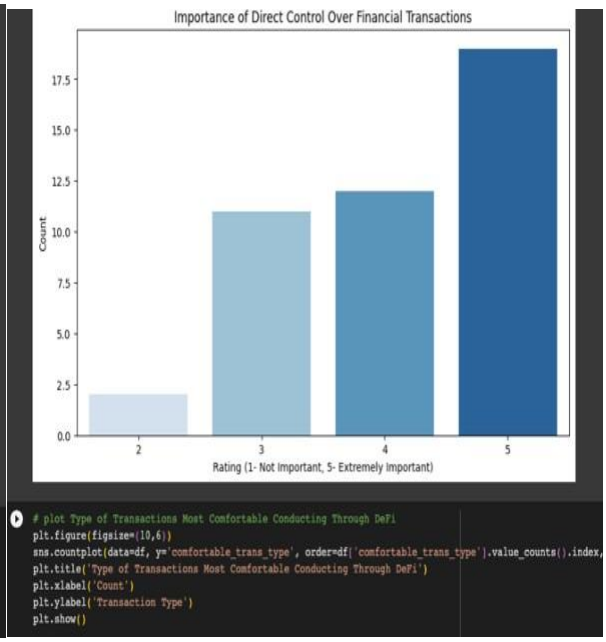
STEP 11: Create a vertical count plot using the Seaborn library to visualize the number of respondents for each transaction type they're most comfortable conducting through Decentralized Finance (DeFi), sorted in descending order of frequency.

STEP 12: Plot a vertical count plot displaying the types of transactions users are most comfortable conducting through DeFi, ordering the transaction types based on their frequency.



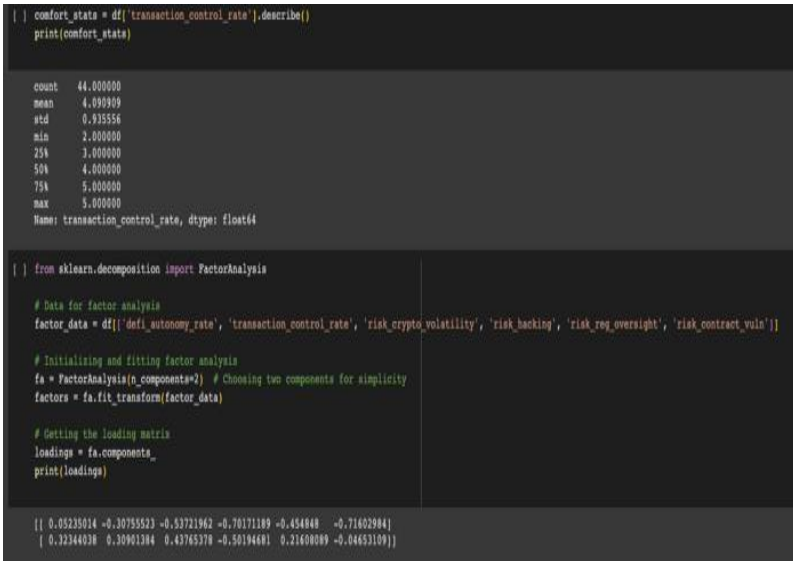






Descriptive Statistics

STEP 13: The code calculates and prints the descriptive statistics (such as count, mean, std deviation, min, 25th percentile, median, 75th percentile, and max) for the. 'transaction_control_rate' column in the dataframe 'df'



```
[ ] comfort_stats = df['transaction_control_rate'].describe()
    print(comfort_stats)

count    44.000000
mean      4.090909
std       0.935556
min       2.000000
25%       3.000000
50%       4.000000
75%       5.000000
max       5.000000
Name: transaction_control_rate, dtype: float64

[ ] from sklearn.decomposition import FactorAnalysis

    # Data for factor analysis
    factor_data = df[['defi_autonomy_rate', 'transaction_control_rate', 'risk_crypto_volatility', 'risk_backing', 'risk_reg_oversight', 'risk_contract_vuln']]

    # Initializing and fitting factor analysis
    fa = FactorAnalysis(n_components=2)  # Choosing two components for simplicity
    factors = fa.fit_transform(factor_data)

    # Getting the loading matrix
    loadings = fa.components_
    print(loadings)

[[ 0.05235014 -0.30755523 -0.53721962 -0.70171189 -0.454848   -0.71602984]
 [ 0.32344038  0.30901384  0.43765378 -0.50194681  0.21608089 -0.04653109]]
```

Factor Analysis

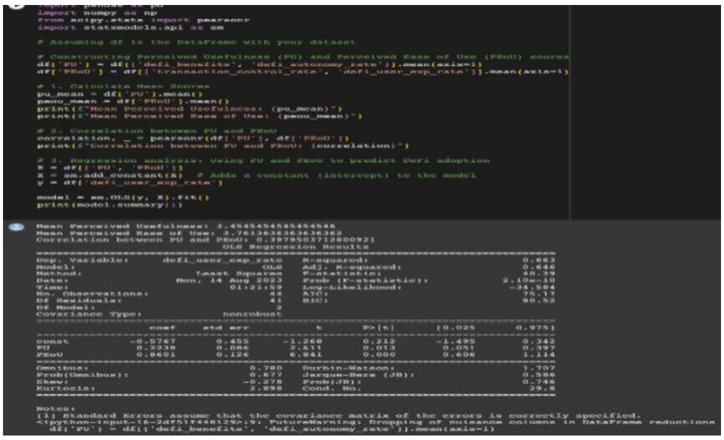
STEP 14: Perform Factor Analysis on selected features from the dataset to reduce dimensions to two main factors, and then prints the loading matrix of these factors.

Technology Acceptance Model (TAM)

STEP 15: Calculate and prints the mean scores of "Perceived Usefulness" and "Perceived Ease of Use" for a given dataset, determines the correlation between them, and then conducts a regression analysis to predict "DeFi adoption" based on these factors.

Unified Theory of Acceptance and Use of Technology (UTAUT):

STEP 16: Run a linear regression model to analyze the impact of three independent variables (Perceived Ease of Use, Expectation, and Facilitating Conditions) on the dependent variable (user experience rate) in the context of decentralized finance (DeFi) adoption, and then prints the summary of the regression results.



```
import numpy as np
from scipy.stats import pearsonr
import statsmodels.api as sm

# Assuming df is the DataFrame with your dataset

# Constructing Perceived Usefulness (PU) and Perceived Ease of Use (PEoU) scores
df['PU'] = df[['defi_benefits', 'defi_autonomy_rate']].mean(axis=1)
df['PEoU'] = df[['transaction_control_rate', 'defi_user_exp_rate']].mean(axis=1)

# 1. Calculate Mean Scores
pu_mean = df['PU'].mean()
peou_mean = df['PEoU'].mean()
print(f"Mean Perceived Usefulness: {pu_mean}")
print(f"Mean Perceived Ease of Use: {peou_mean}")

# 2. Correlation between PU and PEoU
correlation, _ = pearsonr(df['PU'], df['PEoU'])
print(f"Correlation between PU and PEoU: {correlation}")

# 3. Regression analysis: Using PU and PEoU to predict DeFi adoption
X = df[['PU', 'PEoU']]
X = sm.add_constant(X)  # Adds a constant (intercept) to the model
y = df['defi_user_exp_rate']

model = sm.OLS(y, X).fit()
print(model.summary())

Mean Perceived Usefulness: 3.4545454545454546
Mean Perceived Ease of Use: 3.7613636363636362
Correlation between PU and PEoU: 0.39795037128 00921
                            OLS Regression Results
==============================================================================
Dep. Variable:     defi_user_exp_rate   R-squared:                       0.663
Model:                            OLS   Adj. R-squared:                  0.646
Method:                 Least Squares   F-statistic:                     40.29
Date:                Mon, 14 Aug 2023   Prob (F-statistic):           2.10e-10
Time:                        01:21:59   Log-Likelihood:                -34.584
No. Observations:                  44   AIC:                             75.17
Df Residuals:                      41   BIC:                             80.52
Df Model:                           2
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const         -0.5767      0.455     -1.268      0.212      -1.495      0.342
PU             0.2238      0.086      2.611      0.013       0.051      0.397
PEoU           0.8601      0.126      6.841      0.000       0.606      1.114
==============================================================================
Omnibus:                        0.780   Durbin-Watson:                   1.707
Prob(Omnibus):                  0.677   Jarque-Bera (JB):                0.586
Skew:                          -0.278   Prob(JB):                        0.746
Kurtosis:                       2.898   Cond. No.                         29.8
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
<ipython-input-16-2df51f448129>:9: FutureWarning: Dropping of nuisance columns in DataFrame reductions
  df['PU'] = df[['defi_benefits', 'defi_autonomy_rate']].mean(axis=1)
```

Extremely high R-squared and a coefficient of 1 for Effort Expectancy (EE) may indicate multicollinearity; that is, our independent variables may be highly correlated with one another. This makes it difficult to distinguish the effects of each predictor individually.

Future analyses may include examining the correlations between predictors or employing techniques such as variance inflation factor (VIF) to diagnose multicollinearity.