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**EXPLAINABLE ARTIFICIAL INTELLIGENCE BASED
INTUITIONISTIC FUZZY NETWORK TOPSIS PREFERENCE
RELATION MODELS FOR SUKUK INVESTMENT DECISIONS**

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**MASTER OF SCIENCE
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ABSTRAK

Pelaburan *sukuk* semakin penting sebagai instrumen kewangan patuh Syariah yang memerlukan pertimbangan pelbagai kriteria yang saling bercanggah. Cabaran ini memerlukan alat bantuan sokongan keputusan yang bukan hanya mampu menangani ketidakpastian malah menyediakan justifikasi yang telus bagi pemilihan pelaburan. Walaupun terdapat kemajuan dalam aplikasi kecerdasan buatan (AI) bagi sokongan keputusan, kebolehterangan dalam kaedah pembuatan keputusan berbilang kriteria (MCDM) kabur, seperti teknik urutan keutamaan berdasarkan kesamaan dengan penyelesaian ideal (TOPSIS) masih terhad. Kekurangan kebolehterangan ini menjejaskan kepercayaan dan ketelusan, serta melemahkan keyakinan pelabur. Bagi menangani jurang tersebut, kajian ini menyelidik bagaimana model MCDM berasaskan kabur boleh diterangkan, dapat meningkatkan kejelasan, kebolehppercayaan dan jaminan dalam keputusan pelaburan *sukuk*. Justeru, kajian ini mencadangkan pembangunan model boleh diterangkan berasaskan kabur yang menggabungkan ketelusan dan teknik penerangan pasca-hoc yang selaras dengan cirian kecerdasan buatan boleh diterangkan (XAI). Tiga model dibina iaitu, rangkaian kabur berintuisi TOPSIS, hubungan keutamaan kabur berintuisi, dan hubungan keutamaan rangkaian kabur berintuisi dengan algoritma pemberat. Cirian ketelusan dicapai melalui cara model berfungsi, manakala teknik penerangan pasca-hoc dicapai menerusi visualisasi dan diaplikasikan pada data pelaburan *sukuk* bagi pemilihan alternatif pelaburan yang bersesuaian. Dapatan kajian menunjukkan 15 alternatif terbaik dikenal pasti daripada 27 alternatif berdasarkan nilai keutamaan berserta nilai peratusan pelaburan. Nilai peratusan pelaburan tertinggi dijana bagi Alternatif 27 (7.08%), Alternatif 15 (6.97%), dan Alternatif 5 (6.88%). Model yang dibina menunjukkan konsistensi yang baik berbanding model sedia ada melalui analisis sensitiviti. Visualisasi yang dihasilkan telah disahkan oleh pembuat keputusan sebagai teknik yang berkesan untuk mentafsir secara efektif dalam pemilihan alternatif *sukuk* yang paling digemari dan kurang digemari. Kajian ini menyumbang kepada penggabungan cirian XAI ke dalam model MCDM berasaskan kabur, serta memperkenalkan model boleh diterangkan yang menyokong pelbagai keputusan lebih telus, dan disahkan melalui maklum balas pembuat keputusan. Selain itu, model ini juga boleh diaplikasikan dalam domain lain, sekali gus meluaskan sumbangannya melangkaui pelaburan *sukuk*.

Kata kunci: Kecerdasan buatan boleh diterangkan (XAI), Rangkaian kabur, Set kabur berintuisi, Pelaburan *sukuk*, TOPSIS

ABSTRACT

Sukuk investments are increasingly important as Shariah-compliant financial instruments requiring consideration of diverse and conflicting criteria. These challenges require decision support tools that not only handle uncertainty but provide transparent justifications for investment choices. However, despite advancements in artificial intelligence (AI) applications in decision support, explainability in fuzzy multi-criteria decision-making (MCDM) methods such as the technique for order performance by similarity to ideal solution (TOPSIS) remains limited. The lack of explainability reduces trust and transparency, and weakens investor confidence. To address this gap, this study investigates how explainable fuzzy-based MCDM models, can improve decision clarity, reliability, and assurance in *sukuk* investment decisions. Therefore, the study proposes the development of fuzzy-based explainable models that combine transparency with post-hoc techniques and are aligned with eXplainable artificial intelligence (XAI) properties. Three explainable models were developed, namely, intuitionistic fuzzy network TOPSIS, intuitionistic fuzzy preference relation, and intuitionistic fuzzy network preference relation with a weighting algorithm. The properties of transparency were achieved through model design, while post-hoc explainability was addressed using visualisation, and the models were applied to *sukuk* data in selecting suitable investment alternatives. The results revealed the ranking of each alternative by preference value and identified the top 15 out of 27 alternatives with corresponding investment proportions. Among these, the highest investment proportions were generated for Alternative 27 (7.08%), Alternative 15 (6.97%), and Alternative 5 (6.88%). The proposed models showed considerable consistency compared to the established model through sensitivity analysis. The visualisation outputs were then validated by decision makers for effectively interpreting the most and least preferred *sukuk* alternatives. This research contributes to the incorporation of XAI properties into fuzzy MCDM models, introducing a novel explainable model that offers transparent, diversified decisions, validated through decision makers' feedback. Moreover, this model can also be applied in other domains, extending its relevance beyond *sukuk* investments.

Keywords: eXplainable artificial intelligence (XAI), Fuzzy network, Intuitionistic fuzzy set, *Sukuk* investment, TOPSIS

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TABLE OF CONTENTS

Permission to Use.....	ii
Abstrak	iii
Abstract	iv
Acknowledgement.....	v
Table of Contents	vii
List of Tables.....	x
List of Figures	xiii
List of Appendices	xiv
List of Abbreviations.....	xv
CHAPTER ONE INTRODUCTION	1
1.1 Background of Study	1
1.2 Problem Statement	4
1.3 Research Questions	7
1.4 Research Objectives	7
1.5 Research Scope	8
1.6 Significance of the Research	9
1.7 Structure of the Thesis	10
CHAPTER TWO LITERATURE REVIEW	13
2.1 Introduction	13
2.2 Explainable Artificial Intelligence (XAI) Concepts	13
2.2.1 Conflicting Terminologies around XAI.....	15
2.2.2 Essential Properties of XAI	17
2.2.3 Properties of Explainable Models in Machine Learning	19
2.2.3.1 Transparency	19
2.2.3.2 Post-hoc Explainability	20
2.2.4 Application of Explainable Properties	23
2.3 Explainable Fuzzy Systems	27
2.4 Multi-Criteria Decision-Making (MCDM) and its application.....	30

2.5 Fuzzy Set.....	32
2.6 Intuitionistic Fuzzy Set	32
2.7 Fuzzy Systems and Network.....	34
2.8 Fuzzy Network TOPSIS.....	36
2.8.1 Rule base aggregation	36
2.8.2 Rule base merging.....	37
2.9 Fuzzy Preference Relation	37
2.10 Investment Decision.....	39
2.11 Evaluation of MCDM Performances	41
2.12 Measure of Effective Explanation.....	42
2.13 Discussion on Research Gap	43
2.14 Summary	46
CHAPTER THREE RESEARCH METHODOLOGY	47
3.1 Introduction.....	47
3.2 Research Design.....	47
3.2.1 Phase One.....	47
3.2.2 Phase Two	49
3.2.3 Phase Three	52
3.2.4 Phase Four.....	55
3.2.5 Phase Five	55
3.3 Preliminaries	55
3.3.1 Fuzzy Set.....	56
3.3.2 Intuitionistic Fuzzy Set	56
3.3.3 Fuzzy Network TOPSIS	56
3.3.3.1 Vertical Merging.....	57
3.3.3.2 Horizontal Merging	57
3.3.4 Intuitionistic Fuzzy Preference Relation.....	58
3.4 Model I: XAI-based Intuitionistic Fuzzy Network TOPSIS Model (XAI-N)	59
3.5 Model II: XAI-based Intuitionistic Fuzzy Preference Relation Model (XAI-PR)	70

3.6 Model III: XAI-based Weighted Intuitionistic Fuzzy Network Preference Relation TOPSIS Model (XAI-NPW)	73
3.7 Validate derived model	74
3.7.1 Model validation through sensitivity analysis and comparative analysis..74	
3.7.2 Further model validation through decision makers' feedback.....75	
3.8 Summary	78
CHAPTER FOUR RESULTS AND DISCUSSIONS	79
4.1 Introduction	79
4.2 Model I: XAI-based Intuitionistic Fuzzy Network TOPSIS Model (XAI-N)	80
4.3 Model II: XAI-based Intuitionistic Fuzzy Preference Relation TOPSIS model (XAI-PR).....	105
4.4 Model III: XAI-based Weighted Intuitionistic Fuzzy Network Preference Relation TOPSIS model (XAI-NPW).....	117
4.5 Validation of Models.....	123
4.5.1 Results of sensitivity analysis and comparative analysis.....	123
4.5.2 Results of decision makers' feedback	128
4.6 Summary	130
CHAPTER FIVE CONCLUSIONS AND FUTURE WORKS.....	131
5.1 Introduction	131
5.2 Revisiting Objectives	131
5.3 Research Contributions	135
5.3.1 Theoretical Contribution	136
5.3.2 Methodological Contribution.....	137
5.3.3 Practical Contribution	138
5.4 Limitations	140
5.5 Future Works.....	141
5.6 Summary	142
REFERENCES.....	144
APPENDICES	161

LIST OF TABLES

Table 2.1 XAI Essential Properties	17
Table 2.2 Post-hoc Explainability Techniques and Description	21
Table 2.3 Post-hoc Explainability Techniques in Various Application	23
Table 2.4 Features of TOPSIS Model	46
Table 3.1 Data and Sources.....	52
Table 3.2 Scenarios, Decision Criteria and Decision Maker	74
Table 3.3 Questionnaire and Essential Properties of XAI	78
Table 4.1 Decision Makers Evaluation on Benefit Criteria, Bi.....	81
Table 4.2 Decision Makers Evaluation on Cost Criteria, Ci	81
Table 4.3 Decision Makers' Weight, DMk	82
Table 4.4 Aggregated Intuitionistic Fuzzy Decision Matrix on Benefit Criteria, Bi .83	
Table 4.5 Aggregated Intuitionistic Fuzzy Decision Matrix on Cost Criteria, Ci.....83	
Table 4.6 Weighted Intuitionistic Fuzzy Decision Matrix on Benefit Criteria, Bi83	
Table 4.7 Weighted Intuitionistic Fuzzy Decision Matrix on Cost Criteria, Ci	84
Table 4.8 Positive Ideal Solution Benefit, A*	84
Table 4.9 Negative Ideal Solution Benefit, A-	84
Table 4.10 Positive Ideal Solution Cost, A*	85
Table 4.11 Negative Ideal Solution Cost, A-.....	85
Table 4.12 Positive Separation Measure, Benefit Criteria, Bi	85
Table 4.13 Negative Separation Measure, Benefit Criteria, Bi.....	86
Table 4.14 Negative Separation Measure, Cost Criteria, Ci	86
Table 4.15 Negative Separation Measure, Cost Criteria, Ci	86
Table 4.16 Final Positive Separation Measure, Benefit Criteria, Bi	87
Table 4.17 Final Negative Separation Measure, Benefit Criteria, Bi.....	88
Table 4.18 Final Positive Separation Measure, Cost Criteria, Ci	88
Table 4.19 Final Negative Separation Measure, Cost Criteria, Ci	89
Table 4.20 Closeness Coefficient, Benefit Criteria, Bi	89
Table 4.21 Closeness Coefficient, Cost Criteria, Ci.....	90

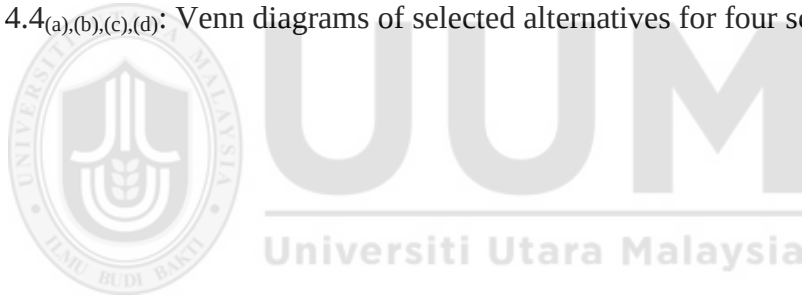
Table 4.22 Influence Closeness Coefficient, ICCj, kB ,Benefit criteria, Bi	90
Table 4.23 Influence Closeness Coefficient, ICCj, kC ,Cost criteria, Ci	90
Table 4.24 Normalise Influence Closeness Coefficient, NICC, τ_j . kB	91
Table 4.25 Normalize Influence Closeness Coefficient, NICC, τ_j . kC	91
Table 4.26 Boolean Benefit System Matrix for A1	97
Table 4.27 Boolean Cost System Matrix for A1	98
Table 4.28 Generalised Boolean Matrix	98
Table 4.29 Boolean Alternative System Matrix.....	99
Table 4.30 Overall System for A1	100
Table 4.31 Overall Rule Generated.....	100
Table 4.32 Average Rule and Overall Output.....	102
Table 4.33 Aggregated Intuitionistic Fuzzy Decision Matrix on Benefit Criteria, Bi	105
Table 4.34 Aggregated Intuitionistic Fuzzy Decision Matrix on Cost Criteria, Ci..	105
Table 4.35 Weighted Intuitionistic Fuzzy Decision Matrix on Benefit Criteria, Bi	106
Table 4.36 Weighted Intuitionistic Fuzzy Decision Matrix on Cost Criteria, Ci	106
Table 4.37 Final Fuzzy Evaluation Value, P1	107
Table 4.38 Final Fuzzy Evaluation Value, P2	107
Table 4.39 Difference of Final Fuzzy Evaluation value, P1-P1	107
Table 4.40 Difference of Final Fuzzy Evaluation Value, P1-P2	108
Table 4.41 Portion Value, P1, P1	108
Table 4.42 Portion Value, P1, P2	109
Table 4.43 Degree of Preference, e_{12}	109
Table 4.44 Fuzzy Strict Preference Relation, DM1.....	111
Table 4.45 Fuzzy Strict Preference Relation, DM1 without Alternative 1, A1.....	113
Table 4.46 Weight for Overall Alternative from Every Decision Makers, DMK	114
Table 4.47 Average Preference Value of the XAI-N Model and the XAI-PR Model	117
Table 4.48 Average Preference Value of Top 15 Alternatives	118
Table 4.49 Buying Proportion of Top 15 Alternatives	119

Table 4.50 Amount Invested	122
Table 4.51 Results of Sensitivity Analysis	124
Table 4.52 Decision Makers' Feedback.....	129



LIST OF FIGURES

Figure 2.1: XAI's concept	14
Figure 2.2: Summarisation of XAI's terminology	16
Figure 2.3: Fuzzy network model using rule base aggregation	36
Figure 2.4: Fuzzy network model using rule base merging	37
Figure 3.1: Research design	48
Figure 3.2: Theoretical framework	54
Figure 3.3: Vertical merging	57
Figure 3.4: Horizontal merging	58
Figure 4.1: Visualisation results of the XAI-N model	103
Figure 4.2: Visualisation results of the XAI-PR model	115
Figure 4.3: Visualisation results of the XAI-NPW model	120
Figure 4.4 _{(a),(b),(c),(d)} : Venn diagrams of selected alternatives for four scenarios	125



LIST OF APPENDICES

Appendix A Linguistic Term and Intuitionistic Fuzzy Number	161
Appendix B Data Processing Resources	162
Appendix C Linguistic Level and Fuzzify value	164
Appendix D Decision Makers' Feedback Form on Bar Chart Visualisation of <i>Sukuk</i> Investment Decisions	165
Appendix E Data: <i>Sukuk</i> Features and Bank Financial Evaluation	166
Appendix F Decision Makers' Evaluation	169
Appendix G Fuzzy Preference Relation Matrix	179
Appendix H Fuzzy Strict Preference Relation	182
Appendix I Python Code Sources	185



LIST OF ABBREVIATIONS

AI	Artificial Intelligence
XAI	eXplainable Artificial Intelligence
DARPA	Defense Advanced Research Projects Agency
DSS	Decision Support System
MCDM	Multi-Criteria Decision-Making
XAI-N	XAI-based Intuitionistic Fuzzy Network TOPSIS
XAI-PR	XAI-based Intuitionistic Fuzzy Preference Relation
XAI-NPW	XAI-based Weighted Intuitionistic Fuzzy Network Preference Relation TOPSIS
TOPSIS	Technique for Order Performance by Similarity to Ideal Solution
CNN	Convolutional Neural Network
SHAP	Shapley Additive exPlanations
FIS	Fuzzy Inference Systems
AHP	Analytics Hierarchy Process
VIKOR	Vlekkriterijumsko KOMpromisno Rangiranje
DEMATEL	Decision Making Trial and Evaluation Laboratory
MOORA	Multi-Objective Optimisation based on Ratio Analysis
ELECTRE	Elimination et Choice Translating Reality
PROMETHEE	Preference Ranking and Organization Method for Enrichment Evaluation
IFS	Intuitionistic Fuzzy Set
IVIFS	Interval Value Intuitionistic Fuzzy Set
IFSOP	Intuitionistic Fuzzy Set Ordered Paired
BL	Benefit Level
CL	Cost Level

AL	Alternative Level
IFPR	Intuitionistic Fuzzy Preference Relation
ROA	Return On Assets
IF-TOPSIS	Intuitionistic Fuzzy TOPSIS



CHAPTER ONE

INTRODUCTION

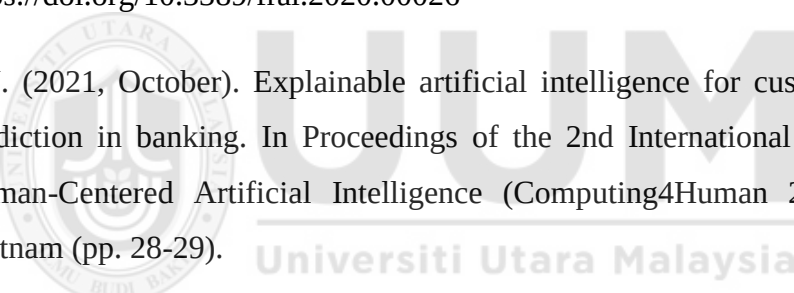
1.1 Background of Study

The rapid development of technology has led to the emergence of artificial intelligence (AI), which facilitates the simplification of human tasks. This advancement has rendered the model underlying with this AI to become more complex, contributing to the difficulty for non-experts or users to comprehend its functioning. Understanding the model becomes crucial and essential as this will help the end user to have a reliable output. Over the past seven years, research on eXplainable artificial intelligence (XAI) began by the Defence Advanced Research Project Agency (DARPA), this influential project triggered an explosion of interest in the effort of developing an explainable model that is comprehensible to end users (Gunning, 2016). It started with a research effort to create an interpretable model in the context of machine learning (ML), a subset of AI that utilise algorithms to evaluate data which allows a computer to learn and enhance its performance without being explicitly taught. Apart from that, previous studies about fuzzy systems have revealed a significant contribution of the fuzzy logic community in the theme of XAI (Arrieta et al., 2020; Cao et al., 2024; Moral et al., 2021). The previous study benefits the fundamental concept through interpretable fuzzy systems which enhance more on human-machine interaction through visual representation as an effective explanation (Moral et al., 2021). Although existing research has contributed significantly to the development of explainable models, ongoing interest from both academic and industrial sectors highlights the necessity for

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APPENDICES

Appendix A

Linguistic Term and Intuitionistic Fuzzy Number

i. Linguistic Terms for Rating the Decision Makers

Linguistic Terms	Intuitionistic Fuzzy Number
Very important (VI)	(0.80; 0.10; 0.10)
Important (I)	(0.55; 0.25; 0.20)
Medium (M)	(0.50; 0.50; 0.00)
Unimportant (UI)	(0.30; 0.50; 0.20)
Very unimportant (VUI)	(0.20; 0.70; 0.10)

ii. Linguistic Terms for Rating the Alternative

Linguistic Terms	Intuitionistic Fuzzy Numbers
Excellent (E)	(1.00; 0.00; 0.00)
Very Good (VG)	(0.75; 0.10; 0.15)
Good (G)	(0.60; 0.25; 0.15)
Medium Good (MG)	(0.50; 0.40; 0.10)
Medium (M)	(0.50; 0.50; 0.00)
Medium Bad (MB)	(0.40; 0.50; 0.10)
Bad (B)	(0.25; 0.60; 0.15)
Very Bad (VB)	(0.10; 0.75; 0.15)

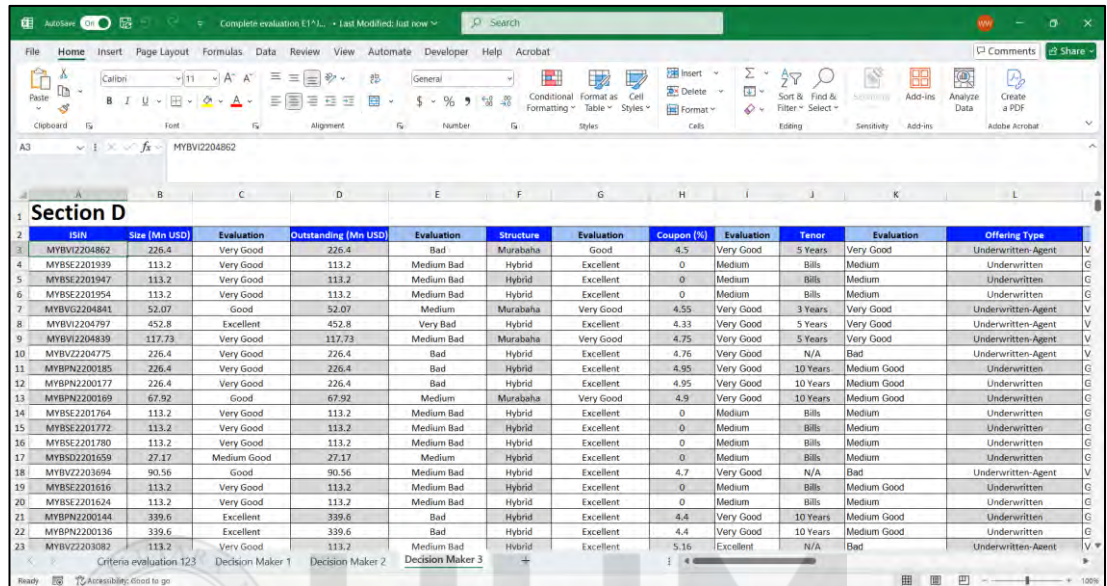
iii. Linguistic terms for Rating the Importance of Criteria

Linguistic Terms	Intuitionistic Fuzzy Numbers
Very important (VI)	(0.90; 0.00; 0.10)
Important (I)	(0.80; 0.10; 0.10)
Medium Important (MI)	(0.70; 0.20; 0.10)
Medium (M)	(0.50; 0.50; 0.00)
Unimportant (UI)	(0.30; 0.50; 0.20)
Very unimportant (VUI)	(0.20; 0.70; 0.10)

Appendix B

Data Processing Resources

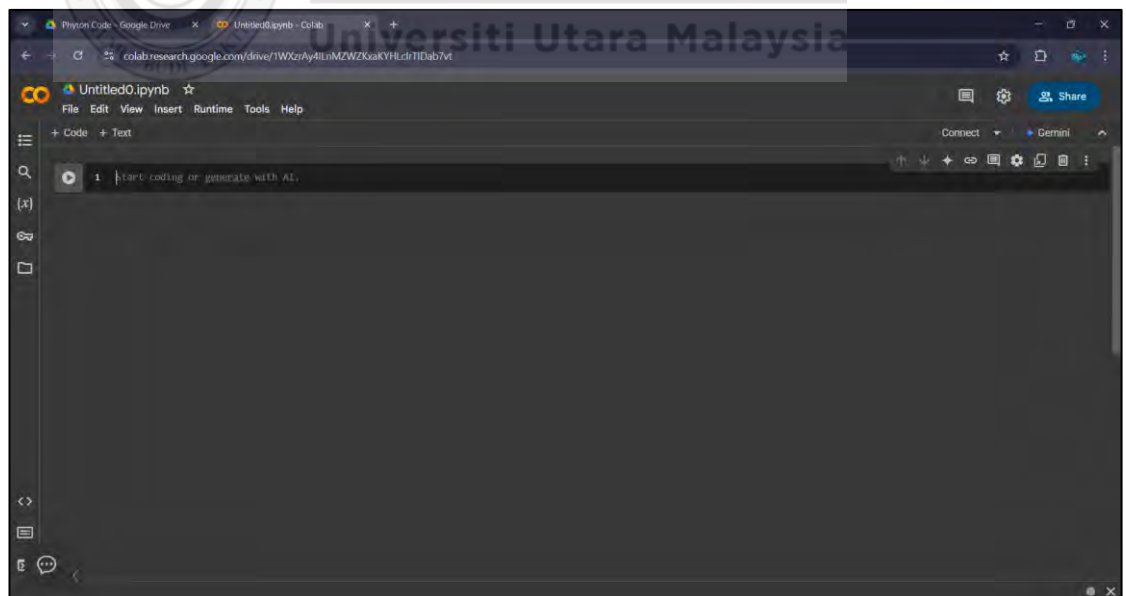
i. Data Management: Microsoft Excel



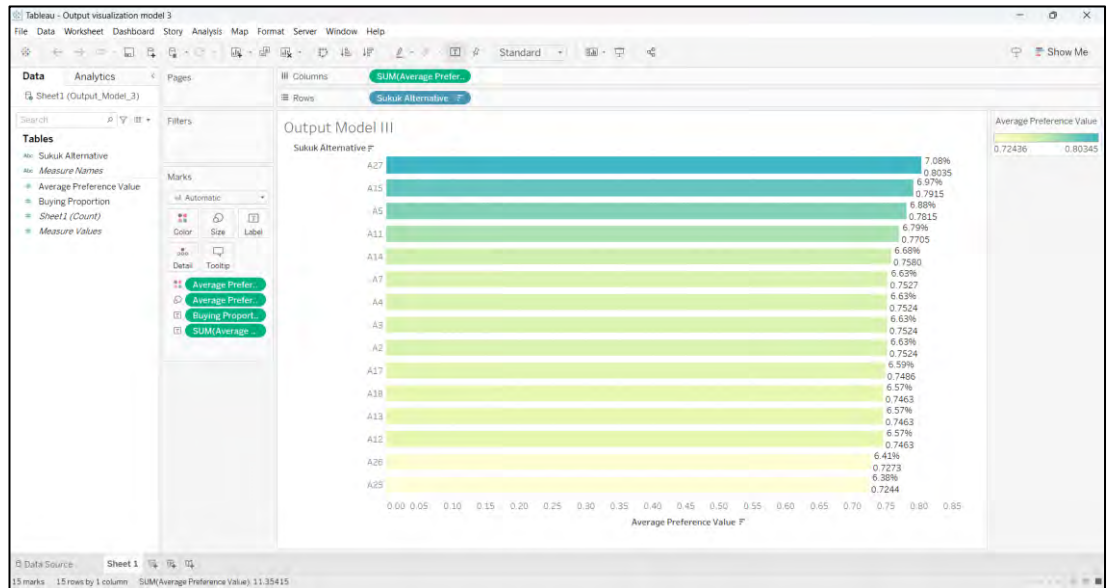
The screenshot shows a Microsoft Excel spreadsheet titled "Complete evaluation E1.xlsx". The data is organized into columns for various bond attributes. The table content is as follows:

ISIN	Size (Mn USD)	Evaluation	Outstanding (Mn USD)	Evaluation	Structure	Evaluation	Coupon (%)	Evaluation	Tenor	Evaluation	Offering Type
MYBV2204862	226.4	Very Good	226.4	Bad	Murabaha	Good	4.5	Very Good	5 Years	Very Good	Underwritten-Agent
MYBSE2201939	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBSE2201947	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBSE2201954	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBV2204841	52.07	Good	52.07	Medium	Murabaha	Very Good	4.55	Very Good	3 Years	Very Good	Underwritten-Agent
MYBV2204797	452.8	Excellent	452.8	Very Bad	Hybrid	Excellent	4.33	Very Good	5 Years	Very Good	Underwritten-Agent
MYBV2204839	117.73	Very Good	117.73	Medium Bad	Murabaha	Very Good	4.75	Very Good	5 Years	Very Good	Underwritten-Agent
MYBV2204775	226.4	Very Good	226.4	Bad	Hybrid	Excellent	4.76	Very Good	N/A	Bad	Underwritten-Agent
MYBPN2200185	226.4	Very Good	226.4	Bad	Hybrid	Excellent	4.95	Very Good	10 Years	Medium Good	Underwritten
MYBPN2200177	226.4	Very Good	226.4	Bad	Hybrid	Excellent	4.95	Very Good	10 Years	Medium Good	Underwritten
MYBPN2200189	67.92	Good	67.92	Medium	Murabaha	Very Good	4.9	Very Good	10 Years	Medium Good	Underwritten
MYBSE2201764	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBSE2201772	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBSE2201780	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBSE2201659	27.17	Medium Good	27.17	Medium	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBV2203694	90.56	Good	90.56	Medium Bad	Hybrid	Excellent	4.7	Very Good	N/A	Bad	Underwritten-Agent
MYBSE2201616	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium Good	Underwritten
MYBSE2201624	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	0	Medium	Bills	Medium	Underwritten
MYBPN2200144	339.6	Excellent	339.6	Bad	Hybrid	Excellent	4.4	Very Good	10 Years	Medium Good	Underwritten
MYBPN2200136	339.6	Excellent	339.6	Bad	Hybrid	Excellent	4.4	Very Good	10 Years	Medium Good	Underwritten
MYBV2203082	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent	5.16	Excellent	N/A	Bad	Underwritten-Agent

ii. Computing Resources: Google Colab



iii. Data Visualisation: Tableau



Appendix C

Linguistic Level and Fuzzify value

i. Linguistic Level and fuzzify value

Linguistic Term	Level	Fuzzify Value
Excellent (E)	8	1
Very Good (VG)	7	0.7619
Good (G)	6	0.6190
Medium Good (MG)	5	0.5
Medium (M)	5	0.5
Medium Bad (MB)	4	0.4
Bad (B)	3	0.2857
Very Bad (VB)	2	0.1428
Very Very Bad (VVB)	1	0

ii. Linguistic level and fuzzify value

Linguistic Term	Level	Fuzzify Value
Excellent (E)	8	0.8
Very Good (VG)	7	0.6
Good (G)	6	0.5
Medium Good (MG)	5	0.4
Medium (M)	5	0.4
Medium Bad (MB)	4	0.3
Bad (B)	3	0.2
Very Bad (VB)	2	0.1
Very Very Bad (VVB)	1	0

*Medium Good and Medium have same preference value, therefore, it share same level

Appendix D

Decision Makers' Feedback Form on Bar Chart Visualisation of *Sukuk* Investment Decisions

1) The bar chart assists me to quickly identify the most and the least preferred *sukuk* alternatives.

☐	Strongly agree
☐	Agree
☐	Disagree
☐	Strongly disagree

2) The differences in preference values are more noticeable in the bar chart than in a numerical table.

☐	Strongly agree
☐	Agree
☐	Disagree
☐	Strongly disagree

3) The bar chart can be understood by non-experts or decision-makers without technical backgrounds.

☐	Strongly agree
☐	Agree
☐	Disagree
☐	Strongly disagree

4) Self-rated understandability of the graphical presentations and explanations of the preference value of *sukuk* alternatives.

☐	Very easy
☐	Rather easy
☐	Rather difficult
☐	Very difficult

Appendix E

Data: *Sukuk* Features and Bank Financial Evaluation

i. Data of 27 *sukuk* alternatives: *Sukuk* Features

ISIN	Issuer	Size (Mn USD)	Outstanding (Mn USD)
MYBVI2204862	Public Islamic Bank Bhd	226.40	226.40
MYBSE2201939	Maybank Islamic Bhd	113.20	113.20
MYBSE2201947	Maybank Islamic Bhd	113.20	113.20
MYBSE2201954	Maybank Islamic Bhd	113.20	113.20
MYBVG2204841	Affin Islamic Bank Bhd	52.07	52.07
MYBVI2204797	Maybank Islamic Bhd	452.80	452.80
MYBVI2204839	Affin Islamic Bank Berhad	117.73	117.73
MYBVZ2204775	Maybank Islamic Bhd	226.40	226.40
MYBPN2200185	CIMB Bank Bhd	226.40	226.40
MYBPN2200177	CIMB Group Holdings Bhd	226.40	226.40
MYBPN2200169	Cimb Islamic Bank Bhd	67.92	67.92
MYBSE2201764	Maybank Islamic Bhd	113.20	113.20
MYBSE2201772	Maybank Islamic Bhd	113.20	113.20
MYBSE2201780	Maybank Islamic Bhd	113.20	113.20
MYBSD2201659	Small Medium Enterprise	27.17	27.17
MYBVZ2203694	Hong Leong Islamic Bank Bhd	90.56	90.56
MYBSE2201616	Maybank Islamic Bhd	113.20	113.20
MYBSE2201624	Maybank Islamic Bhd	113.20	113.20
MYBPN2200144	CIMB Group Holdings Bhd	339.60	339.60
MYBPN2200136	CIMB Bank Bhd	339.60	339.60
MYBVZ2203082	Bank Islam Malaysia Bhd	113.20	113.20
MYBVG2202753	Small Medium Enterprise	113.20	113.20
MYBVN2202726	Public Islamic Bank Bhd	113.20	113.20
MYBVN2202536	Bank Muamalat Malaysia Bhd	67.92	67.92
MYBVN2201967	Alliance Islamic Bank Bhd	29.43	29.43
MYBPN2200052	RHB Islamic Bank Bhd	56.60	56.60
MYBVN2201157	AmBank Islamic Bhd	56.60	56.60

Structure	Coupon (%)	Tenor	Offering Type	Coupon Type	Yield to Maturity
Murabaha	4.5000	5 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.221106
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	4.163368
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	4.165978
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	4.176065
Murabaha	4.5500	3 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.210481
Hybrid	4.3300	5 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.100701
Murabaha	4.7500	5 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.330768
Hybrid	4.7600	N/A	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.707008
Hybrid	4.9500	10 Years	Underwritten	Fixed:Plain Vanilla Fixed Coupon	4.643137
Hybrid	4.9500	10 Years	Underwritten	Fixed:Plain Vanilla Fixed Coupon	4.633169
Murabaha	4.9000	10 Years	Underwritten	Fixed:Plain Vanilla Fixed Coupon	4.581913
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	3.774025
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	3.809484
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	3.843022
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	3.091863
Hybrid	4.7000	N/A	Underwritten-Agent	Variable: Step Up/Step Down	0
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	3.261407
Hybrid	0.0000	Bills	Underwritten	Fixed: Discount	3.29538
Hybrid	4.4000	10 Years	Underwritten	Fixed:Plain Vanilla Fixed Coupon	4.377805
Hybrid	4.4000	10 Years	Underwritten	Fixed:Plain Vanilla Fixed Coupon	4.377805
Hybrid	5.1600	N/A	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	5.114138
Hybrid	4.0400	3 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	3.942688
Murabaha	4.4000	10 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.341106
Murabaha	5.3300	10 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	5.098853
Murabaha	4.4500	10 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.563852
Murabaha	4.0600	10 Years	Underwritten	Fixed:Plain Vanilla Fixed Coupon	4.182441
Murabaha	4.2500	10 Years	Underwritten-Agent	Fixed:Plain Vanilla Fixed Coupon	4.494661

ii. Bank Financial Evaluation

ISIN	Issuer	Credit Rating	Profitability	Liquidity Ratio	Cash Flow Generation
MYBVI2204862	Public Islamic Bank Bhd	AAA	37.00%	N/A	2,405,723
MYBSE2201939	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBSE2201947	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBSE2201954	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBVG2204841	AFFIN ISLAMIC BANK BER	AA ₃	32.90%	5%	-539,060
MYBVI2204797	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBVI2204839	AFFIN ISLAMIC BANK BER	AA ₃	32.90%	5%	-539,060
MYBVZ2204775	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBPN2200185	CIMB Bank Bhd	AAA	36.50%	60.30%	2,434,974
MYBPN2200177	CIMB Group Holdings Bhd	AA ₁	26.30%	69.78%	2,692,001
MYBPN2200169	Cimb Islamic Bank Bhd	AAA	33.40%	81.16%	2,964,207
MYBSE2201764	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBSE2201772	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBSE2201780	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBSD2201659	Small Medium Enterprise	No Ratings	-155.70%	N/A	62,276
MYBVZ2203694	Hong Leong Islamic Bank	AAA	32.80%	N/A	-2,630,264
MYBSE2201616	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBSE2201624	Maybank Islamic Bhd	AAA	52.00%	67.30%	2,233,475
MYBPN2200144	CIMB Group Holdings Bhd	AA ₁	26.30%	69.78%	2,692,001
MYBPN2200136	CIMB Bank Bhd	AAA	36.50%	60.30%	2,434,974
MYBVZ2203082	Bank Islam Malaysia Bhd	AA ₃	17.00%	74.58%	20,886
MYBVG2202753	Small Medium Enterprise	No Ratings	-155.70%	N/A	62,276
MYBVN2202726	Public Islamic Bank Bhd	AAA	37.00%	N/A	2,405,723
MYBVN2202536	Bank Muamalat Malaysia	A ₂	21.70%	N/A	83,726
MYBVN2201967	Alliance Islamic Bank Bhd	A ₁	31.30%	N/A	44,720
MYBPN2200052	RHB Islamic Bank Bhd	AA ₁	45.30%	N/A	5,799,354
MYBVN2201157	AmBank Islamic Bhd	AA ₃	10.20%	N/A	-5,799,637

Appendix F

Decision Makers' Evaluation

i. Decision Maker 1, (DM_1)

Access link:

<https://docs.google.com/spreadsheets/d/1bndPRJBQjPmK2nbrH-b3zet3Siu6plfL4urJqpYooTY/edit?usp=sharing>

Instructions	
1) This sheet consists of 3 tabs, Tab 0 , Tab 1 , Tab 2 2) Tab 0 - Contains instruction to the respected expert 3) Tab 1 - Consists of 3 Section, Section A , Section B and Section C 4) Tab 2 - Consists of Section D Section A - This section require an expert to rate their level of expertise on portfolio management. Section B - This section require an expert to rate the importance of the criteria. Section C - This section require an expert to determine which criteria to maximise (benefit criteria) and which criteria to minimise (cost criteria) when it comes to sukuk investment selection. Section D - This section require an expert to do evaluation on the data. 5) An Expert is required to answer all the section. 6) The criteria listed above is based on Sukuk feature in which the data gained from Eikon database. We have listed the feature and its definition below for your further references.	
Your time answering this questionnaire is highly appreciated. p/s: In the event that the data in section D is indicated as N/A , it is still necessary for the expert to provide an answer.	
Criteria	Definition
1 Size	Issuance size of the Sukuk.
2 Outstanding	Outstanding sukuk are those sukuk that have been purchased by an investor and have not yet been paid back by the company to the investor.
3 Structure	Types of sukuk such as: Murabaha, Hybrid and Wakala bil istithmar.
4 Coupon (%)	A coupon or coupon payment is the annual interest rate paid on a Sukuk, expressed as a percentage of the face value and paid from issue date until maturity.
5 Tenor	Tenor describes the length of time remaining in the life of a financial contract. Eg: 3, 7, 10, 12 years.
6 Offering Type	It is often used in reference to an initial public offering (IPO) when a Sukuk is made available for purchase by the public Eg: Underwritten-Agent, Underwritten, Private Placement.
7 Coupon Type	Coupon Type means that coupons are set at issuance and do not change over the life of the Sukuk. Eg: Plain Vanilla Fixed Coupon, Discount.
8 Yield to maturity	The promised return rate
9 Issuer credit rating	An independent opinion of your organization's overall creditworthiness and financial strength.
10 Company's profitability Ratio	Profitability ratios assess a company's ability to earn profits from its sales or operations, balance sheet assets, or shareholders' equity. The value shows in our data based on net profit margin .

Section A

From scale 1-10 please
rate your level of expertise
in Portfolio Management
(very low) 1-10 (very high)

Section B

Criteria	Evaluation
Size	Important
Outstanding	Very Important
Structure	Important
Coupon (%)	Important
Tenor	Very Important
Offering Type	Important
Coupon Type	Very Important
Yield to Maturity	Very Important
Issuer Credit Rating	Important
Profitability Ratio	Important
Liquidity Ratio	Very Important
Cash flow generation	Important

Section C

Criteria	Evaluation
Size	Cost Criteria
Outstanding	Benefit Criteria
Structure	Cost Criteria
Coupon (%)	Cost Criteria
Tenor	Benefit Criteria
Offering Type	Cost Criteria

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Coupon Type	Benefit Criteria
Yield to Maturity	Benefit Criteria
Issuer Credit Rating	Cost Criteria
Profitability Ratio	Cost Criteria
Liquidity Ratio	Benefit Criteria
Cash flow generation	Cost Criteria

Section D

ISIN	Size (Mn USD)	Evaluation	Outstanding (Mn USD)	Evaluation	Structure	Evaluation
MYBVI2204862	226.4	Very Good	226.4	Medium Bad	Murabaha	Very Good
MYBSE2201939	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201947	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201954	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBVG2204841	52.07	Good	52.07	Medium Bad	Murabaha	Very Good
MYBVI2204797	452.8	Excellent	452.8	Medium Bad	Hybrid	Excellent
MYBVI2204839	117.73	Very Good	117.73	Medium Bad	Murabaha	Very Good
MYBVZ2204775	226.4	Very Good	226.4	Medium Bad	Hybrid	Excellent
MYBPN2200185	226.4	Very Good	226.4	Medium Bad	Hybrid	Excellent
MYBPN2200177	226.4	Very Good	226.4	Medium Bad	Hybrid	Excellent
MYBPN2200169	67.92	Good	67.92	Medium	Murabaha	Very Good
MYBSE2201764	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201772	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201780	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSD2201659	27.17	Medium Good	27.17	Medium	Hybrid	Excellent
MYBVZ2203694	90.56	Good	90.56	Medium	Hybrid	Excellent
MYBSE2201616	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201624	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBPN2200144	339.6	Excellent	339.6	Medium	Hybrid	Excellent
MYBPN2200136	339.6	Excellent	339.6	Medium	Hybrid	Excellent
MYBVZ2203082	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBVG2202753	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBPN2202726	113.2	Very Good	113.2	Medium Bad	Murabaha	Very Good
MYBVN2202536	67.92	Good	67.92	Medium Bad	Murabaha	Very Good
MYBVN2201967	29.43	Medium Good	29.43	Medium	Murabaha	Very Good
MYBPN2200052	56.6	Good	56.6	Medium	Murabaha	Very Good
MYBVN2201157	56.6	Good	56.6	Medium	Murabaha	Very Good

Coupon (%)	Evaluation	Tenor	Evaluation	Offering Type	Evaluation	Coupon Type	Evaluation
4.5	Very Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
4.55	Very Good	3 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.33	Very Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.75	Very Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.76	Very Good	N/A	Medium	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.95	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.95	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.9	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
4.7	Very Good	N/A	Medium	Underwritten-Agent	Very Good	Variable: Step Up/Step Down	Very Good
0	Medium	Bills	Medium Good	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
4.4	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.4	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
5.16	Very Good	N/A	Medium	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.04	Medium	3 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.4	Excellent	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
5.33	Excellent	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.45	Excellent	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.06	Medium	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good
4.25	Medium	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Medium Good

Yield To Maturity	Evaluation	Credit Rating	Evaluation	Profitability Ratio	Evaluation	Liquidity Ratio	Evaluation	Cash Flow Generation	Evaluation
4.221106	Excellent	AAA	Excellent	37.00%	Medium Good	N/A	Medium	2,405,723	Very Good
4.163368	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.165978	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.176065	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.210481	Excellent	AA3	Very Good	32.90%	Medium Good	5%	Medium Good	-539,060	Medium
4.100701	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.330768	Excellent	AA3	Very Good	32.90%	Medium Good	5%	Medium Good	-539,060	Medium
4.707008	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.643137	Excellent	AAA	Excellent	36.50%	Medium Good	60.30%	Very Good	2,434,974	Very Good
4.633169	Excellent	AA1	Very Good	26.30%	Medium	69.78%	Very Good	2,692,001	Very Good
4.581913	Excellent	AAA	Excellent	33.40%	Medium Good	81.16%	Very Good	2,964,207	Very Good
3.774025	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.809484	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.843022	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.091863	Very Good	No Ratings	Medium	-155.70%	Medium	N/A	Medium Good	62,276	Good
0	Medium Good	AAA	Excellent	32.80%	Medium Good	N/A	Medium Good	-2,630,264	Bad
3.261407	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.29538	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.377805	Excellent	AA1	Very Good	26.30%	Medium Good	69.78%	Very Good	2,692,001	Very Good
4.377805	Excellent	AAA	Excellent	36.50%	Medium Good	60.30%	Very Good	2,434,974	Very Good
5.114138	Excellent	AA3	Very Good	17.00%	Medium	74.58%	Very Good	20,886	Good
3.942688	Very Good	No Ratings	Medium	-155.70%	Medium	N/A	Medium Good	62,276	Good
4.341106	Excellent	AAA	Excellent	37.00%	Medium Good	N/A	Medium Good	2,405,723	Very Good
5.098853	Excellent	A2	Good	21.70%	Medium Good	N/A	Medium Good	83,726	Good
4.563852	Excellent	A1	Good	31.30%	Medium Good	N/A	Medium Good	44,720	Medium Good
4.182441	Excellent	AA1	Very Good	45.30%	Very Good	N/A	Medium Good	5,799,354	Very Good
4.494661	Excellent	AA3	Very Good	10.20%	Medium	N/A	Medium Good	-5,799,637	Very Bad



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- ii. Decision maker 2, (DM_2)

Access link: <https://docs.google.com/spreadsheets/d/1yd9LqoRg8Io3-6APqeDqQaFTNNs7eKFdpjX4OgUDQo/edit?usp=sharing>

Section A	
From scale 1-10 please rate your level of expertise in Portfolio Management (very low) 1-10 (very high)	
Section B	
Criteria	Evaluation
Size	Important
Outstanding	Important
Structure	Medium Important
Coupon (%)	Important
Tenor	Medium Important
Offering Type	Important
Coupon Type	Medium Important
Yield to Maturity	Important
Issuer Credit Rating	Very Important
Profitability Ratio	Medium Important
Liquidity Ratio	Important
Cash flow generation	Very Important

Section D

ISIN	Size (Mn USD)	Evaluation	Outstanding (Mn USD)	Evaluation	Structure	Evaluation
MYBVI2204862	226.4	Excellent	226.4	Medium Bad	Murabaha	Good
MYBSE2201939	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBSE2201947	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBSE2201954	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBVG2204841	52.07	Good	52.07	Good	Murabaha	Good
MYBVI2204797	452.8	Excellent	452.8	Medium Bad	Hybrid	Very Good
MYBVI2204839	117.73	Very Good	117.73	Medium Bad	Murabaha	Good
MYBVZ2204775	226.4	Excellent	226.4	Medium Bad	Hybrid	Very Good
MYBPN2200185	226.4	Excellent	226.4	Medium Bad	Hybrid	Very Good
MYBPN2200177	226.4	Excellent	226.4	Medium Bad	Hybrid	Very Good
MYBPN2200169	67.92	Good	67.92	Medium Good	Murabaha	Good
MYBSE2201764	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBSE2201772	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBSE2201780	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBSD2201659	27.17	Medium Good	27.17	Good	Hybrid	Very Good
MYBVZ2203694	90.56	Good	90.56	Good	Hybrid	Very Good
MYBSE2201616	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBSE2201624	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBPN2200144	339.6	Excellent	339.6	Medium Good	Hybrid	Very Good
MYBPN2200136	339.6	Excellent	339.6	Medium Good	Hybrid	Very Good
MYBVZ2203082	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBVG2202753	113.2	Very Good	113.2	Medium Good	Hybrid	Very Good
MYBVN2202726	113.2	Very Good	113.2	Medium Good	Murabaha	Good
MYBVN2202536	67.92	Good	67.92	Good	Murabaha	Good
MYBVN2201967	29.43	Medium Good	29.43	Good	Murabaha	Good
MYBPN2200052	56.6	Good	56.6	Good	Murabaha	Good
MYBVN2201157	56.6	Good	56.6	Good	Murabaha	Good

Coupon (%)	Evaluation	Tenor	Evaluation	Offering Type	Evaluation	Coupon Type	Evaluation
4.5	Medium Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
4.55	Medium Good	3 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.33	Medium Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.75	Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.76	Good	N/A	Medium Bad	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.95	Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.95	Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.9	Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
4.7	Good	N/A	Medium Bad	Underwritten-Agent	Very Good	Variable: Step Up/Step Down	Medium Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
0	Medium Bad	Bills	Good	Underwritten	Good	Fixed: Discount	Very Good
4.4	Medium Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.4	Medium Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Good
5.16	Very Good	N/A	Medium Bad	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.04	Medium Good	3 Years	Very Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.4	Medium Good	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
5.33	Very Good	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.45	Medium Good	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.06	Medium Good	10 Years	Medium Good	Underwritten	Good	Fixed: Plain Vanilla Fixed Coupon	Good
4.25	Medium Good	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed: Plain Vanilla Fixed Coupon	Good

Yield To Maturity	Evaluation	Credit Rating	Evaluation	Profitability Ratio	Evaluation	Liquidity Ratio	Evaluation	Cash Flow Generation	Evaluation
4.221106	Good	AAA	Very Good	37.00%	Medium Good	N/A	Medium Bad	2,405,723	Very Good
4.163368	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
4.165978	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
4.176065	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
4.210481	Good	AA3	Good	32.90%	Medium Good	5%	Medium Good	-539,060	Medium Bad
4.100701	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
4.330768	Good	AA3	Good	32.90%	Medium Good	5%	Medium Good	-539,060	Medium Bad
4.707008	Very Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
4.643137	Very Good	AAA	Very Good	36.50%	Medium Good	60.30%	Good	2,434,974	Very Good
4.633169	Very Good	AA1	Good	26.30%	Medium Good	69.78%	Good	2,692,001	Very Good
4.581913	Very Good	AAA	Very Good	33.40%	Medium Good	81.16%	Good	2,964,207	Very Good
3.774025	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
3.809484	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
3.843022	Very Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
3.091863	Good	No Ratings	Medium Good	-155.70%	Bad	N/A	Medium Bad	62,276	Good
0	Medium Bad	AAA	Very Good	32.80%	Medium Good	N/A	Medium Bad	-2,630,264	Bad
3.261407	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
3.29538	Good	AAA	Very Good	52.00%	Very Good	67.30%	Good	2,233,475	Very Good
4.377805	Very Good	AA1	Good	26.30%	Medium Good	69.78%	Good	2,692,001	Very Good
4.377805	Very Good	AAA	Very Good	36.50%	Medium Good	60.30%	Good	2,434,974	Very Good
5.114138	Very Good	AA3	Good	17.00%	Medium Good	74.58%	Good	20,886	Medium Good
3.942688	Good	No Ratings	Medium Good	-155.70%	Bad	N/A	Medium Bad	62,276	Medium Good
4.341106	Good	AAA	Very Good	37.00%	Medium Good	N/A	Medium Bad	2,405,723	Very Good
5.098853	Very Good	A2	Medium Good	21.70%	Medium Good	N/A	Medium Bad	83,726	Medium Good
4.563852	Good	A1	Medium Good	31.30%	Medium Good	N/A	Medium Bad	44,720	Medium Good
4.182441	Good	AA1	Good	45.30%	Medium Good	N/A	Medium Bad	5,799,354	Very Good
4.494661	Good	AA3	Good	10.20%	Medium Bad	N/A	Medium Bad	-5,799,637	Very Bad



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- iii. Decision maker 3, (DM_3)

Access link:

https://docs.google.com/spreadsheets/d/1GjC2Kag6q_QSaDRw5kL1FGqYLJozTRC_fd68oLYqVrY/edit?usp=sharing

Section A	
From scale 1-10 please rate your level of expertise in Portfolio Management (very low) 1-10 (very high)	
Section B	
Criteria	Evaluation
Size	Important
Outstanding	Very Important
Structure	Very Important
Coupon (%)	Important
Tenor	Very Important
Offering Type	Important
Coupon Type	Very Important
Yield to Maturity	Very Important
Issuer Credit Rating	Very Important
Profitability Ratio	Important
Liquidity Ratio	Very Important
Cash flow generation	Very Important

Section D

ISIN	Size (Mn USD)	Evaluation	Outstanding (Mn USD)	Evaluation	Structure	Evaluation
MYBV12204862	226.4	Very Good	226.4	Good	Murabaha	Good
MYBSE2201939	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201947	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201954	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBVG2204841	52.07	Good	52.07	Medium	Murabaha	Very Good
MYBV12204797	452.8	Excellent	452.8	Good	Hybrid	Excellent
MYBV12204839	117.73	Very Good	117.73	Medium Bad	Murabaha	Very Good
MYBVZ2204775	226.4	Very Good	226.4	Good	Hybrid	Excellent
MYBPN2200185	226.4	Very Good	226.4	Good	Hybrid	Excellent
MYBPN2200177	226.4	Very Good	226.4	Good	Hybrid	Excellent
MYBPN2200169	67.92	Good	67.92	Medium	Murabaha	Very Good
MYBSE2201764	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201772	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201780	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSD2201659	27.17	Medium Good	27.17	Medium	Hybrid	Excellent
MYBVZ2203694	90.56	Good	90.56	Medium Bad	Hybrid	Excellent
MYBSE2201616	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBSE2201624	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBPN2200144	339.6	Excellent	339.6	Good	Hybrid	Excellent
MYBPN2200136	339.6	Excellent	339.6	Good	Hybrid	Excellent
MYBVZ2203082	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBVG2202753	113.2	Very Good	113.2	Medium Bad	Hybrid	Excellent
MYBVN2202726	113.2	Very Good	113.2	Medium Bad	Murabaha	Very Good
MYBVN2202536	67.92	Good	67.92	Medium	Murabaha	Very Good
MYBVN2201967	29.43	Medium Good	29.43	Medium	Murabaha	Very Good
MYBPN2200052	56.6	Good	56.6	Medium	Murabaha	Very Good
MYBVN2201157	56.6	Good	56.6	Medium	Murabaha	Very Good

Coupon (%)	Evaluation	Tenor	Evaluation	Offering Type	Evaluation	Coupon Type	Evaluation
4.5	Very Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Good
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
4.55	Very Good	3 Years	Very Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.33	Very Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.75	Very Good	5 Years	Very Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.76	Very Good	N/A	Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.95	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.95	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.9	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
4.7	Very Good	N/A	Good	Underwritten-Agent	Very Good	Variable: Step Up/Step Down	Very Good
0	Medium	Bills	Medium Good	Underwritten	Good	Fixed: Discount	Excellent
0	Medium	Bills	Medium	Underwritten	Good	Fixed: Discount	Excellent
4.4	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.4	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
5.16	Excellent	N/A	Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.04	Very Good	3 Years	Very Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.4	Very Good	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
5.33	Excellent	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.45	Very Good	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.06	Very Good	10 Years	Medium Good	Underwritten	Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good
4.25	Very Good	10 Years	Medium Good	Underwritten-Agent	Very Good	Fixed:Plain Vanilla Fixed Coupon	Medium Good

Yield To Maturity	Evaluation	Credit Rating	Evaluation	Profitability Ratio	Evaluation	Liquidity Ratio	Evaluation	Cash Flow Generation	Evaluation
4.221106	Excellent	AAA	Excellent	37.00%	Good	N/A	Bad	2,405,723	Very Good
4.163368	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.165978	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.176065	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.210481	Excellent	AA3	Good	32.90%	Good	5%	Bad	-539,060	Medium Bad
4.100701	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.330768	Excellent	AA3	Good	32.90%	Good	5%	Bad	-539,060	Medium Bad
4.707008	Excellent	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.643137	Excellent	AAA	Excellent	36.50%	Good	60.30%	Very Good	2,434,974	Very Good
4.633169	Excellent	AA1	Very Good	26.30%	Medium Good	69.78%	Very Good	2,692,001	Very Good
4.581913	Excellent	AAA	Excellent	33.40%	Good	81.16%	Excellent	2,964,207	Very Good
3.774025	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.809484	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.843022	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.091863	Very Good	No Ratings	Medium	-155.70%	Bad	N/A	Bad	62,276	Good
0	Medium Good	AAA	Excellent	32.80%	Good	N/A	Bad	-2,630,264	Bad
3.261407	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
3.29538	Very Good	AAA	Excellent	52.00%	Excellent	67.30%	Very Good	2,233,475	Very Good
4.377805	Excellent	AA1	Very Good	26.30%	Medium Good	69.78%	Very Good	2,692,001	Very Good
4.377805	Excellent	AAA	Excellent	36.50%	Good	60.30%	Very Good	2,434,974	Very Good
5.114138	Excellent	AA3	Good	17.00%	Medium	74.58%	Very Good	20,886	Good
3.942688	Very Good	No Ratings	Medium	-155.70%	Bad	N/A	Bad	62,276	Good
4.341106	Excellent	AAA	Excellent	37.00%	Good	N/A	Bad	2,405,723	Very Good
5.098853	Excellent	A2	Medium Good	21.70%	Medium Good	N/A	Bad	83,726	Good
4.563852	Excellent	A1	Medium Good	31.30%	Good	N/A	Bad	44,720	Medium Good
4.182441	Excellent	AA1	Very Good	45.30%	Very Good	N/A	Bad	5,799,354	Very Good
4.494661	Excellent	AA3	Good	10.20%	Medium	N/A	Bad	-5,799,637	Very Bad

Appendix G

Fuzzy Preference Relation Matrix

i. Decision Maker 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0.5	0.48789	0.48789	0.48789	0.515369	0.487975	0.508998	0.4947	0.5	0.503688	0.504232	0.492005	0.492005	0.492005	0.514328	0.518327	0.492178	0.492005	0.502513	0.498664	0.50789	0.51499	0.501792	0.512351	0.513291	0.51207	0.523267
2	0.511551	0.5	0.5	0.5	0.526154	0.500081	0.520108	0.5065	0.511551	0.51506	0.515578	0.503929	0.503929	0.503929	0.525166	0.528957	0.504094	0.503929	0.513942	0.510279	0.519056	0.525794	0.513257	0.523291	0.524183	0.523025	0.533634
3	0.511551	0.5	0.5	0.5	0.526154	0.500081	0.520108	0.5065	0.511551	0.51506	0.515578	0.503929	0.503929	0.503929	0.525166	0.528957	0.504094	0.503929	0.513942	0.510279	0.519056	0.525794	0.513257	0.523291	0.524183	0.523025	0.533634
4	0.511551	0.5	0.5	0.5	0.526154	0.500081	0.520108	0.5065	0.511551	0.51506	0.515578	0.503929	0.503929	0.503929	0.525166	0.528957	0.504094	0.503929	0.513942	0.510279	0.519056	0.525794	0.513257	0.523291	0.524183	0.523025	0.533634
5	0.483624	0.47079	0.47079	0.47079	0.5	0.47088	0.4932	0.478	0.483624	0.487544	0.488124	0.475145	0.475145	0.475145	0.498887	0.503163	0.475328	0.475145	0.486295	0.482206	0.492019	0.499595	0.485529	0.496777	0.49778	0.496477	0.508454
6	0.511473	0.499919	0.499919	0.499919	0.526082	0.5	0.520034	0.506421	0.511473	0.514984	0.515502	0.503849	0.503849	0.503849	0.525094	0.528886	0.504014	0.503849	0.513866	0.510201	0.518981	0.525722	0.51318	0.523218	0.52411	0.522951	0.533565
7	0.490666	0.478133	0.478133	0.478133	0.50662	0.478221	0.5	0.485176	0.490666	0.494489	0.495053	0.482388	0.482388	0.482388	0.505537	0.509696	0.482567	0.482388	0.49327	0.489282	0.49885	0.506226	0.492523	0.503483	0.504459	0.503191	0.51484
8	0.50519	0.493327	0.493327	0.493327	0.520221	0.49341	0.513994	0.5	0.50519	0.508799	0.509332	0.49736	0.49736	0.49736	0.519203	0.52311	0.497529	0.49736	0.50765	0.503883	0.512911	0.51985	0.506944	0.517272	0.51819	0.516997	0.527933
9	0.5	0.48789	0.48789	0.48789	0.515369	0.487975	0.508998	0.4947	0.5	0.503688	0.504232	0.492005	0.492005	0.492005	0.514328	0.518327	0.492178	0.492005	0.502513	0.498664	0.50789	0.51499	0.501792	0.512351	0.513291	0.51207	0.523267
10	0.496257	0.483974	0.483974	0.483974	0.511864	0.484061	0.505392	0.49088	0.496257	0.5	0.500552	0.488147	0.488147	0.488147	0.510806	0.51487	0.488322	0.488147	0.498807	0.494902	0.504267	0.511479	0.498076	0.508798	0.509752	0.508513	0.519893
11	0.495695	0.483387	0.483387	0.483387	0.511338	0.483473	0.504851	0.490306	0.495695	0.499446	0.5	0.487568	0.487568	0.487568	0.510277	0.514351	0.487743	0.487568	0.498251	0.494337	0.503723	0.510952	0.497518	0.508264	0.509221	0.507978	0.519386
12	0.507747	0.496008	0.496008	0.496008	0.522608	0.496091	0.516453	0.502613	0.507747	0.511317	0.511843	0.5	0.5	0.5	0.521602	0.525463	0.500168	0.5	0.51018	0.506454	0.515382	0.522242	0.509482	0.519693	0.520601	0.519422	0.530228
13	0.507747	0.496008	0.496008	0.496008	0.522608	0.496091	0.516453	0.502613	0.507747	0.511317	0.511843	0.5	0.5	0.5	0.521602	0.525463	0.500168	0.5	0.51018	0.506454	0.515382	0.522242	0.509482	0.519693	0.520601	0.519422	0.530228
14	0.507747	0.496008	0.496008	0.496008	0.522608	0.496091	0.516453	0.502613	0.507747	0.511317	0.511843	0.5	0.5	0.5	0.521602	0.525463	0.500168	0.5	0.51018	0.506454	0.515382	0.522242	0.509482	0.519693	0.520601	0.519422	0.530228
15	0.484801	0.472017	0.472017	0.472017	0.501108	0.472106	0.494337	0.479199	0.484801	0.488706	0.489282	0.476355	0.476355	0.476355	0.5	0.504256	0.476537	0.476355	0.487461	0.483388	0.493162	0.500704	0.486698	0.497899	0.498897	0.4976	0.509523
16	0.480224	0.46725	0.46725	0.46725	0.496797	0.467341	0.489912	0.474536	0.480224	0.484189	0.484775	0.47165	0.47165	0.47165	0.49567	0.5	0.471835	0.47165	0.482925	0.478789	0.488717	0.496387	0.48215	0.493533	0.494548	0.493229	0.505361
17	0.507585	0.495837	0.495837	0.495837	0.522456	0.49592	0.516297	0.502446	0.507585	0.511157	0.511684	0.499832	0.499832	0.499832	0.52145	0.525313	0.5	0.499832	0.510019	0.50629	0.515225	0.52209	0.509321	0.519539	0.520447	0.519268	0.530082
18	0.507747	0.496008	0.496008	0.496008	0.522608	0.496091	0.516453	0.502613	0.507747	0.511317	0.511843	0.5	0.5	0.5	0.521602	0.525463	0.500168	0.5	0.51018	0.506454	0.515382	0.522242	0.509482	0.519693	0.520601	0.519422	0.530228
19	0.497462	0.485234	0.485234	0.485234	0.512993	0.48532	0.506553	0.492109	0.497462	0.501187	0.501737	0.489388	0.489388	0.489388	0.51194	0.515983	0.489563	0.489388	0.5	0.496113	0.505434	0.51261	0.499272	0.509942	0.510892	0.509658	0.52098
20	0.501329	0.489281	0.489281	0.489281	0.516612	0.489365	0.510278	0.496056	0.501329	0.504996	0.505538	0.493375	0.493375	0.493375	0.515577	0.519552	0.493357	0.493375	0.503828	0.5	0.509176	0.516235	0.503111	0.513612	0.514545	0.513332	0.524463
21	0.491852	0.479372	0.479372	0.479372	0.507734	0.47946	0.501145	0.486386	0.491852	0.495659	0.496221	0.48361	0.48361	0.48361	0.506656	0.510796	0.483788	0.48361	0.494445	0.490474	0.5	0.507342	0.493702	0.504612	0.505583	0.504321	0.515914
22	0.484054	0.471238	0.471238	0.471238	0.500405	0.471328	0.493615	0.478437	0.484054	0.487968	0.488547	0.475586	0.475586	0.475586	0.499294	0.503562	0.475769	0.475586	0.48672	0.482638	0.492436	0.5	0.485956	0.497186	0.498188	0.496887	0.508844
23	0.498195	0.486001	0.486001	0.486001	0.51368	0.486087	0.50726	0.492857	0.498195	0.501909	0.502458	0.490144	0.490144	0.490144	0.51263	0.51666	0.490318	0.490144	0.500726	0.49685	0.506143	0.513297	0.5	0.510638	0.511585	0.510355	0.521641
24	0.487007	0.474316	0.474316	0.474316	0.503182	0.474405	0.496468	0.481446	0.487007	0.490881	0.491453	0.478623	0.478623	0.478623	0.502084	0.506304	0.478804	0.478623	0.489646	0.485605	0.495301	0.502782	0.488889	0.5	0.50099	0.499704	0.511524
25	0.485963	0.473228	0.473228	0.473228	0.502201	0.473317	0.49546	0.480383	0.485963	0.489852	0.490426	0.477549	0.477549	0.477549	0.501098	0.505335	0.477731	0.477549	0.488612	0.484556	0.494289	0.501799	0.487852	0.499006	0.5	0.498709	0.510578
26	0.487317	0.47464	0.47464	0.47464	0.503474	0.474729	0.496768	0.481763	0.487317	0.491187	0.491759	0.478942	0.478942	0.478942	0.502377	0.506592	0.479123	0.478942	0.489954	0.485917	0.495603	0.503075	0.489198	0.500296	0.501285	0.5	0.511806
27	0.474346	0.461138	0.461138	0.461138	0.491251	0.46123	0.484224	0.468553	0.474346	0.478387	0.478985	0.465615	0.465615	0.465615	0.4901	0.494522	0.465803	0.465615	0.477098	0.472884	0.483005	0.490832	0.476309	0.487919	0.488955	0.487609	0.5

ii. Decision Maker 2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0.5	0.497975	0.497975	0.497975	0.511944	0.493556	0.511048	0.491893	0.496493	0.499359	0.504209	0.497975	0.497975	0.49544	0.519689	0.520267	0.497975	0.497975	0.503665	0.50075	0.50334	0.514311	0.506615	0.510378	0.519226	0.513294	0.525653
2	0.502009	0.5	0.5	0.5	0.513853	0.495616	0.512965	0.493966	0.49853	0.501373	0.506183	0.5	0.5	0.497485	0.521529	0.522102	0.5	0.5	0.505644	0.502753	0.505321	0.516199	0.508569	0.5123	0.521071	0.515191	0.527438
3	0.502009	0.5	0.5	0.5	0.513853	0.495616	0.512965	0.493966	0.49853	0.501373	0.506183	0.5	0.5	0.497485	0.521529	0.522102	0.5	0.5	0.505644	0.502753	0.505321	0.516199	0.508569	0.5123	0.521071	0.515191	0.527438
4	0.502009	0.5	0.5	0.5	0.513853	0.495616	0.512965	0.493966	0.49853	0.501373	0.506183	0.5	0.5	0.497485	0.521529	0.522102	0.5	0.5	0.505644	0.502753	0.505321	0.516199	0.508569	0.5123	0.521071	0.515191	0.527438
5	0.487457	0.485335	0.485335	0.485335	0.5	0.480708	0.499057	0.478969	0.483783	0.486785	0.491872	0.485335	0.485335	0.48268	0.508157	0.508768	0.485335	0.485335	0.491301	0.488243	0.49096	0.502491	0.494398	0.498353	0.50767	0.50142	0.514452
6	0.506282	0.504309	0.504309	0.504309	0.51791	0.5	0.517038	0.498378	0.502864	0.505657	0.510382	0.504309	0.504309	0.501837	0.525438	0.526	0.504309	0.504309	0.509853	0.507013	0.509536	0.520212	0.512724	0.516387	0.524989	0.519223	0.53123
7	0.488441	0.486326	0.486326	0.486326	0.500939	0.481716	0.5	0.479982	0.48478	0.487771	0.492841	0.486326	0.486326	0.483681	0.509065	0.509673	0.486326	0.486326	0.492272	0.489225	0.491932	0.503421	0.495357	0.499298	0.50858	0.502354	0.515334
8	0.507852	0.505892	0.505892	0.505892	0.519399	0.501612	0.518534	0.5	0.504457	0.507232	0.511924	0.505892	0.505892	0.503437	0.526873	0.527431	0.505892	0.505892	0.511399	0.508578	0.511084	0.521684	0.51425	0.517887	0.526427	0.520703	0.53262
9	0.503458	0.501461	0.501461	0.501461	0.51523	0.497103	0.514347	0.495462	0.5	0.502826	0.507608	0.501461	0.501461	0.498961	0.522856	0.523426	0.501461	0.501461	0.507072	0.504198	0.506751	0.517561	0.509979	0.513687	0.522401	0.516559	0.528726
10	0.50064	0.49862	0.49862	0.49862	0.512552	0.494212	0.511658	0.492553	0.497142	0.5	0.504838	0.49862	0.49862	0.496091	0.520275	0.520852	0.49862	0.49862	0.504296	0.501388	0.503971	0.514912	0.507237	0.51099	0.519814	0.513898	0.526221
11	0.495719	0.49366	0.49366	0.49366	0.507872	0.489168	0.50696	0.487478	0.492153	0.495067	0.5	0.49366	0.49366	0.491083	0.515761	0.51635	0.49366	0.49366	0.499447	0.496482	0.499116	0.510282	0.502448	0.506278	0.51529	0.509247	0.52184
12	0.502009	0.5	0.5	0.5	0.513853	0.495616	0.512965	0.493966	0.49853	0.501373	0.506183	0.5	0.5	0.497485	0.521529	0.522102	0.5	0.5	0.505644	0.502753	0.505321	0.516199	0.508569	0.5123	0.521071	0.515191	0.527438
13	0.502009	0.5	0.5	0.5	0.513853	0.495616	0.512965	0.493966	0.49853	0.501373	0.506183	0.5	0.5	0.497485	0.521529	0.522102	0.5	0.5	0.505644	0.502753	0.505321	0.516199	0.508569	0.5123	0.521071	0.515191	0.527438
14	0.504478	0.50249	0.50249	0.50249	0.516198	0.498149	0.515319	0.496515	0.501034	0.503849	0.50861	0.50249	0.50249	0.5	0.523789	0.524356	0.50249	0.50249	0.508076	0.505215	0.507757	0.518519	0.51097	0.514662	0.523336	0.517521	0.52963
15	0.478628	0.476442	0.476442	0.476442	0.491567	0.471168	0.490594	0.469891	0.474844	0.477936	0.483179	0.476442	0.476442	0.473709	0.5	0.500631	0.476442	0.476442	0.482591	0.479439	0.482238	0.494141	0.485784	0.489867	0.499496	0.493035	0.506517
16	0.477945	0.475754	0.475754	0.475754	0.490914	0.470982	0.489938	0.469189	0.474152	0.477251	0.482506	0.475754	0.475754	0.473015	0.499367	0.5	0.475754	0.475754	0.481916	0.478757	0.481563	0.493493	0.485117	0.489209	0.498862	0.492385	0.5059
17	0.502009	0.5	0.5	0.5	0.513853	0.495616	0.512965	0.493966	0.49853	0.501373	0.506183	0.5	0.5	0.497485	0.521529	0.522102	0.5	0.5	0.505644	0.502753	0.505321	0.516199	0.508569	0.5123	0.521071	0.515191	0.527438
18	0.502009	0.5	0.5	0.5	0.513853	0.495616	0.512965	0.493966	0.49853	0.501373	0.506183	0.5	0.5	0.497485	0.521529	0.522102	0.5	0.5	0.505644	0.502753	0.505321	0.516199	0.508569	0.5123	0.521071	0.515191	0.527438
19	0.49628	0.494225	0.494225	0.494225	0.508406	0.489743	0.507496	0.488057	0.492722	0.495629	0.500552	0.494225	0.494225	0.491654	0.516276	0.516864	0.494225	0.494225	0.5	0.497041	0.49967	0.510811	0.502994	0.506816	0.515806	0.509777	0.52234
20	0.499247	0.497216	0.497216	0.497216	0.511229	0.492784	0.51033	0.491117	0.49573	0.498604	0.503469	0.497216	0.497216	0.494674	0.518999	0.519579	0.497216	0.497216	0.502924	0.5	0.502597	0.513603	0.505882	0.509658	0.518535	0.512583	0.524983
21	0.496615	0.494563	0.494563	0.494563	0.508725	0.490086	0.507816	0.488402	0.493062	0.495965	0.500881	0.494563	0.494563	0.491995	0.516583	0.517171	0.494563	0.494563	0.50033	0.497375	0.5	0.511126	0.50332	0.507136	0.516114	0.510094	0.522638
22	0.48482	0.482678	0.482678	0.482678	0.497484	0.478011	0.496532	0.476256	0.481112	0.484142	0.489276	0.482678	0.482678	0.48	0.505725	0.506341	0.482678	0.482678	0.488701	0.485614	0.488356	0.5	0.491827	0.49582	0.505232	0.498919	0.512087
23	0.493206	0.491127	0.491127	0.491127	0.505479	0.486593	0.504558	0.484888	0.489606	0.492547	0.497528	0.491127	0.491127	0.488526	0.513451	0.514047	0.491127	0.491127	0.49697	0.493976	0.496635	0.507915	0.5	0.503869	0.512975	0.506868	0.519596
24	0.489173	0.487063	0.487063	0.487063	0.501636	0.482464	0.5007	0.480735	0.48552	0.488504	0.49356	0.487063	0.487063	0.484424	0.509739	0.510345	0.487063	0.487063	0.492993	0.489954	0.492654	0.504111	0.49607	0.5	0.509255	0.503047	0.515989
25	0.479172	0.476989	0.476989	0.476989	0.492087	0.472235	0.491115	0.470449	0.475394	0.47848	0.483714	0.476989	0.476989	0.474261	0.500503	0.501133	0.476989	0.476989	0.483127	0.479981	0.482775	0.494656	0.486315	0.490389	0.5	0.493552	0.507006
26	0.48596	0.483826	0.483826	0.483826	0.498571	0.479176	0.497624	0.477428	0.482266	0.485284	0.490398	0.483826	0.483826	0.481158	0.506776	0.50739	0.483826	0.483826	0.489825	0.48675	0.489481	0.501077	0.492938	0.496915	0.506286	0.5	0.51311
27	0.471414	0.469179	0.469179	0.469179	0.484661	0.464312	0.483663	0.462485	0.467545	0.470706	0.47607	0.469179	0.469179	0.466386	0.493309	0.493957	0.469179	0.469179	0.475468	0.472243	0.475107	0.487299	0.478737	0.482918	0.492792	0.486165	0.5

iii. Decision Maker 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0.5	0.487392	0.487392	0.487392	0.503206	0.48213	0.504283	0.486659	0.493427	0.497407	0.498556	0.487392	0.487392	0.484928	0.511554	0.511655	0.487392	0.487392	0.495979	0.492021	0.493427	0.503304	0.499903	0.502133	0.510747	0.503206	0.516245
2	0.512003	0.5	0.5	0.5	0.515048	0.494977	0.516071	0.499301	0.505751	0.509538	0.510631	0.5	0.5	0.497649	0.522964	0.52306	0.5	0.5	0.508179	0.504412	0.505751	0.515141	0.511911	0.514029	0.5222	0.515048	0.527404
3	0.512003	0.5	0.5	0.5	0.515048	0.494977	0.516071	0.499301	0.505751	0.509538	0.510631	0.5	0.5	0.497649	0.522964	0.52306	0.5	0.5	0.508179	0.504412	0.505751	0.515141	0.511911	0.514029	0.5222	0.515048	0.527404
4	0.512003	0.5	0.5	0.5	0.515048	0.494977	0.516071	0.499301	0.505751	0.509538	0.510631	0.5	0.5	0.497649	0.522964	0.52306	0.5	0.5	0.508179	0.504412	0.505751	0.515141	0.511911	0.514029	0.5222	0.515048	0.527404
5	0.496753	0.483988	0.483988	0.483988	0.5	0.478665	0.501092	0.483247	0.490097	0.494127	0.49529	0.483988	0.483988	0.481496	0.508461	0.508563	0.483988	0.483988	0.49268	0.488674	0.490097	0.500099	0.496655	0.498913	0.507643	0.5	0.513217
6	0.516678	0.504924	0.504924	0.504924	0.519658	0.5	0.520658	0.504239	0.510558	0.514266	0.515335	0.504924	0.504924	0.50262	0.527398	0.527492	0.504924	0.504924	0.512935	0.509247	0.510558	0.519748	0.516589	0.518661	0.526651	0.519658	0.531736
7	0.495642	0.482825	0.482825	0.482825	0.498903	0.477481	0.5	0.482081	0.488958	0.493005	0.494173	0.482825	0.482825	0.480323	0.507402	0.507505	0.482825	0.482825	0.491552	0.487529	0.488958	0.499003	0.495544	0.497811	0.50658	0.498903	0.51218
8	0.512665	0.500697	0.500697	0.500697	0.515701	0.495688	0.516721	0.5	0.506432	0.510208	0.511297	0.500697	0.500697	0.498353	0.523593	0.523688	0.500697	0.500697	0.508853	0.505097	0.506432	0.515793	0.512574	0.514685	0.522831	0.515701	0.528018
9	0.506404	0.494113	0.494113	0.494113	0.509526	0.488977	0.510575	0.493398	0.5	0.503879	0.504998	0.494113	0.494113	0.491709	0.517647	0.517745	0.494113	0.494113	0.502487	0.498629	0.5	0.509621	0.50631	0.508481	0.516862	0.509526	0.522205
10	0.502566	0.490083	0.490083	0.490083	0.505738	0.484871	0.506805	0.489358	0.49606	0.5	0.501137	0.490083	0.490083	0.487643	0.513997	0.514097	0.490083	0.490083	0.498586	0.494668	0.49606	0.505835	0.502471	0.504676	0.513199	0.505738	0.518635
11	0.501435	0.488897	0.488897	0.488897	0.504622	0.483663	0.505694	0.488168	0.4949	0.498858	0.5	0.488897	0.488897	0.486446	0.512921	0.513021	0.488897	0.488897	0.497437	0.493502	0.4949	0.50472	0.501339	0.503556	0.512119	0.504622	0.517582
12	0.512003	0.5	0.5	0.5	0.515048	0.494977	0.516071	0.499301	0.505751	0.509538	0.510631	0.5	0.5	0.497649	0.522964	0.52306	0.5	0.5	0.508179	0.504412	0.505751	0.515141	0.511911	0.514029	0.5222	0.515048	0.527404
13	0.512003	0.5	0.5	0.5	0.515048	0.494977	0.516071	0.499301	0.505751	0.509538	0.510631	0.5	0.5	0.497649	0.522964	0.52306	0.5	0.5	0.508179	0.504412	0.505751	0.515141	0.511911	0.514029	0.5222	0.515048	0.527404
14	0.514215	0.502329	0.502329	0.502329	0.517229	0.497353	0.518242	0.501637	0.508025	0.511775	0.512857	0.502329	0.502329	0.5	0.525063	0.525158	0.502329	0.502329	0.510429	0.506699	0.508025	0.517321	0.514124	0.516221	0.524307	0.517229	0.529455
15	0.487886	0.474713	0.474713	0.474713	0.491243	0.469229	0.492372	0.473949	0.481013	0.485173	0.486375	0.474713	0.474713	0.472144	0.5	0.500106	0.474713	0.474713	0.483679	0.479544	0.481013	0.491345	0.487785	0.490119	0.499153	0.491243	0.504929
16	0.487775	0.474597	0.474597	0.474597	0.491133	0.469111	0.492263	0.473833	0.480899	0.485061	0.486263	0.474597	0.474597	0.472027	0.498994	0.5	0.474597	0.474597	0.483566	0.47943	0.480899	0.491235	0.487674	0.490008	0.499046	0.491133	0.504825
17	0.512003	0.5	0.5	0.5	0.515048	0.494977	0.516071	0.499301	0.505751	0.509538	0.510631	0.5	0.5	0.497649	0.522964	0.52306	0.5	0.5	0.508179	0.504412	0.505751	0.515141	0.511911	0.514029	0.5222	0.515048	0.527404
18	0.512003	0.5	0.5	0.5	0.515048	0.494977	0.516071	0.499301	0.505751	0.509538	0.510631	0.5	0.5	0.497649	0.522964	0.52306	0.5	0.5	0.508179	0.504412	0.505751	0.515141	0.511911	0.514029	0.5222	0.515048	0.527404
19	0.503958	0.491544	0.491544	0.491544	0.507112	0.486359	0.508172	0.490822	0.497488	0.501406	0.502537	0.491544	0.491544	0.489117	0.515321	0.51542	0.491544	0.491544	0.5	0.496104	0.497488	0.507208	0.503863	0.506056	0.514528	0.507112	0.51993
20	0.507732	0.495508	0.495508	0.495508	0.510835	0.490398	0.511878	0.494797	0.501363	0.505221	0.506334	0.495508	0.495508	0.493116	0.518909	0.519006	0.495508	0.495508	0.503836	0.5	0.501363	0.51093	0.507639	0.509797	0.518129	0.510835	0.523439
21	0.506404	0.494113	0.494113	0.494113	0.509526	0.488977	0.510575	0.493398	0.5	0.503879	0.504998	0.494113	0.494113	0.491709	0.517647	0.517745	0.494113	0.494113	0.502487	0.498629	0.5	0.509621	0.50631	0.508481	0.516862	0.509526	0.522205
22	0.496652	0.483883	0.483883	0.483883	0.499901	0.478558	0.500993	0.483142	0.489994	0.494025	0.495189	0.483883	0.483883	0.48139	0.508365	0.508468	0.483883	0.483883	0.492578	0.48857	0.489994	0.5	0.496554	0.498813	0.507547	0.499901	0.513123
23	0.500096	0.487493	0.487493	0.487493	0.503301	0.482233	0.504378	0.486761	0.493526	0.497505	0.498653	0.487493	0.487493	0.48503	0.511646	0.511747	0.487493	0.487493	0.496077	0.492121	0.493526	0.503399	0.5	0.502228	0.51084	0.503301	0.516335
24	0.497849	0.485137	0.485137	0.485137	0.501082	0.479834	0.50217	0.484399	0.491221	0.495234	0.496393	0.485137	0.485137	0.482654	0.509506	0.509608	0.485137	0.485137	0.493794	0.489804	0.491221	0.501181	0.497752	0.5	0.508691	0.501082	0.51424
25	0.48877	0.475637	0.475637	0.475637	0.492116	0.470168	0.493242	0.474875	0.481918	0.486066	0.487264	0.475637	0.475637	0.473075	0.500845	0.50095	0.475637	0.475637	0.484576	0.480454	0.481918	0.492218	0.488669	0.490996	0.5	0.492116	0.505757
26	0.496753	0.483988	0.483988	0.483988	0.5	0.478665	0.501092	0.483247	0.490097	0.494127	0.49529	0.483988	0.483988	0.481496	0.508461	0.508563	0.483988	0.483988	0.49268	0.488674	0.490097	0.500099	0.496655	0.498913	0.507643	0.5	0.513217
27	0.482626	0.469223	0.469223	0.469223	0.486046	0.463649	0.487196	0.468446	0.47563	0.479864	0.481088	0.469223	0.469223	0.466612	0.494972	0.49508	0.469223	0.469223	0.478344	0.474136	0.47563	0.48615	0.482523	0.4849	0.494107	0.486046	0.5

Appendix H

Fuzzy Strict Preference Relation

i. Decision Maker 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0	0	0	0	0.031745	0	0.018333	0	0	0.007431	0.008537	0	0	0	0.029526	0.038103	0	0	0.005051	0	0.016038	0.030936	0.003597	0.025345	0.027327	0.024753	0.048921
2	0.023661	0	0	0	0.055363	0.000162	0.041975	0.013173	0.023661	0.031086	0.032191	0.007921	0.007921	0.007921	0.05315	0.061707	0.008257	0.007921	0.028708	0.020998	0.039684	0.054556	0.027256	0.048976	0.050955	0.048385	0.072496
3	0.023661	0	0	0	0.055363	0.000162	0.041975	0.013173	0.023661	0.031086	0.032191	0.007921	0.007921	0.007921	0.05315	0.061707	0.008257	0.007921	0.028708	0.020998	0.039684	0.054556	0.027256	0.048976	0.050955	0.048385	0.072496
4	0.023661	0	0	0	0.055363	0.000162	0.041975	0.013173	0.023661	0.031086	0.032191	0.007921	0.007921	0.007921	0.05315	0.061707	0.008257	0.007921	0.028708	0.020998	0.039684	0.054556	0.027256	0.048976	0.050955	0.048385	0.072496
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.006366	0	0	0	0	0	0	0	0	0	0	0.017203
6	0.023498	0	0	0	0.055201	0	0.041813	0.013011	0.023498	0.030924	0.032029	0.007759	0.007759	0.007759	0.052988	0.061545	0.008094	0.007759	0.028546	0.020835	0.039521	0.054394	0.027093	0.048814	0.050793	0.048223	0.072334
7	0	0	0	0	0.01342	0	0	0	0	0	0	0	0	0	0.0112	0.019784	0	0	0	0	0.01261	0	0.007015	0.008999	0.006423	0.030616	
8	0.010491	0	0	0	0.042221	0	0.028818	0	0.010491	0.01792	0.019026	0	0	0	0.040005	0.048574	0	0	0.01554	0.007827	0.026524	0.041413	0.014087	0.035826	0.037807	0.035234	0.059381
9	0	0	0	0	0.031745	0	0.018333	0	0	0.007431	0.008537	0	0	0	0.029526	0.038103	0	0	0.005051	0	0.016038	0.030936	0.003597	0.025345	0.027327	0.024753	0.048921
10	0	0	0	0	0.02432	0	0.010904	0	0	0.001106	0	0	0	0	0.022101	0.030681	0	0	0	0.008608	0.023511	0	0.017917	0.019901	0.017325	0.041506	
11	0	0	0	0	0.023214	0	0.009797	0	0	0	0	0	0	0	0.020995	0.029576	0	0	0	0	0.007502	0.022405	0	0.016811	0.018795	0.016219	0.040401
12	0.015742	0	0	0	0.047463	0	0.034065	0.005253	0.015742	0.02317	0.024276	0	0	0	0.045248	0.053813	0.000336	0	0.020791	0.013079	0.031772	0.046655	0.019338	0.04107	0.043051	0.040479	0.064613
13	0.015742	0	0	0	0.047463	0	0.034065	0.005253	0.015742	0.02317	0.024276	0	0	0	0.045248	0.053813	0.000336	0	0.020791	0.013079	0.031772	0.046655	0.019338	0.04107	0.043051	0.040479	0.064613
14	0.015742	0	0	0	0.047463	0	0.034065	0.005253	0.015742	0.02317	0.024276	0	0	0	0.045248	0.053813	0.000336	0	0.020791	0.013079	0.031772	0.046655	0.019338	0.04107	0.043051	0.040479	0.064613
15	0	0	0	0	0.00222	0	0	0	0	0	0	0	0	0	0	0.008586	0	0	0	0	0.001411	0	0	0	0	0	0.019423
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.010839
17	0.015407	0	0	0	0.047128	0	0.03373	0.004917	0.015407	0.022835	0.023941	0	0	0	0.044913	0.053478	0	0	0.020456	0.012743	0.031437	0.046321	0.019003	0.040735	0.042716	0.040144	0.064279
18	0.015742	0	0	0	0.047463	0	0.034065	0.005253	0.015742	0.02317	0.024276	0	0	0	0.045248	0.053813	0.000336	0	0.020791	0.013079	0.031772	0.046655	0.019338	0.04107	0.043051	0.040479	0.064613
19	0	0	0	0	0.026698	0	0.013283	0	0	0.00238	0.003486	0	0	0	0.024479	0.033059	0	0	0	0	0.010988	0.025889	0	0.020297	0.02228	0.019705	0.043881
20	0.002664	0	0	0	0.034406	0	0.020996	0	0.002664	0.010095	0.011201	0	0	0	0.032188	0.040763	0	0	0.007715	0	0.018702	0.033597	0.006261	0.028007	0.029989	0.027415	0.051578
21	0	0	0	0	0.015715	0	0.002295	0	0	0	0	0	0	0	0.013495	0.022078	0	0	0	0	0	0.014905	0	0.00931	0.011294	0.008718	0.032909
22	0	0	0	0	0.00081	0	0	0	0	0	0	0	0	0	0.007175	0	0	0	0	0	0	0	0	0	0	0	0.018013
23	0	0	0	0	0.028151	0	0.014737	0	0	0.003834	0.00494	0	0	0	0.025932	0.03451	0	0	0.001453	0	0.012442	0.027342	0	0.021749	0.023733	0.021157	0.045332
24	0	0	0	0	0.006405	0	0	0	0	0	0	0	0	0	0.004185	0.012771	0	0	0	0	0	0.005596	0	0	0.001984	0	0.023606
25	0	0	0	0	0.004421	0	0	0	0	0	0	0	0	0	0.002201	0.010787	0	0	0	0	0	0.003612	0	0	0	0	0.021623
26	0	0	0	0	0.006998	0	0	0	0	0	0	0	0	0	0.004777	0.013363	0	0	0	0	0	0.006188	0	0.000592	0.002576	0	0.024198
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ii. Decision Maker 2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0	0	0	0	0.024487	0	0.022607	0	0	0	0.00849	0	0	0	0.04106	0.042323	0	0	0.007385	0.001503	0.006725	0.029491	0.013409	0.021205	0.040055	0.027334	0.054238
2	0.004034	0	0	0	0.028518	0	0.026638	0	0	0.002753	0.012524	0	0	0	0.045087	0.046349	0	0	0.011419	0.005537	0.010759	0.033521	0.017442	0.025237	0.044082	0.031365	0.058259
3	0.004034	0	0	0	0.028518	0	0.026638	0	0	0.002753	0.012524	0	0	0	0.045087	0.046349	0	0	0.011419	0.005537	0.010759	0.033521	0.017442	0.025237	0.044082	0.031365	0.058259
4	0.004034	0	0	0	0.028518	0	0.026638	0	0	0.002753	0.012524	0	0	0	0.045087	0.046349	0	0	0.011419	0.005537	0.010759	0.033521	0.017442	0.025237	0.044082	0.031365	0.058259
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01659	0.017854	0	0	0	0	0	0.005007	0	0	0.015583	0.002849	0.029791
6	0.012726	0.008693	0.008693	0.008693	0.037202	0	0.035323	0	0.005762	0.011446	0.021214	0.008693	0.008693	0.003689	0.053758	0.055019	0.008693	0.008693	0.02011	0.014229	0.019449	0.042201	0.026131	0.033923	0.052754	0.040046	0.066918
7	0	0	0	0	0.001881	0	0	0	0	0	0	0	0	0	0.018471	0.019735	0	0	0	0	0	0.006889	0	0	0.017464	0.00473	0.031671
8	0.015959	0.011926	0.011926	0.011926	0.04043	0.003234	0.038552	0	0.008995	0.014679	0.024446	0.011926	0.011926	0.006922	0.056982	0.058242	0.011926	0.011926	0.023342	0.017462	0.022682	0.045428	0.029362	0.037152	0.055978	0.043274	0.070136
9	0.006965	0.002931	0.002931	0.002931	0.031447	0	0.029567	0	0	0.005684	0.015454	0.002931	0.002931	0	0.048012	0.049273	0.002931	0.002931	0.01435	0.008468	0.013689	0.036448	0.020372	0.028167	0.047007	0.034293	0.06118
10	0.001281	0	0	0	0.025767	0	0.023887	0	0	0	0.009771	0	0	0	0.042339	0.043601	0	0	0.008666	0.002784	0.008006	0.03077	0.01469	0.022486	0.041334	0.028614	0.055515
11	0	0	0	0	0.016	0	0.014119	0	0	0	0	0	0	0	0.032582	0.033845	0	0	0	0	0	0.021006	0.00492	0.012718	0.031576	0.018849	0.04577
12	0.004034	0	0	0	0.028518	0	0.026638	0	0	0.002753	0.012524	0	0	0	0.045087	0.046349	0	0	0.011419	0.005537	0.010759	0.033521	0.017442	0.025237	0.044082	0.031365	0.058259
13	0.004034	0	0	0	0.028518	0	0.026638	0	0	0.002753	0.012524	0	0	0	0.045087	0.046349	0	0	0.011419	0.005537	0.010759	0.033521	0.017442	0.025237	0.044082	0.031365	0.058259
14	0.009038	0.005004	0.005004	0.005004	0.033518	0	0.031638	0	0.002073	0.007757	0.017527	0.005004	0.005004	0	0.05008	0.051341	0.005004	0.005004	0.016422	0.010541	0.015762	0.038519	0.022444	0.030238	0.049075	0.036363	0.063245
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001265	0	0	0	0	0	0	0	0	0	0	0.013208
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.011944
17	0.004034	0	0	0	0.028518	0	0.026638	0	0	0.002753	0.012524	0	0	0	0.045087	0.046349	0	0	0.011419	0.005537	0.010759	0.033521	0.017442	0.025237	0.044082	0.031365	0.058259
18	0.004034	0	0	0	0.028518	0	0.026638	0	0	0.002753	0.012524	0	0	0	0.045087	0.046349	0	0	0.011419	0.005537	0.010759	0.033521	0.017442	0.025237	0.044082	0.031365	0.058259
19	0	0	0	0	0.017105	0	0.015224	0	0	0	0.001105	0	0	0	0.033685	0.034948	0	0	0	0	0	0.02211	0.006024	0.013822	0.032679	0.019953	0.046872
20	0	0	0	0	0.022985	0	0.021105	0	0	0	0.006987	0	0	0	0.03956	0.040822	0	0	0.005883	0	0.005222	0.027989	0.011906	0.019703	0.038554	0.025832	0.05274
21	0	0	0	0	0.017765	0	0.015884	0	0	0	0.001765	0	0	0	0.034345	0.035608	0	0	0.000661	0	0	0.02277	0.006685	0.014483	0.033339	0.020613	0.047531
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.011584	0.012848	0	0	0	0	0	0	0	0	0.010577	0	0.024788
23	0	0	0	0	0.011082	0	0.0092	0	0	0	0	0	0	0	0.027667	0.02893	0	0	0	0	0	0.016088	0	0.007799	0.02666	0.01393	0.040859
24	0	0	0	0	0.003283	0	0.001402	0	0	0	0	0	0	0	0.019872	0.021136	0	0	0	0	0	0.00829	0	0	0.018866	0.006132	0.033071
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.001007	0.002272	0	0	0	0	0	0	0	0	0	0	0.014215
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.013742	0.015006	0	0	0	0	0	0.002158	0	0	0.012735	0	0.026945
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

iii. Decision Maker 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0	0	0	0	0.006453	0	0.008642	0	0.00E+00	0	0	0	0	0	0.023669	0.023881	0	0	0	0	0	0.006651	0	0.004284	0.021978	6.45E-03	0.033618
2	0.024611	0	0	0	0.031059	0	0.033246	0	1.16E-02	0.019455	0.021734	0	0	0	0.048251	0.048463	0	0	0.016635	0.008904	0.011638	0.031257	0.024418	0.028892	0.046563	3.11E-02	0.058181
3	0.024611	0	0	0	0.031059	0	0.033246	0	1.16E-02	0.019455	0.021734	0	0	0	0.048251	0.048463	0	0	0.016635	0.008904	0.011638	0.031257	0.024418	0.028892	0.046563	3.11E-02	0.058181
4	0.024611	0	0	0	0.031059	0	0.033246	0	1.16E-02	0.019455	0.021734	0	0	0	0.048251	0.048463	0	0	0.016635	0.008904	0.011638	0.031257	0.024418	0.028892	0.046563	3.11E-02	0.058181
5	0	0	0	0	0	0	0.002189	0	0.00E+00	0	0	0	0	0	0.017218	0.01743	0	0	0	0	0	0.000198	0	0	0.015527	1.67E-16	0.027171
6	0.034549	0.009946	0.009946	0.009946	0.040993	0	0.043177	0.008551	2.16E-02	0.029395	0.031673	0.009946	0.009946	0.005267	0.058169	0.058381	0.009946	0.009946	0.026577	0.018848	0.021581	0.04119	0.034356	0.038826	0.056483	4.10E-02	0.068087
7	0	0	0	0	0	0	0	0	0.00E+00	0	0	0	0	0	0.01503	0.015242	0	0	0	0	0	0	0	0	0.013338	0.00E+00	0.024984
8	0.026006	0.001396	0.001396	0.001396	0.032454	0	0.03464	0	1.30E-02	0.02085	0.023128	0.001396	0.001396	0	0.049644	0.049856	0.001396	0.001396	0.01803	0.010299	0.013033	0.032651	0.025813	0.030286	0.047956	3.25E-02	0.059572
9	0.012977	0	0	0	0.019429	0	0.021616	0	0.00E+00	0.007819	0.010098	0	0	0	0.036634	0.036846	0	0	0.004998	0	0	0.019627	0.012784	0.01726	0.034945	1.94E-02	0.046575
10	0.005159	0	0	0	0.011611	0	0.0138	0	0.00E+00	0	0.00228	0	0	0	0.028824	0.029036	0	0	0	0	0	0.01181	0.004966	0.009442	0.027133	1.16E-02	0.03877
11	0.002879	0	0	0	0.009332	0	0.01152	0	0.00E+00	0	0	0	0	0	0.026546	0.026758	0	0	0	0	0	0.00953	0.002686	0.007163	0.024855	9.33E-03	0.036494
12	0.024611	0	0	0	0.031059	0	0.033246	0	1.16E-02	0.019455	0.021734	0	0	0	0.048251	0.048463	0	0	0.016635	0.008904	0.011638	0.031257	0.024418	0.028892	0.046563	3.11E-02	0.058181
13	0.024611	0	0	0	0.031059	0	0.033246	0	1.16E-02	0.019455	0.021734	0	0	0	0.048251	0.048463	0	0	0.016635	0.008904	0.011638	0.031257	0.024418	0.028892	0.046563	3.11E-02	0.058181
14	0.029287	0.004679	0.004679	0.004679	0.035734	0	0.037919	0.003284	1.63E-02	0.024132	0.02641	0.004679	0.004679	0	0.052919	0.053131	0.004679	0.004679	0.021313	0.013583	0.016316	0.035931	0.029094	0.033566	0.051231	3.57E-02	0.062843
15	0	0	0	0	0	0	0	0	0.00E+00	0	0	0	0	0	0	0.000212	0	0	0	0	0	0	0	0	0	0.00E+00	0.009958
16	0	0	0	0	0	0	0	0	0.00E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00E+00	0.009745
17	0.024611	0	0	0	0.031059	0	0.033246	0	1.16E-02	0.019455	0.021734	0	0	0	0.048251	0.048463	0	0	0.016635	0.008904	0.011638	0.031257	0.024418	0.028892	0.046563	3.11E-02	0.058181
18	0.024611	0	0	0	0.031059	0	0.033246	0	1.16E-02	0.019455	0.021734	0	0	0	0.048251	0.048463	0	0	0.016635	0.008904	0.011638	0.031257	0.024418	0.028892	0.046563	3.11E-02	0.058181
19	0.007979	0	0	0	0.014432	0	0.01662	0	0.00E+00	0.002821	0.0051	0	0	0	0.031642	0.031854	0	0	0	0	0	0.01463	0.007786	0.012262	0.029952	1.44E-02	0.041586
20	0.015711	0	0	0	0.022162	0	0.024349	0	2.73E-03	0.010553	0.012832	0	0	0	0.039365	0.039577	0	0	0.007732	0	0.002734	0.022236	0.015518	0.019993	0.037675	2.22E-02	0.049303
21	0.012977	0	0	0	0.019429	0	0.021616	0	1.11E-16	0.007819	0.010098	0	0	0	0.036634	0.036846	0	0	0.004998	0	0	0.019627	0.012784	0.01726	0.034945	1.94E-02	0.046575
22	0	0	0	0	0	0	0.00199	0	0.00E+00	0	0	0	0	0	0.01702	0.017232	0	0	0	0	0	0	0	0	0.015328	0.00E+00	0.026973
23	0.000193	0	0	0	0.006646	0	0.008835	0	0.00E+00	0	0	0	0	0	0.023862	0.024074	0	0	0	0	0	0.006844	0	0.004477	0.02217	6.65E-03	0.033811
24	0	0	0	0	0.00217	0	0.004358	0	0.00E+00	0	0	0	0	0	0.019387	0.019599	0	0	0	0	0	0.002368	0	0	0.017696	2.17E-03	0.029339
25	0	0	0	0	0	0	0	0	0.00E+00	0	0	0	0	0	0.001692	0.001904	0	0	0	0	0	0	0	0	0	0.00E+00	0.01165
26	0	0	0	0	0	0	0.002189	0	0.00E+00	0	0	0	0	0	0.017218	0.01743	0	0	0	0	0	0.000198	0	0	0.015527	0.00E+00	0.027171
27	0	0	0	0	0	0	0	0	0.00E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00E+00	0

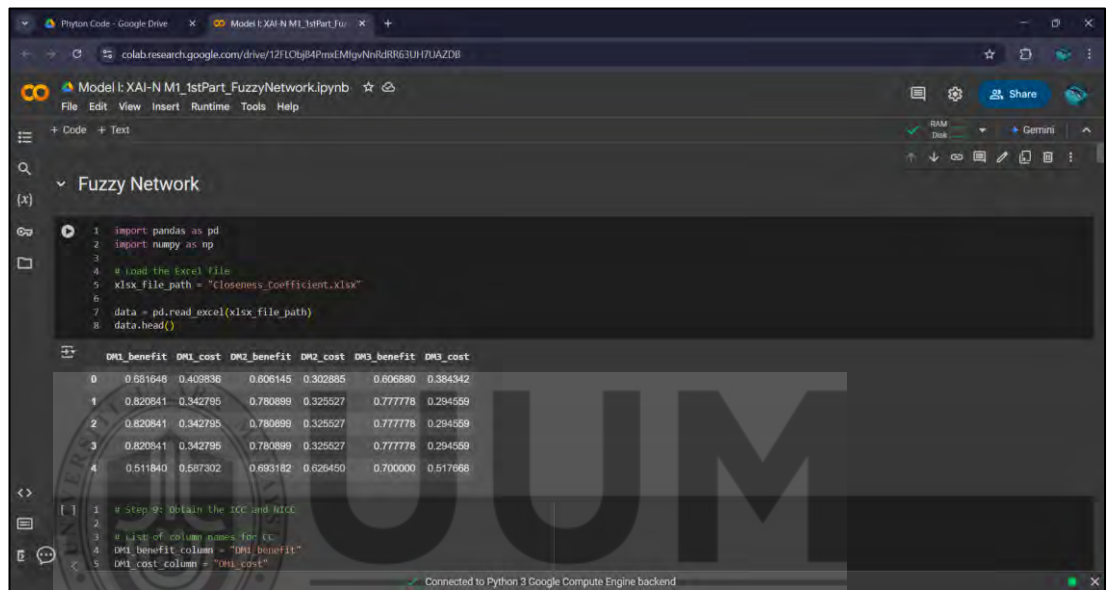
Appendix I

Python Code Sources

The python code sources for all models can be access through the following link:

https://drive.google.com/drive/folders/1b_Ii-K1bL0sJiaDdqCGlRKOHEvigaL6s?usp=sharing

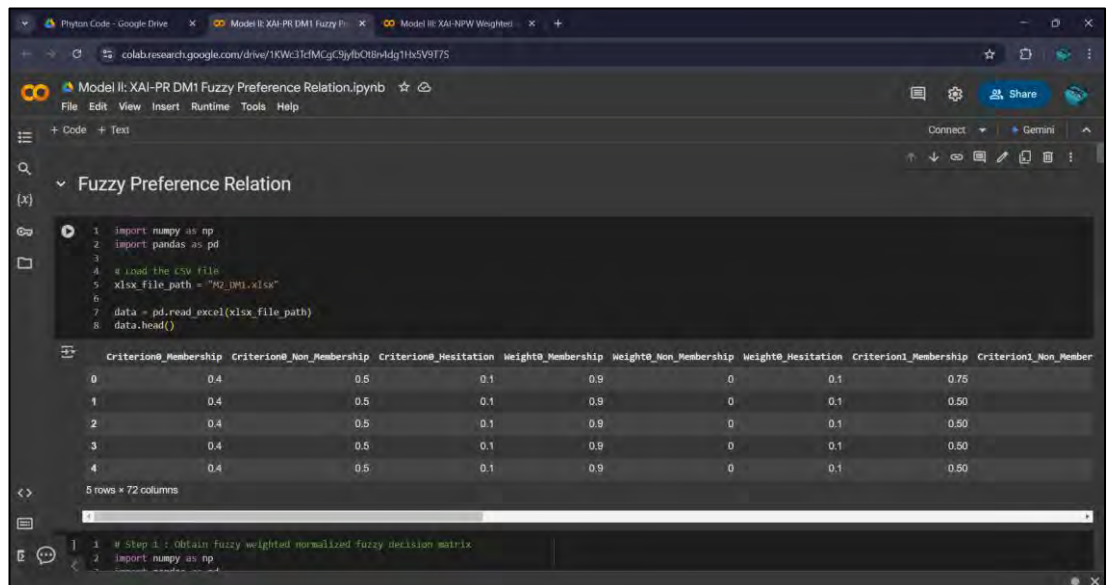
i. XAI-N model



```
1 import pandas as pd
2 import numpy as np
3
4 # load the Excel file
5 xlsx_file_path = "Closeness_Coefficient.xlsx"
6
7 data = pd.read_excel(xlsx_file_path)
8 data.head()
```

	DM1_benefit	DM1_cost	DM2_benefit	DM2_cost	DM3_benefit	DM3_cost
0	0.661648	0.409836	0.606145	0.302885	0.606880	0.384342
1	0.820841	0.342795	0.780899	0.325527	0.777778	0.294559
2	0.820841	0.342795	0.780899	0.325527	0.777778	0.294559
3	0.820841	0.342795	0.780899	0.325527	0.777778	0.294559
4	0.511840	0.587302	0.693182	0.626450	0.700000	0.517666

ii. XAI-PR model



```
1 import numpy as np
2 import pandas as pd
3
4 # load the XSV file
5 xlsx_file_path = "FQ_DM1.xlsx"
6
7 data = pd.read_excel(xlsx_file_path)
8 data.head()
```

	Criterion0_Membership	Criterion0_Non_Membership	Criterion0_Hesitation	Weight0_Membership	Weight0_Non_Membership	Weight0_Hesitation	Criterion1_Membership	Criterion1_Non_Member
0	0.4	0.5	0.1	0.9	0	0.1	0.75	
1	0.4	0.5	0.1	0.9	0	0.1	0.50	
2	0.4	0.5	0.1	0.9	0	0.1	0.50	
3	0.4	0.5	0.1	0.9	0	0.1	0.50	
4	0.4	0.5	0.1	0.9	0	0.1	0.50	

iii. XAI-NPW model

```
1 # Read Data
2 import pandas as pd
3 import numpy as np
4
5 # Load the Excel file
6 xlsx_file_path = "M1_data.xlsx"
7
8 data = pd.read_excel(xlsx_file_path)
9 data.head(27)
```

Sukuk Alternative	M1_Preference_Value	M2_Preference_Value	
0	A1	0.392208	0.962867
1	A2	0.542622	0.962200
2	A3	0.542622	0.962200
3	A4	0.542622	0.962200
4	A5	0.599318	0.963667
5	A6	0.233058	0.961967
6	A7	0.541936	0.963467
7	A8	0.222250	0.962200
8	A9	0.358870	0.962600
9	A10	0.341091	0.962867
10	A11	0.577905	0.963033

