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**A HEURISTIC EVALUATION CHECKLIST FOR MOBILE  
SHOPPING APPLICATIONS**

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**MASTER OF SCIENCE  
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## Abstrak

Kajian mengenai isu yang berkaitan dengan aplikasi beli-belah mudah alih adalah banyak, namun, terdapat ketidakcukupan dalam melaksanakan pendekatan penilaian heuristik untuk mengenal pasti dan mendokumentasikan jenis isu yang pasti sejauh klasifikasi mereka untuk aplikasi beli-belah mudah alih. Kajian terkini menunjukkan bahawa terdapat kekurangan kaedah penilaian yang betul dan kategori heuristik yang sesuai dan subkategori yang diperlukan dalam mengenal pasti isu kebolehgunaan khusus mudah alih memandangkan senarai semak sedia ada sama ada berpusatkan web atau dibangunkan untuk aplikasi mudah alih umum seperti aplikasi mudah alih media sosial dan aplikasi mudah alih utiliti, dan bukan untuk aplikasi membeli-belah mudah alih. Senarai semak sedia ada ini tidak berupaya mengenal pasti isu kebolehgunaan aplikasi beli-belah mudah alih, justeru, kajian ini bertujuan untuk menangani isu tersebut dengan mencadangkan senarai semak penilaian heuristik untuk aplikasi beli-belah mudah alih. Strategi yang digunakan dalam penilaian terdiri daripada empat fasa: mengenal pasti isu dan sasaran, pengenalan heuristik, pembangunan heuristik dan penilaian heuristik. Dua belas pakar domain mengesahkan senarai semak penilaian heuristik yang dicadangkan dan data yang dikumpul dianalisis menggunakan Kaedah Fuzzy Delphi. Kajian ini berjaya mengenal pasti kategori dan subkategori heuristik yang sesuai yang membentuk senarai semak penilaian heuristik yang dicadangkan. Selepas itu, penilaian heuristik telah dijalankan oleh enam pakar domain yang terdiri daripada pakar kebolehgunaan, perisian dan pembangun aplikasi mudah alih, serta pereka aplikasi m-belanja, dan hasilnya mengesahkan keberkesanan senarai semak penilaian heuristik yang dicadangkan dalam mengenal pasti isu kebolehgunaan yang ketara dalam Shopee. aplikasi membeli-belah mudah alih. Melalui senarai semak penilaian heuristik yang dicadangkan, pakar kebolehgunaan dan penganalisis boleh mengarahkan penilaian tepat secara dinamik bagi aplikasi beli-belah dalam talian. Dalam kaedah yang sama, pembangun perisian dan aplikasi mudah alih serta pereka beli-belah mudah alih boleh mereka bentuk antara muka yang boleh digunakan secara logik mengikut set piawaian kebolehgunaan yang akan memenuhi kepuasan pengguna.

**Kata kunci:** Penilaian kebolehgunaan, Senarai semak penilaian ceuristik, Beli-belah mudah alih

## Abstract

Studies on issues related to mobile shopping applications are numerous, however, there is inadequacy in implementing the heuristic evaluation approach to identifying and documenting definite kinds of issues as far as their classifications for mobile shopping applications. Recent studies have shown that there is a deficiency of proper evaluation methods and suitable heuristics and subheuristics needed in recognizing mobile-specific usability issues since existing checklists are either web-centered or developed for general mobile applications such as social media mobile applications and utility mobile applications, and not for mobile shopping applications. These existing checklists are incapable of identifying usability issues of mobile shopping applications; hence, this study aims to address these issues by developing a heuristic evaluation checklist for mobile shopping applications. The strategy employed in the evaluation comprises four phases: identifying problems and objectives, heuristic identification, heuristic evaluation checklist development, and heuristic checklist evaluation. Twelve domain experts verified the proposed heuristic evaluation checklist and data collected was analysed using the Fuzzy Delphi Method. The study successfully identified suitable heuristics and subheuristics that made up the proposed heuristic evaluation checklist. Subsequently, a heuristic evaluation was conducted by six domain experts comprising usability experts, software and mobile application developers, as well as mobile shopping application designers, and the results confirm the effectiveness of the proposed heuristic evaluation checklist in identifying significant usability issues in Shopee mobile shopping applications. Through the heuristic evaluation checklist, usability experts and analysts can direct a dynamically exact evaluation of online shopping applications. In the same method, software and mobile application developers as well as mobile shopping designers can logically design a usable interface following a set of usability standards that will meet users' satisfaction.

**Keywords:** Usability evaluation, Heuristic evaluation checklist, Mobile shopping.

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# CHAPTER ONE

## INTRODUCTION

### 1.0 Introduction

The word "usability" was begotten a few decades before supplanting the expression "easy to use" which by the mid-1980s had gained a large group of unfortunately obscure and abstract undertones. In any case, in the interceding years, the word usability itself has become nearly as degraded as the term it was planned to replace (Nielsen, 2010).

The International Standards Organization (ISO 9241-11, 2018) set out a more extensive definition of usability, expressing: "Usability is the degree to which an item can be utilised by indicated users to accomplish determined objectives with effectiveness, efficiency, and satisfaction in a pre-determined set of utilisation". ISO 9241-11 underscores that an item's ease of use is subjected to pre-established setting that incorporates users, tasks, and tools (equipment, programming, and items), coupled with the substantial and communal state that could affect the usability of a product. Hence, usability is a fraction of quality in use, according to ISO/IEC 25010, which states that "usability" is gotten from the term "ease of use" and cannot be significantly administered to items that are not utilised.

Usability as indicated by Nielsen (2012), "is a quality characteristic that decides how advantageous the UI maybe during the structure procedure". Nielsen (2003; 1993) and Nielsen Norman Group (2012) additionally expressed the attributes of usability as learnability, efficiency, memorability, errors, and satisfaction. It is observed as a significant factor in the advancement of numerous innovative items and software applications.

Due to the significance of these quality traits, a few usability evaluation methods have been developed, for example, systematic mapping review which incorporates the

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## **Appendix A**

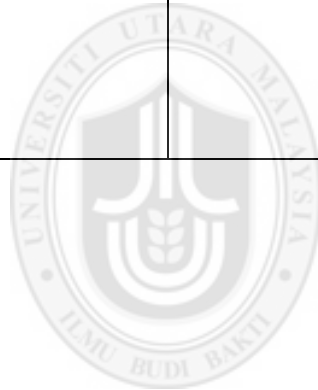
### **Usability Measures, Heuristics and Subheuristics**

The usability measures, heuristic categories and subcategories initially generated for this study through content analysis are shown below.



Usability measures	Mobile in General			m-commerce			
	Gómez et al., (2014)		Al-Khalifa et al., (2016)	Dourado and Canedo, (2018)	Ajibola and Goosen, (2017)	Salah et al., (2019)	Swaid and Suid, (2019)
Appropriateness recognisability measures	Categories	Subcategories	Subcategories	Categories	Categories	Categories	Subcategories
		Skills		Main page			
Learnability measures	Recognition rather than recall,	Memory load reduction, General visual cues Input/output data Menu's, Navigation	Help, Feedback and Error Tolerance, Data Entry, Task Orientation	Recognition and not remembering User control and freedom Correspondence between system and the real world	Recognition rather than recall, User control and freedom Match between system and the real world	User control and freedom, Translatability,	Recognition User control Help Natural-Interaction Matching real world Natural-Interaction
	User control and freedom	Explorable interfaces, Some level of personalization, Process confirmation, Undo/cancelation, Menu's control					
	Match between system and the real world	Metaphors/mental models, Navigational structure, Menu's, Simplicity, Output of numeric information					
Operability measures	Flexibility and efficiency of use	Search Navigation	Navigability Content and Search	Efficiency of use and performance, Help and documentation Customization and Shortcuts	Flexibility and efficiency of use, Help and documentation	Adaptability and control	Flexibility and efficient use Performance Dynamic-Engagement
	Help and documentation						
User error protection measures	Error prevention	Fat-finger syndrome		Error prevention	Error prevention		Error prevention Diagnose-and-Recover
User interface aesthetics measures	Visibility of system status,	System status feedback, Location information, Response time, Selection/input of data, Presentation adaptation	Page Layout and Visual Design	Visibility of system status	Visibility of system status, Aesthetic and minimalist design Visibility of 'Add to Cart' on each product page Images or product information on different subpages	Visual design	Visibility Minimal design
	Aesthetic and minimalist design	Multimedia content Icons Menu's Orientation Navigation					
Functionality measures	Help users recognise, diagnose, and recover from errors			Help users recognise, diagnose, and recover from errors	Help users recognise, diagnose, and recover from errors	Search and findability	
Reliability measures	Pleasurable and respectful interaction with the user			Pleasant and respectful interaction with the user	Consistency and standards		

	Consistency and standards	Design consistency; Menu's and Input fields, Naming convention consistency Menu's/task consistency Functional goals consistency System response consistency Orientation		Consistency and standards			
<b>Maintainability measures</b>				. Minimize User Memory load			
<b>Portability measures</b>							
<b>Security measures</b>	Privacy		Trust and Credibility	Privacy	Privacy and security		





	Website e-commerce						General studies						
Usability measures	Hasan et al., (2012)		Goh et al., (2013)	Beyk. (2015)	Panda et al., (2015)		Diaz et al., (2016)	Moumane et al., (2016)/ (ISO 9126-1 2001)	ISO 9126-1 (1991)	ISO 9241-11:1998	ISO/IEC FDIS 25010:2011	ISO/IEC 25023:2016	Nielsen Usability Principles
	Categories	Subcategories	Categories	Categories	Categories	Subcategories	Categories	Categories	Categories	Categories	Categories	Subcategories	Categories
<b>Appropriateness recognisability measures</b>			Visual lucidity	Content relevance	Content	Up-to-date Information, Relevant information, No under construction page, True information, The shopping information, Company information, Product information						Description Completeness, Demonstration Coverage, Entry point self-descriptiveness	
<b>Learnability measures</b>		Up-to-date information; Relevant information; Accurate information; Grammatical accuracy; Information about the company; Information about the products	Language and content, Client direction and backing, Route, Enlightening input	Learnability, Interactivity, Readability			Recognition rather than recall, User control and freedom, Match between system and the real world,	Learnability		Satisfaction	Satisfaction, Context inclusion	User guidance Completeness, Entry fields Defaults, Error messages Understandability, Self-explanatory user interface	Recognition rather than recall, User control and freedom, Match between system and the real world,
	Content												
	Accessibility and customer service	Easy to find and access website; Contact us information; Help/customer service; Compatibility; Foreign language and currency support.											Flexibility and efficiency of use
<b>Operability measures</b>	Purchasing process	Easy order process; Ordering information; Delivery information; Order/delivery status provision; Alternative methods of ordering/ payment/delivery are available; Reasonable confidence in security and privacy	Adaptability and control	Simplicity, Supportability, Navigability	Ease of use	Link support Link support Search result No misleading links, No Broken Links No Orphan Pages	Flexibility and efficiency of use	Understandability, Operability	Usability, Effectiveness	Effectiveness	Effectiveness	Operational Message clarity, User interface Customizability, Monitoring Capability, Undo Capability, Understandable categorization of information, Input device Support.	
<b>User error protection measures</b>							Error prevention,			Efficiency	Efficiency, Freedom from risks	Avoidance of user operation error, User entry error correction,	Error prevention

							The information structure					User error recoverability	
						Architecture of a site, No depth structure, Link path							Visibility of system status, Aesthetic and minimalist design
<b>User interface aesthetics measures</b>		Aesthetic design; Appropriate use of images; Appropriate choice of fonts and colours; Appropriate page design			Structure	Attractiveness of sites, Images displayed, Fonts are clear, Color combination, Page structure, Consistency	Visibility of system status, Aesthetic and minimalist design					Appearance aesthetics of user interfaces	
	Design				Design			Attractiveness					
<b>Functionality measures</b>		Consistency; navigation support; internal search; working links; resourceful pages; logical structure of site; simple navigation menu					Help users recognise, diagnose, and recover from errors					Functional customizability	Help users recognise, diagnose, and recover from errors
	Architecture and navigation			Telepresence									
<b>Reliability measures</b>		Usefulness, Consistency and standards					Consistency and standards, Accurate and detailed results					Appearance Consistency, Consistency	Consistency and standards
				Credibility, Consistency									
<b>Maintainability measures</b>							Help and documentation,						Help and Documentation
<b>Portability measures</b>													
<b>Security measures</b>													

## Appendix B

### The Verification Form

The verification form/review questionnaire: <https://forms.gle/9Frz53x1rj2BmiQt8>

The screenshot shows a Google Forms interface. At the top, there are tabs for 'Questions', 'Responses' (with a count of 12), and 'Settings'. Below the tabs, it says 'Section 1 of 18'. The main content area contains the following text:

**EXPERT REVIEW HEURISTIC EVALUATION CHECKLIST VERIFICATION FORM: A Heuristics Evaluation Checklist for M-Shopping Applications**

Expert Request for Nomination Letter

Dear Prof/Dr/Sir/Madam,

My name is Ihediohanna Raphael Uzoma, an M.Sc. research student of Information Technology (IT) specializing in Mobile Human Computer Interaction (MHCI) at Universiti Utara Malaysia.

My intention is to request you on being the nominee for expert review in verifying the newly developed heuristics evaluation checklist in my research. The developed heuristics evaluation checklist is intended to be implemented in the evaluation of m-shopping applications interface.

The heuristics evaluation checklist needs to be reviewed in order to verify that the checklist is constructed with appropriate heuristics/sub-heuristics, satisfactory, and align with the intention of the proposed heuristic evaluation checklist. The constructed heuristics evaluation checklist is aimed to guide usability experts in evaluating the usability of the m-shopping applications.

Kindly accept my request and review questionnaire as well as the heuristics evaluation checklist constructed with the descriptions and all the information will be sent to you in guiding this expert review process. All the information will be used only for the purpose of the research, please feel free to give any suggestion after the review. This evaluation will need between 20 to 25 minutes of your time.

Thank you for your time and co-operation.

Ihediohanna Raphael Uzoma  
+60164476628  
ihediralph@gmail.com  
M.Sc. Research Student, Universiti Utara Malaysia

Below the text is an email input field with the label 'Email \*' and a placeholder 'Valid email address'. At the bottom of the form, there is a note: 'This form is collecting email addresses. [Change settings](#)'.

At the very bottom of the page, there is a navigation bar with the text 'After section 1 Continue to next section' and a right-pointing arrow.

## PART B: Instruments of Measurement Verification

This section will be verifying the consistency of flow between the evaluation questions and the selected heuristics/sub-heuristics in the proposed heuristic evaluation checklist. It contains the evaluation questions and the list of selected heuristics/sub-heuristics for the evaluation of m-shopping applications. The heuristics evaluation checklist needs to be reviewed in order to verify that the checklist is constructed with appropriate heuristics/sub-heuristics, satisfactory, and align with the intention of the proposed heuristic evaluation checklist. Kindly verify with 5 - Likert Scale responds and provide suggestion where applicable.

There are ELEVEN heuristics and their accompanying sub-heuristics (SH) in the checklist. These heuristics and sub-heuristics were selected through the content analysis of previous studies such as Nielsen, (1994), Gómez et al., (2014), and ISO/IEC 25023 (2016). The selected heuristics and sub-heuristics are rearranged and structured to be suitable for the evaluation of m-shopping applications. The evaluation questions are carefully derived and placed under each heuristic and sub-heuristic so that the purpose of this study will be achieved.

A complete description of the proposed heuristic evaluation checklist can be downloaded below for your reference :

[https://drive.google.com/file/d/1hbVm\\_VXineqdbfeb-1fiikHSHqctZccT/view](https://drive.google.com/file/d/1hbVm_VXineqdbfeb-1fiikHSHqctZccT/view)

The verification will be accomplished using the 5 - Likert Scale: (5=Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree)

On each item, please tick on the scale accordingly. The estimated time to complete the questionnaire is 1h 15mins.

After section 4: Continue to next section

### Heuristics 1 – Recognition rather than recall (H1)

Minimizing the user's memory load by making objects, actions, and options visible or easily retrievable whenever appropriate

H1 - 1: Is it necessary to concentrate and remember information in the m-shopping applications throughout several responses?

Strongly Disagree      1      2      3      4      5      Strongly Agree

## Appendix C

### Feedbacks from Respondents

Table C1

EXPERT	ITEMS								
	H1 - 1	H1 - 2	H1 - 3	H1SH1 - 1	H1SH1 - 2	H1SH1 - 3	H1SH2 - 1	H1SH2 - 2	H1SH2 - 3
1	5	4	2	4	4	5	5	5	5
2	4	3	5	5	4	3	5	5	5
3	4	4	5	4	4	4	4	4	4
4	5	2	2	2	2	2	3	4	2
5	4	5	5	5	5	4	4	4	4
6	4	4	5	3	4	4	4	3	4
7	5	5	5	5	5	5	5	5	5
8	4	4	4	3	4	2	2	2	4
9	2	5	5	4	5	3	4	2	5
10	4	3	4	5	5	4	4	4	5
11	5	2	5	5	3	5	5	3	4
12	2	4	5	5	4	5	5	2	2

Table C2

H2 - 1	H2 - 2	H2 - 3	H2SH1 - 1	H2SH1 - 2	H2SH1 - 3	H2SH2 - 1	H2SH2 - 2	H2SH2 - 3	H2SH3 - 1	H2SH3 - 2
5	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	4	5	5	5
5	4	5	3	5	4	4	5	4	5	5
2	2	2	4	2	2	1	2	2	2	2
4	4	4	4	4	4	4	4	3	4	4
4	5	4	5	4	4	4	4	4	3	5
5	5	5	5	5	5	5	5	5	5	5
4	4	3	4	4	4	4	4	3	4	4
4	5	4	4	3	3	4	4	3	3	3
5	5	4	5	4	3	5	4	4	5	5
4	5	3	4	5	3	5	4	3	4	5
5	5	4	4	5	4	4	4	3	2	4

Table C3

H3 - 1	H3 - 2	H3 - 3	H3SH1 - 1	H3SH1 - 2	H3SH2 - 1	H3SH2 - 2	H3SH2 - 3
5	5	5	5	5	5	5	5
5	5	5	5	4	5	4	5
5	4	5	5	5	5	4	5
4	4	2	2	2	2	2	2

5	4	4	3	4	4	2	4
3	3	4	3	3	4	4	5
5	5	5	5	5	5	5	5
4	3	5	4	4	5	5	4
5	5	4	4	4	3	3	4
5	4	5	4	5	5	4	5
5	5	5	3	4	4	5	4
5	4	4	3	5	5	4	5

Table C4

H4 - 1	H4 - 2	H4 - 3	H4SH1 - 1	H4SH1 - 2	H4SH1 - 3	H4SH2 - 1	H4SH2 - 2	H4SH2 - 3
5	5	5	5	5	5	5	5	5
5	4	5	4	4	5	5	5	4
5	4	4	5	5	5	4	3	3
2	2	2	2	2	2	4	2	2
3	3	3	5	5	5	1	4	3
3	3	4	4	4	4	4	3	4
5	5	5	5	5	5	5	5	5
4	4	5	4	5	4	4	4	4
5	4	3	4	3	4	3	3	3
4	3	4	5	5	5	5	5	5
5	1	4	5	5	4	5	5	4
4	1	2	5	5	5	5	5	5

Table C5

H5 - 1	H5 - 2	H5 - 3	H5SH1 - 1	H5SH1 - 2	H5SH1 - 3	H5SH2 - 1	H5SH2 - 2	H5SH2 - 3
5	5	5	5	5	5	5	5	5
5	4	4	5	5	5	5	5	5
5	5	5	5	5	5	3	5	4
2	2	4	2	2	2	2	2	1
4	4	2	4	4	4	4	4	4
5	5	4	5	4	5	3	4	3
5	5	5	5	5	5	5	5	5
4	4	2	4	4	2	2	3	2
4	3	3	4	3	3	4	3	3
5	4	5	5	4	5	4	5	4
5	5	4	4	4	3	4	3	3
5	4	5	4	5	4	4	4	4

Table C6

H6 - 1	H6 - 2	H6 - 3	H6SH1 - 1	H6SH1 - 2	H6SH1 - 3	H6SH2 - 1	H6SH2 - 2	H6SH2 - 3
5	5	5	5	5	5	5	5	5

5	5	5	5	4	5	4	5	5
5	5	5	4	5	5	3	4	5
2	2	5	1	1	2	1	2	2
2	4	2	4	4	3	1	4	4
2	3	2	3	4	3	2	4	4
5	5	5	5	5	5	5	5	5
1	1	2	3	2	2	3	2	3
4	4	3	3	3	5	5	2	4
4	5	4	5	5	4	4	5	4
4	4	3	5	5	4	5	5	5
2	4	4	4	2	4	5	4	5

Table C7

H7 -1	H7 -2	H7 -3	H7SH1 -1	H7SH1 -2	H7SH1 -3	H7SH2 -1	H7SH2 -2	H7SH2 -3	H7SH3 -1	H7SH3 -2	H7SH3 -3
5	5	5	5	5	5	5	5	5	5	5	5
5	5	4	5	5	5	5	5	5	5	5	4
4	4	4	5	5	5	5	5	5	5	5	5
1	1	1	2	2	1	2	2	1	2	2	2
4	4	4	4	4	4	4	4	4	4	4	4
3	4	4	4	3	2	4	4	5	4	4	5
5	5	5	5	5	5	5	5	5	5	5	5
3	4	4	3	2	3	3	4	4	4	4	4
5	5	4	4	3	4	3	4	4	3	4	3
4	5	3	5	5	5	4	5	5	4	5	5
5	4	2	5	4	4	5	4	5	3	2	4
5	4	2	5	5	4	4	4	5	5	4	4

Table C8

H8 -1	H8 -2	H8SH1 -1	H8SH1 -2	H8SH1 -3	H8SH2 -1	H8SH2 -2	H8SH2 -3	H8SH3 -1	H8SH3 -2	H8SH3 -3
5	5	5	5	5	5	5	5	5	5	5
5	4	5	5	4	4	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5
2	2	2	1	2	2	2	2	2	2	2
4	4	3	4	4	3	2	4	4	4	4
5	3	2	3	5	4	4	4	4	4	5
5	5	5	5	5	5	5	5	5	5	5
3	4	4	4	4	4	4	5	5	5	4
3	5	5	5	3	3	5	5	5	5	3
4	5	5	5	5	4	5	5	5	4	4
5	5	5	3	5	3	4	4	5	4	4
4	4	4	4	5	4	2	4	5	5	4

Table C9

H9 - 1	H9 - 2	H9SH1 -1	H9SH1 -2	H9SH1 -3	H9SH2 - 1	H9SH2 - 2	H9SH2 - 3
5	5	5	5	5	5	5	5
5	5	5	4	5	5	5	5
3	3	3	3	4	4	2	5
2	2	1	2	2	2	2	2
5	5	4	3	4	3	3	4
3	5	4	4	5	5	5	4
5	5	5	5	5	5	5	5
5	4	4	4	4	3	2	4
4	5	5	3	3	3	4	3
4	5	5	5	5	4	5	5
5	5	5	4	4	4	4	4
4	4	4	4	5	4	5	5

Table C10

H10 - 1	H10 - 2	H10 - 3	H10SH1- 1	H10SH1- 2	H10SH1- 3	H10SH2- 1	H10SH2- 2	H10SH2- 3	H10SH3- 1	H10SH3- 2
5	5	5	5	5	5	5	5	5	5	5
5	5	4	5	5	5	5	5	5	4	4
4	4	4	4	4	4	4	4	4	4	4
2	2	2	2	2	2	2	2	2	2	2
4	4	4	4	4	4	4	4	4	5	4
3	2	5	4	5	4	4	3	3	4	4
5	5	5	5	5	5	5	5	5	5	5
4	5	5	4	4	3	4	5	4	2	4
4	2	4	3	4	4	3	4	4	5	5
4	5	3	4	5	5	4	4	4	4	3
5	5	3	3	4	4	5	5	1	4	4
4	4	4	5	5	5	4	5	3	4	5

Table C11

H11 - 1	H11 - 2	H11SH1- 1	H11SH1- 2	H11SH1- 3	H11SH2- 1	H11SH2- 2	H11SH3- 1	H11SH3- 2	H11SH3- 3
5	5	5	5	5	5	5	5	5	5
5	4	5	4	5	5	5	5	5	5
5	5	4	4	4	3	3	4	4	4
1	2	2	2	2	1	1	1	1	1
5	4	4	5	4	4	4	4	4	4
4	4	4	3	3	2	3	3	2	4
5	5	5	5	5	5	5	5	5	5
1	2	2	4	4	1	4	2	2	4
4	5	4	5	4	4	4	4	4	4
5	4	4	4	4	4	4	4	4	5
5	5	4	5	5	4	4	5	5	5
4	5	4	5	5	4	5	5	4	5



## Appendix D

### Average Fuzzy Value (m1, m2, m3)

Table D1

	ITEMS								
EXPERTS		H1 - 1			H1 - 2			H1 - 3	
	n1	n2	n3						
1	0.6	0.8	1.0	0.4	0.6	0.8	0.0	0.2	0.4
2	0.4	0.6	0.8	0.2	0.4	0.6	0.6	0.8	1.0
3	0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
4	0.6	0.8	1.0	0.0	0.2	0.4	0.0	0.2	0.4
5	0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
6	0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
7	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
8	0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
9	0.0	0.2	0.4	0.6	0.8	1.0	0.6	0.8	1.0
10	0.4	0.6	0.8	0.2	0.4	0.6	0.4	0.6	0.8
11	0.6	0.8	1.0	0.0	0.2	0.4	0.6	0.8	1.0
12	0.0	0.2	0.4	0.4	0.6	0.8	0.6	0.8	1.0
	m1	m2	m3						
AVERAGE	0.400	0.600	0.800	0.350	0.550	0.750	0.466	0.666	0.866

Table D2

	H1SH1-1			H1SH1 - 2			H1SH1 - 3	
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8	0.0	0.2	0.4
0.4	0.6	0.8	0.6	0.8	1.0	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.2	0.4	0.6	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.433	0.633	0.833	0.416	0.616	0.816	0.366	0.566	0.766

Table D3

	H1SH2 - 1			H1SH2 - 2			H1SH2 - 3	
--	-----------	--	--	-----------	--	--	-----------	--

0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.4	0.6	0.8	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.4	0.6	0.8
0.4	0.6	0.8	0.0	0.2	0.4	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.0	0.2	0.4	0.0	0.2	0.4
0.433	0.633	0.833	0.316	0.516	0.716	0.416	0.616	0.816

Table D4

	H2 -1			H2 -2			H2 -3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.466	0.666	0.866	0.500	0.700	0.900	0.400	0.600	0.800

Table D5

	H2SH1 – 1			H2SH1 – 2			H2SH1 – 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8

0.466	0.666	0.866	0.450	0.650	0.850	0.366	0.566	0.766
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Table D6

	H2SH2 - 1			H2SH2 - 2			H2SH2 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.0	0.0	0.2	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.450	0.633	0.833	0.416	0.616	0.816	0.333	0.533	0.733

Table D7

	H2SH3 -1			H2SH3 -2	
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0
0.0	0.2	0.4	0.4	0.6	0.8
0.383	0.583	0.783	0.466	0.666	0.866

Table D8

	H3 - 1			H3 - 2			H3 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.0	0.2	0.4
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.2	0.4	0.6	0.4	0.6	0.8

0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.2	0.4	0.6	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.533	0.733	0.933	0.450	0.650	0.850	0.483	0.683	0.883

Table D9

	H3SH1 - 1			H3SH1 - 2	
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4
0.2	0.4	0.6	0.4	0.6	0.8
0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8
0.2	0.4	0.6	0.6	0.8	1.0
0.366	0.566	0.766	0.433	0.633	0.833

Table D10

	H3SH2 - 1		H3SH2 - 2		H3SH2 - 3			
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.0	0.2	0.4	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.2	0.4	0.6	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.466	0.666	0.866	0.383	0.583	0.783	0.483	0.683	0.883

Table D11

	H4 - 1		H4 - 2		H4 - 3			
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0

0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.2	0.4	0.6	0.2	0.4	0.6	0.2	0.4	0.6
0.2	0.4	0.6	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.0	0.0	0.2	0.4	0.6	0.8
0.4	0.6	0.8	0.0	0.0	0.2	0.0	0.2	0.4
0.433	0.633	0.833	0.283	0.450	0.650	0.366	0.566	0.766

Table D12

	H4SH1 - 1			H4SH1 - 2			H4SH1 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.483	0.683	0.883	0.483	0.683	0.883	0.483	0.683	0.883

Table D13

	H4SH2 - 1			H4SH2 - 2			H4SH2 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.4	0.6	0.8	0.0	0.2	0.4	0.0	0.2	0.4
0.0	0.0	0.2	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0

0.450	0.633	0.833	0.416	0.616	0.816	0.383	0.583	0.783
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Table D14

	H5 - 1			H5 - 2			H5 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.0	0.2	0.4
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.0	0.2	0.4
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.500	0.700	0.900	0.433	0.633	0.833	0.400	0.600	0.800

Table D15

	H5SH1 - 1			H5SH1 - 2			H5SH1 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.0	0.2	0.4
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.466	0.666	0.866	0.433	0.633	0.833	0.400	0.600	0.800

Table D16

	H5SH2 - 1			H5SH2 - 2			H5SH2 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.6	0.8	1.0	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.0	0.2
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8

0.2	0.4	0.6	0.4	0.6	0.8	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.2	0.4	0.6	0.0	0.2	0.4
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.350	0.550	0.750	0.400	0.600	0.800	0.333	0.516	0.716

Table D17

	H6 - 1			H6 - 2			H6 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.6	0.8	1.0
0.0	0.2	0.4	0.4	0.6	0.8	0.0	0.2	0.4
0.0	0.2	0.4	0.2	0.4	0.6	0.0	0.2	0.4
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.0	0.2	0.4	0.4	0.6	0.8	0.4	0.6	0.8
0.300	0.483	0.683	0.400	0.583	0.783	0.350	0.550	0.750

Table D18

	H6SH1 - 1			H6SH1 - 2			H6SH1 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.2	0.4	0.6	0.4	0.6	0.8	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.0	0.2	0.4	0.0	0.2	0.4
0.2	0.4	0.6	0.2	0.4	0.6	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.0	0.2	0.4	0.4	0.6	0.8
0.400	0.583	0.783	0.366	0.550	0.750	0.383	0.583	0.783

Table D19

	H6SH2 - 1			H6SH2 - 2			H6SH2 - 3	
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0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8	0.6	0.8	1.0
0.0	0.0	0.2	0.0	0.2	0.4	0.0	0.2	0.4
0.0	0.0	0.2	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.0	0.2	0.4	0.2	0.4	0.6
0.6	0.8	1.0	0.0	0.2	0.4	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.350	0.516	0.716	0.383	0.583	0.783	0.450	0.650	0.850

Table D20

	H7 - 1			H7 - 2			H7 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.2
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.2	0.4	0.6
0.6	0.8	1.0	0.4	0.6	0.8	0.0	0.2	0.4
0.6	0.8	1.0	0.4	0.6	0.8	0.0	0.2	0.4
0.433	0.616	0.816	0.450	0.633	0.833	0.316	0.500	0.700

Table D21

	H7SH1 - 1			H7SH1 - 2			H7SH1 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.0	0.2
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.0	0.2	0.4
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.0	0.2	0.4	0.2	0.4	0.6
0.4	0.6	0.8	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8



0.466	0.666	0.866	0.400	0.600	0.800	0.400	0.583	0.783

Table D22

	H7SH2 - 1			H7SH2 - 2			H7SH2 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.0	0.2
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.416	0.616	0.816	0.450	0.650	0.850	0.500	0.683	0.883

Table D23

	H7SH3 - 1			H7SH3 - 2			H7SH3 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.0	0.2	0.4	0.4	0.6	0.8
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.416	0.616	0.816	0.416	0.616	0.816	0.433	0.633	0.833

Table D24

	H8 - 1			H8 - 2	
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4

0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8
0.2	0.4	0.6	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8
0.433	0.633	0.833	0.450	0.650	0.850

Table D25

	H8SH1 - 1			H8SH1 - 2			H8SH1 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.0	0.2	0.0	0.2	0.4
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.2	0.4	0.6	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.2	0.4	0.6	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.433	0.633	0.833	0.433	0.616	0.816	0.466	0.666	0.866

Table D26

	H8SH2 - 1			H8SH2 - 2			H8SH2 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.2	0.4	0.6	0.0	0.2	0.4	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.2	0.4	0.6	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.0	0.2	0.4	0.4	0.6	0.8
0.366	0.566	0.766	0.400	0.600	0.800	0.483	0.683	0.883

Table D27

	H8SH3 – 1			H8SH3 – 2			H8SH3 – 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.2	0.4	0.6
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.483	0.683	0.883	0.483	0.683	0.883	0.433	0.633	0.833

Table D28

	H9 - 1			H9 - 2	
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.2	0.4	0.6
0.0	0.2	0.4	0.0	0.2	0.4
0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8
0.433	0.633	0.833	0.483	0.683	0.883

Table D29

	H9SH1 – 1			H9SH1 – 2			H9SH1 – 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.2	0.4	0.6	0.2	0.4	0.6	0.4	0.6	0.8
0.0	0.0	0.2	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.2	0.4	0.6	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8

0.6	0.8	1.0	0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	0.6
0.450	0.633	0.833	0.366	0.566	0.766	0.450	0.650	0.850

Table D30

	H9SH2 – 1			H9SH2 – 2			H9SH2 – 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.0	0.2	0.4	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.2	0.4	0.6	0.2	0.4	0.6	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.4	0.0	0.2	0.4	0.4	0.6	0.8
0.2	0.4	0.6	0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.383	0.583	0.783	0.383	0.583	0.783	0.450	0.650	0.850

Table D31

	H10 - 1			H10 - 2			H10 - 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.0	0.2	0.4	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.0	0.2	0.4	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.2	0.4	0.6
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.416	0.616	0.816	0.400	0.600	0.800	0.400	0.600	0.800

Table D32

	H10SH1– 1			H10SH1– 2			H10SH1– 3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0

0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.2	0.4	0.6
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.400	0.600	0.800	0.466	0.666	0.866	0.433	0.633	0.833

Table D33

	H10SH2-1			H10SH2-2			H10SH2-3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.0	0.0	0.2
0.4	0.6	0.8	0.6	0.8	1.0	0.2	0.4	0.6
0.416	0.616	0.816	0.450	0.650	0.850	0.350	0.533	0.733

Table D34

	H10SH3-1			H10SH3-2	
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4
0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.2	0.4	0.6
0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0
0.400	0.600	0.800	0.416	0.616	0.816

Table D35

	H11 - 1			H11 - 2	
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.0	0.2	0.0	0.2	0.4
0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.0	0.2	0.0	0.2	0.4
0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0
0.450	0.616	0.816	0.433	0.633	0.833

Table D36

	H11SH1-1			H11SH1-2			H11SH1-3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.2	0.4	0.6	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0
0.383	0.583	0.783	0.450	0.650	0.850	0.433	0.633	0.833

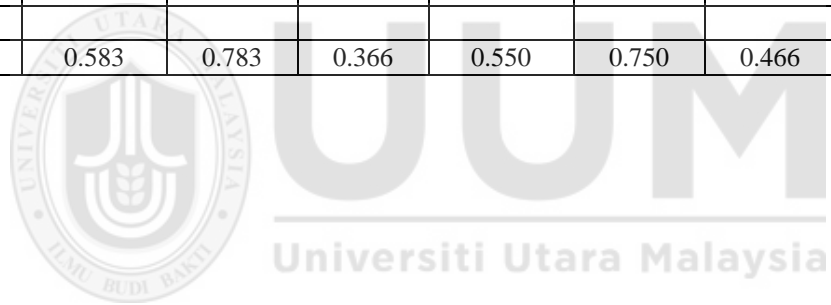
Table D37

	H11SH2-1			H11SH2-2	
0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0
0.2	0.4	0.6	0.2	0.4	0.6
0.0	0.0	0.2	0.0	0.0	0.2
0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.2	0.4	0.2	0.4	0.6
0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.0	0.2	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8

0.4	0.6	0.8	0.6	0.8	1.0
0.333	0.500	0.700	0.400	0.583	0.783

Table D38

	H11SH3-1			H11SH3-2			H11SH3-3	
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.2
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.2	0.4	0.6	0.0	0.2	0.4	0.4	0.6	0.8
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.0	0.2	0.4	0.0	0.2	0.4	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
0.4	0.6	0.8	0.4	0.6	0.8	0.6	0.8	1.0
0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
0.6	0.8	1.0	0.4	0.6	0.8	0.6	0.8	1.0
0.400	0.583	0.783	0.366	0.550	0.750	0.466	0.650	0.850



## Appendix E

### Threshold (d) Representation

Table E1

Items Experts	H1 - 1	H1 - 2	H1 - 3	H1SH1 - 1	H1SH1 - 2	H1SH1 - 3	H1SH2 - 1	H1SH2 - 2	H1SH2 - 3
1	0.103	0.006	0.560	0.003	0.001	0.141	0.072	0.208	0.087
2	0.000	0.058	0.046	0.072	0.001	0.071	0.072	0.208	0.087
3	0.000	0.006	0.046	0.003	0.001	0.003	0.003	0.018	0.001
4	0.103	0.316	0.560	0.483	0.446	0.345	0.140	0.018	0.446
5	0.000	0.161	0.046	0.072	0.087	0.003	0.003	0.018	0.001
6	0.000	0.006	0.046	0.140	0.001	0.003	0.003	0.035	0.001
7	0.103	0.161	0.046	0.072	0.087	0.141	0.072	0.208	0.087
8	0.000	0.006	0.011	0.140	0.001	0.345	0.483	0.257	0.001
9	0.412	0.161	0.046	0.003	0.087	0.071	0.003	0.257	0.087
10	0.000	0.058	0.011	0.072	0.087	0.003	0.003	0.018	0.087
11	0.103	0.316	0.046	0.072	0.120	0.141	0.072	0.035	0.001
12	0.412	0.006	0.046	0.072	0.001	0.141	0.072	0.257	0.446
d value for each item	1.237	1.263	1.512	1.203	0.919	1.409	0.997	1.538	1.332

Table E2

H2 - 1	H2 - 2	H2 - 3	H2SH1 - 1	H2SH1 - 2	H2SH1 - 3	H2SH2 - 1	H2SH2 - 2	H2SH2 - 3	H2SH3 - 1	H2SH3 - 2
0.046	0.026	0.103	0.046	0.058	0.141	0.069	0.087	0.184	0.121	0.046
0.046	0.026	0.103	0.046	0.058	0.141	0.069	0.001	0.184	0.121	0.046
0.046	0.026	0.103	0.182	0.058	0.003	0.004	0.087	0.012	0.121	0.046
0.560	0.644	0.412	0.011	0.522	0.345	0.918	0.446	0.286	0.378	0.560
0.011	0.026	0.000	0.011	0.006	0.003	0.004	0.001	0.046	0.001	0.011
0.011	0.026	0.000	0.046	0.006	0.003	0.004	0.001	0.012	0.086	0.046
0.046	0.026	0.103	0.046	0.058	0.141	0.069	0.087	0.184	0.121	0.046
0.011	0.026	0.103	0.011	0.006	0.003	0.004	0.001	0.046	0.001	0.011
0.011	0.026	0.000	0.011	0.161	0.071	0.004	0.001	0.046	0.086	0.182
0.046	0.026	0.000	0.046	0.006	0.071	0.069	0.001	0.025	0.121	0.046
0.011	0.026	0.103	0.011	0.058	0.071	0.069	0.001	0.046	0.001	0.046
0.046	0.026	0.000	0.011	0.058	0.003	0.004	0.001	0.046	0.378	0.011
0.893	0.928	1.031	0.481	1.055	0.997	1.284	0.713	1.113	1.538	1.100

Table E3

H3 - 1	H3 - 2	H3 - 3	H3SH1 - 1	H3SH1 - 2	H3SH2 - 1	H3SH2 - 2	H3SH2 - 3
0.012	0.058	0.035	0.141	0.072	0.046	0.121	0.035
0.012	0.058	0.035	0.141	0.003	0.046	0.001	0.035
0.012	0.006	0.035	0.141	0.072	0.046	0.001	0.035
0.046	0.006	0.601	0.345	0.483	0.560	0.378	0.601



0.012	0.006	0.018	0.071	0.003	0.011	0.378	0.018
0.286	0.161	0.018	0.071	0.140	0.011	0.001	0.035
0.012	0.058	0.035	0.141	0.072	0.046	0.121	0.035
0.046	0.161	0.035	0.003	0.003	0.046	0.121	0.018
0.012	0.058	0.018	0.003	0.003	0.182	0.086	0.018
0.012	0.006	0.035	0.003	0.072	0.046	0.001	0.035
0.012	0.058	0.035	0.071	0.003	0.011	0.121	0.018
0.012	0.006	0.018	0.071	0.072	0.046	0.001	0.035
0.481	0.644	0.919	1.203	0.997	1.100	1.332	0.919

Table E4

H4 - 1	H4 - 2	H4 - 3	H4SH1 - 1	H4SH1 - 2	H4SH1 - 3	H4SH2 - 1	H4SH2 - 2	H4SH2 - 3
0.072	0.303	0.141	0.035	0.035	0.035	0.069	0.087	0.121
0.072	0.053	0.141	0.018	0.018	0.035	0.069	0.087	0.001
0.072	0.053	0.003	0.035	0.035	0.035	0.004	0.120	0.086
0.483	0.171	0.345	0.601	0.601	0.601	0.004	0.446	0.378
0.140	0.009	0.071	0.035	0.035	0.035	0.918	0.001	0.086
0.140	0.009	0.003	0.018	0.018	0.018	0.004	0.120	0.001
0.072	0.303	0.141	0.035	0.035	0.035	0.069	0.087	0.121
0.003	0.053	0.141	0.018	0.035	0.018	0.004	0.001	0.001
0.072	0.053	0.071	0.018	0.206	0.018	0.145	0.120	0.086
0.003	0.009	0.003	0.035	0.035	0.035	0.069	0.087	0.121
0.072	0.451	0.003	0.035	0.035	0.018	0.069	0.087	0.001
0.003	0.451	0.345	0.035	0.035	0.035	0.069	0.087	0.121
1.203	1.918	1.409	0.919	1.125	0.919	1.490	1.332	1.125

Table E5

H5 - 1	H5 - 2	H5 - 3	H5SH1 - 1	H5SH1 - 2	H5SH1 - 3	H5SH2 - 1	H5SH2 - 2	H5SH2 - 3
0.026	0.072	0.103	0.046	0.072	0.103	0.161	0.103	0.202
0.026	0.003	0.000	0.046	0.072	0.103	0.161	0.103	0.202
0.026	0.072	0.103	0.046	0.072	0.103	0.058	0.103	0.017
0.644	0.483	0.000	0.560	0.483	0.412	0.316	0.412	0.597
0.026	0.003	0.412	0.011	0.003	0.000	0.006	0.000	0.017
0.026	0.072	0.000	0.046	0.003	0.103	0.058	0.000	0.037
0.026	0.072	0.103	0.046	0.072	0.103	0.161	0.103	0.202
0.026	0.003	0.412	0.011	0.003	0.412	0.316	0.103	0.264
0.026	0.140	0.103	0.011	0.140	0.103	0.006	0.103	0.037
0.026	0.003	0.103	0.046	0.003	0.103	0.006	0.103	0.017
0.026	0.072	0.000	0.011	0.003	0.103	0.006	0.103	0.037
0.026	0.003	0.103	0.011	0.072	0.000	0.006	0.000	0.017
0.928	0.997	1.443	0.893	0.997	1.650	1.263	1.237	1.646

Table E6

H6 - 1	H6 - 2	H6 - 3	H6SH1 - 1	H6SH1 - 2	H6SH1 - 3	H6SH2 - 1	H6SH2 - 2	H6SH2 - 3
0.253	0.117	0.161	0.117	0.157	0.121	0.197	0.121	0.058
0.253	0.117	0.161	0.117	0.006	0.121	0.016	0.121	0.058

0.253	0.117	0.161	0.001	0.157	0.121	0.040	0.001	0.058
0.212	0.386	0.161	0.772	0.682	0.378	0.603	0.378	0.522
0.212	0.001	0.316	0.001	0.006	0.086	0.603	0.001	0.006
0.212	0.090	0.316	0.090	0.006	0.086	0.270	0.001	0.006
0.253	0.117	0.161	0.117	0.157	0.121	0.197	0.121	0.058
0.519	0.772	0.316	0.090	0.322	0.378	0.040	0.378	0.161
0.033	0.001	0.058	0.090	0.061	0.121	0.197	0.378	0.006
0.033	0.117	0.006	0.117	0.157	0.001	0.016	0.121	0.006
0.033	0.001	0.058	0.117	0.157	0.001	0.197	0.121	0.058
0.212	0.001	0.006	0.001	0.322	0.001	0.197	0.001	0.058
2.478	1.837	1.881	1.630	2.188	1.538	2.575	1.744	1.057

Table E7

H7 - 1	H7 - 2	H7 - 3	H7SH1 - 1	H7SH1 - 2	H7SH1 - 3	H7SH2 - 1	H7SH2 - 2	H7SH2 - 3	H7SH3 - 1	H7SH3 - 2	H7SH3 - 3
0.084	0.069	0.227	0.046	0.103	0.117	0.087	0.058	0.033	0.087	0.087	0.072
0.084	0.069	0.024	0.046	0.103	0.117	0.087	0.058	0.033	0.087	0.087	0.003
0.001	0.004	0.024	0.046	0.103	0.117	0.087	0.058	0.033	0.087	0.087	0.072
0.867	0.918	0.558	0.560	0.412	0.772	0.446	0.522	1.077	0.446	0.446	0.483
0.001	0.004	0.024	0.011	0.000	0.001	0.001	0.006	0.020	0.001	0.001	0.003
0.125	0.004	0.024	0.011	0.103	0.386	0.001	0.006	0.033	0.001	0.001	0.072
0.084	0.069	0.227	0.046	0.103	0.117	0.087	0.058	0.033	0.087	0.087	0.072
0.125	0.004	0.024	0.182	0.412	0.090	0.120	0.006	0.020	0.001	0.001	0.003
0.084	0.069	0.024	0.011	0.103	0.001	0.120	0.006	0.020	0.120	0.001	0.140
0.001	0.069	0.028	0.046	0.103	0.117	0.001	0.058	0.033	0.001	0.087	0.072
0.084	0.004	0.238	0.046	0.000	0.001	0.087	0.006	0.033	0.120	0.446	0.003
0.084	0.004	0.238	0.046	0.103	0.001	0.001	0.006	0.033	0.087	0.001	0.003
1.623	1.284	1.658	1.100	1.650	1.837	1.125	0.851	1.401	1.125	1.332	0.997

Table E8

H8 - 1	H8 - 2	H8SH1 - 1	H8SH1 - 2	H8SH1 - 3	H8SH2 - 1	H8SH2 - 2	H8SH2 - 3	H8SH3 - 1	H8SH3 - 2	H8SH3 - 3
0.072	0.058	0.072	0.084	0.046	0.141	0.103	0.035	0.035	0.035	0.072
0.072	0.006	0.072	0.084	0.011	0.003	0.103	0.035	0.035	0.035	0.072
0.072	0.058	0.072	0.084	0.046	0.141	0.103	0.035	0.035	0.035	0.072
0.483	0.522	0.483	0.867	0.560	0.345	0.412	0.601	0.601	0.601	0.483
0.003	0.006	0.140	0.001	0.011	0.071	0.412	0.018	0.018	0.018	0.003
0.072	0.161	0.483	0.125	0.046	0.003	0.000	0.018	0.018	0.018	0.072
0.072	0.058	0.072	0.084	0.046	0.141	0.103	0.035	0.035	0.035	0.072
0.140	0.006	0.003	0.001	0.011	0.003	0.000	0.035	0.035	0.035	0.003
0.140	0.058	0.072	0.084	0.182	0.071	0.103	0.035	0.035	0.035	0.140
0.003	0.058	0.072	0.084	0.046	0.003	0.103	0.035	0.035	0.018	0.003
0.134	0.058	0.072	0.125	0.046	0.071	0.000	0.018	0.018	0.018	0.003
0.003	0.006	0.003	0.001	0.046	0.003	0.412	0.018	0.018	0.035	0.003
1.264	1.057	1.615	1.623	1.100	0.997	1.856	0.919	0.919	0.919	0.997

Table E9

H9 - 1	H9 - 2	H9SH1 - 1	H9SH1 - 2	H9SH1 - 3	H9SH2 - 1	H9SH2 - 2	H9SH2 - 3
0.072	0.035	0.069	0.141	0.058	0.121	0.121	0.058

0.072	0.035	0.069	0.003	0.058	0.121	0.121	0.058
0.140	0.206	0.145	0.071	0.006	0.001	0.378	0.058
0.483	0.601	0.918	0.345	0.522	0.378	0.378	0.522
0.072	0.035	0.004	0.071	0.006	0.086	0.086	0.006
0.140	0.035	0.004	0.003	0.058	0.121	0.121	0.006
0.072	0.035	0.069	0.141	0.058	0.121	0.121	0.058
0.072	0.018	0.004	0.003	0.006	0.200	0.378	0.006
0.003	0.035	0.069	0.071	0.161	0.086	0.001	0.161
0.003	0.035	0.069	0.141	0.058	0.001	0.121	0.058
0.072	0.035	0.069	0.003	0.206	0.001	0.001	0.006
0.003	0.018	0.004	0.003	0.098	0.001	0.121	0.058
1.203	1.125	1.490	0.997	1.297	1.239	1.950	1.057

Table E10

H10 - 1	H10 - 2	H10 - 3	H10SH1- 1	H10SH1- 2	H10SH1- 3	H10SH2- 1	H10SH2- 2	H10SH2- 3	H10SH3- 1	H10SH3- 2
0.087	0.103	0.103	0.103	0.046	0.072	0.087	0.058	0.179	0.103	0.087
0.087	0.103	0.000	0.103	0.046	0.072	0.087	0.058	0.179	0.000	0.001
0.001	0.000	0.000	0.000	0.011	0.003	0.001	0.006	0.010	0.000	0.001
0.446	0.412	0.412	0.412	0.560	0.483	0.446	0.522	0.293	0.412	0.446
0.001	0.000	0.000	0.000	0.011	0.003	0.001	0.006	0.010	0.103	0.001
0.120	0.412	0.103	0.000	0.046	0.003	0.001	0.161	0.048	0.000	0.001
0.087	0.103	0.103	0.103	0.046	0.072	0.087	0.058	0.179	0.103	0.087
0.001	0.103	0.103	0.000	0.011	0.140	0.001	0.058	0.010	0.412	0.001
0.001	0.412	0.000	0.103	0.011	0.003	0.120	0.006	0.010	0.103	0.087
0.001	0.103	0.103	0.000	0.046	0.072	0.001	0.006	0.010	0.000	0.120
0.087	0.103	0.103	0.103	0.011	0.003	0.087	0.058	0.639	0.000	0.001
0.001	0.000	0.000	0.103	0.046	0.072	0.001	0.058	0.048	0.000	0.087
0.919	1.856	1.031	1.031	0.893	0.997	0.919	1.057	1.616	1.237	0.919

Table E11

H11 - 1	H11 - 2	H11SH1- 1	H11SH1- 2	H11SH1- 3	H11SH2- 1	H11SH2- 2	H11SH3- 1	H11SH3- 2	H11SH3- 3
0.081	0.072	0.121	0.058	0.072	0.221	0.117	0.117	0.157	0.055
0.081	0.003	0.121	0.006	0.072	0.221	0.117	0.117	0.157	0.055
0.081	0.072	0.001	0.006	0.003	0.030	0.090	0.001	0.006	0.008
0.876	0.483	0.378	0.522	0.483	0.564	0.772	0.772	0.682	0.970
0.081	0.003	0.001	0.058	0.003	0.023	0.001	0.001	0.006	0.008
0.002	0.003	0.001	0.161	0.140	0.244	0.090	0.090	0.322	0.008
0.081	0.072	0.121	0.058	0.072	0.221	0.117	0.117	0.157	0.055
0.876	0.483	0.378	0.006	0.003	0.564	0.001	0.386	0.322	0.008
0.002	0.072	0.001	0.058	0.003	0.023	0.001	0.001	0.006	0.008
0.081	0.003	0.001	0.006	0.003	0.023	0.001	0.001	0.006	0.055
0.081	0.072	0.001	0.058	0.072	0.023	0.001	0.117	0.157	0.055
0.002	0.072	0.001	0.058	0.072	0.023	0.117	0.117	0.006	0.055
2.322	1.409	1.125	1.057	0.997	2.179	1.424	1.837	1.982	1.340

Table E12

	H1 - 1	H1 - 2	H1 - 3	H1SH1 - 1	H1SH1 - 2	H1SH1 - 3	H1SH2 - 1	H1SH2 - 2	H1SH2 - 3
Threshold value (d) for each item	1.237	1.263	1.512	1.203	0.919	1.409	0.997	1.538	1.332
Average threshold value (d) for each item	0.103	0.105	0.126	0.100	0.076	0.117	0.083	0.128	0.111
Σ Average threshold value (d) for each item	11.413								
Threshold value (d-Construct)	0.009								

Table E13

H2 - 1	H2 - 2	H2 - 3	H2SH1 - 1	H2SH1 - 2	H2SH1 - 3	H2SH2 - 1	H2SH2 - 2	H2SH2 - 3	H2SH3 - 1	H2SH3 - 2
0.893	0.928	1.031	0.481	1.055	0.997	1.284	0.713	1.113	1.538	1.100
0.074	0.077	0.085	0.040	0.087	0.083	0.107	0.059	0.093	0.128	0.091

Table E14

H3 - 1	H3 - 2	H3 - 3	H3SH1 - 1	H3SH1 - 2	H3SH2 - 1	H3SH2 - 2	H3SH2 - 3
0.481	0.644	0.919	1.203	0.997	1.100	1.332	0.919
0.040	0.053	0.076	0.100	0.083	0.092	0.111	0.076

Table E15

H4 - 1	H4 - 2	H4 - 3	H4SH1 - 1	H4SH1 - 2	H4SH1 - 3	H4SH2 - 1	H4SH2 - 2	H4SH2 - 3
1.203	1.918	1.409	0.919	1.125	0.919	1.490	1.332	1.125
0.100	0.160	0.117	0.076	0.093	0.076	0.124	0.111	0.094

Table E16

H5 - 1	H5 - 2	H5 - 3	H5SH1 - 1	H5SH1 - 2	H5SH1 - 3	H5SH2 - 1	H5SH2 - 2	H5SH2 - 3
0.928	0.997	1.443	0.893	0.997	1.650	1.263	1.237	1.646
0.077	0.083	0.120	0.074	0.083	0.138	0.105	0.103	0.137

Table E17

H6 - 1	H6 - 2	H6 - 3	H6SH1 - 1	H6SH1 - 2	H6SH1 - 3	H6SH2 - 1	H6SH2 - 2	H6SH2 - 3
2.478	1.837	1.881	1.630	2.188	1.538	2.575	1.744	1.057
0.207	0.153	0.157	0.136	0.182	0.128	0.214	0.145	0.088

Table E18

H7 - 1	H7 - 2	H7 - 3	H7SH1 - 1	H7SH1 - 2	H7SH1 - 3	H7SH2 - 1	H7SH2 - 2	H7SH2 - 3	H7SH3 - 1	H7SH3 - 2	H7SH3 - 3
1.623	1.284	1.658	1.100	1.650	1.837	1.125	0.851	1.401	1.125	1.332	0.997
0.135	0.107	0.138	0.091	0.138	0.153	0.094	0.071	0.117	0.093	0.111	0.083

Table E19

H8 - 1	H8 - 2	H8SH1 - 1	H8SH1 - 2	H8SH1 - 3	H8SH2 - 1	H8SH2 - 2	H8SH2 - 3	H8SH3 - 1	H8SH3 - 2	H8SH3 - 3
1.264	1.057	1.615	1.623	1.100	0.997	1.856	0.919	0.919	0.919	0.997
0.105	0.088	0.125	0.135	0.092	0.083	0.155	0.076	0.076	0.076	0.083

Table E20

H9 - 1	H9 - 2	H9SH1 -1	H9SH1 -2	H9SH1 -3	H9SH2 - 1	H9SH2 - 2	H9SH2 - 3
1.203	1.125	1.490	0.997	1.297	1.239	1.950	1.057
0.100	0.094	0.124	0.083	0.108	0.103	0.163	0.088

Table E21

H10 - 1	H10 - 2	H10 - 3	H10SH1- 1	H10SH1- 2	H10SH1- 3	H10SH2- 1	H10SH2- 2	H10SH2- 3	H10SH3- 1	H10SH3- 2
0.919	1.856	1.031	1.031	0.893	0.997	0.919	1.057	1.616	1.237	0.919
0.076	0.155	0.086	0.086	0.074	0.083	0.076	0.088	0.135	0.103	0.076

Table E22

H11 - 1	H11 - 2	H11SH1- 1	H11SH1- 2	H11SH1- 3	H11SH2- 1	H11SH2- 2	H11SH3- 1	H11SH3- 2	H11SH3- 3
2.322	1.409	1.125	1.057	0.997	2.179	1.424	1.837	1.982	1.340
0.194	0.117	0.094	0.088	0.083	0.182	0.119	0.153	0.165	0.112



## Appendix F

### Percentage (%) of Expert Consensus of each Item and Overall

Table F1

EXPERTS	H1 - 1	H1 - 2	H1 - 3	H1SH1 - 1	H1SH1 - 2	H1SH1 - 3	H1SH2 - 1	H1SH2 - 2	H1SH2 - 3
No. of Items $d \leq 0.2$	10	10	10	11	11	10	11	9	10
% of items $d \leq 0.2$	83%	83%	83%	92%	92%	83%	92%	75%	83%

Table F2

H2 - 1	H2 - 2	H2 - 3	H2SH1 - 1	H2SH1 - 2	H2SH1 - 3	H2SH2 - 1	H2SH2 - 2	H2SH2 - 3	H2SH3 - 1	H2SH3 - 2
11	11	11	12	11	11	11	11	11	10	11
92%	92%	92%	100%	92%	92%	92%	92%	92%	83%	92%

Table F4

H3 - 1	H3 - 2	H3 - 3	H3SH1 - 1	H3SH1 - 2	H3SH2 - 1	H3SH2 - 2	H3SH2 - 3
12	12	11	11	11	11	10	11
100%	100%	92%	92%	92%	92%	83%	92%

Table F5

H4 - 1	H4 - 2	H4 - 3	H4SH1 - 1	H4SH1 - 2	H4SH1 - 3	H4SH2 - 1	H4SH2 - 2	H4SH2 - 3
11	9	11	11	11	11	11	11	11
92%	67%	92%	92%	92%	92%	92%	92%	92%

Table F6

H5 - 1	H5 - 2	H5 - 3	H5SH1 - 1	H5SH1 - 2	H5SH1 - 3	H5SH2 - 1	H5SH2 - 2	H5SH2 - 3
11	11	10	11	11	11	10	11	10
92%	92%	83%	92%	92%	92%	83%	92%	83%

Table F7

H6 - 1	H6 - 2	H6 - 3	H6SH1 - 1	H6SH1 - 2	H6SH1 - 3	H6SH2 - 1	H6SH2 - 2	H6SH2 - 3
8	10	9	11	9	10	8	9	11
58%	83%	75%	92%	75%	83%	67%	75%	92%

Table F8

H7 - 1	H7 - 2	H7 - 3	H7SH1 - 1	H7SH1 - 2	H7SH1 - 3	H7SH2 - 1	H7SH2 - 2	H7SH2 - 3	H7SH3 - 1	H7SH3 - 2	H7SH3 - 3
11	11	9	11	10	10	11	11	11	11	10	11
92%	92%	75%	92%	83%	83%	92%	92%	92%	92%	83%	92%

Table F9

H8 - 1	H8 - 2	H8SH1 - 1	H8SH1 - 2	H8SH1 - 3	H8SH2 - 1	H8SH2 - 2	H8SH2 - 3	H8SH3 - 1	H8SH3 - 2	H8SH3 - 3

11	11	10	11	11	11	10	11	11	11	11
92%	92%	83%	92%	92%	92%	83%	92%	92%	92%	92%

Table F10

H9 - 1	H9 - 2	H9SH1 -1	H9SH1 -2	H9SH1 -3	H9SH2 - 1	H9SH2 - 2	H9SH2 - 3
11	11	11	11	11	11	9	11
92%	92%	92%	92%	92%	92%	75%	92%

Table F11

H10 - 1	H10 - 2	H10 - 3	H10SH1- 1	H10SH1- 2	H10SH1- 3	H10SH2- 1	H10SH2- 2	H10SH2- 3	H10SH3- 1	H10SH3- 2
11	9	11	11	11	11	11	11	10	10	11
92%	75%	92%	92%	92%	92%	92%	92%	83%	83%	92%

Table F12

H11 - 1	H11 - 2	H11SH1- 1	H11SH1- 2	H11SH1- 3	H11SH2- 1	H11SH2- 2	H11SH3- 1	H11SH3- 2	H11SH3- 3
10	10	10	11	11	9	11	10	9	11
83%	83%	83%	92%	92%	75%	92%	83%	75%	92%



## Appendix G

### Score Determination (Rank of Item)/ Defuzzification

Table G1

		H1 - 1			H1 - 2			H1 - 3	
	m1	m2	m3	m1	m2	m3	m1	m2	m3
Fuzzy Evaluation	0.400	0.600	0.800	0.350	0.550	0.750	0.466	0.666	0.866
Av. Fuzzy Values		0.600			0.550			0.666	
Ranking		13			18			5	

Table G2

	H1SH1-1			H1SH1-2			H1SH1-3			H1SH2-1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.433	0.633	0.833	0.416	0.616	0.816	0.366	0.566	0.766	0.433	0.633	0.833
	0.633			0.616			0.566			0.633	
	9			12			16			9	

Table G3

	H1SH2-2			H1SH2-3			H2-1			H2-2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.316	0.516	0.716	0.416	0.616	0.816	0.466	0.666	0.866	0.500	0.700	0.900
	0.516			0.616			0.666			0.700	
	22			12			5			2	

Table G4

	H2-3			H2SH1-1			H2SH1-2			H2SH1-3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.400	0.600	0.800	0.466	0.666	0.866	0.450	0.650	0.850	0.366	0.566	0.766
	0.600			0.666			0.650			0.566	
	13			5			7			16	

Table G5

	H2SH2-1			H2SH2-2			H2SH2-3			H2SH3-1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.450	0.633	0.833	0.416	0.616	0.816	0.333	0.533	0.733	0.383	0.583	0.783
	0.633			0.616			0.533			0.583	
	8			12			19			15	

Table G6

	H2SH3-2			H3-1			H3-2			H3-3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.466	0.666	0.866	0.533	0.733	0.933	0.450	0.650	0.850	0.483	0.683	0.883
	0.666			0.733			0.650			0.683	
	5			1			7			4	

Table G7



	H3SH1 - 1			H3SH1 - 2			H3SH2 -1			H3SH2 -2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.366	0.566	0.766	0.433	0.633	0.833	0.466	0.666	0.866	0.383	0.583	0.783
	0.566			0.633			0.666			0.583	
	16			9			5			15	

Table G8

	H3SH2 -3			H4 - 1			H4 - 2			H4 - 3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.483	0.683	0.883	0.433	0.633	0.833	0.283	0.450	0.650	0.366	0.566	0.766
	0.683			0.633			0.461			0.566	
	4			9			26			16	

Table G9

	H4SH1 - 1			H4SH1 - 2			H4SH1 - 3			H4SH2 - 1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.483	0.683	0.883	0.483	0.683	0.883	0.483	0.683	0.883	0.450	0.633	0.833
	0.683			0.683			0.683			0.639	
	4			4			4			8	

Table G10

	H4SH2 - 2			H4SH2 - 3			H5 - 1			H5 - 2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.416	0.616	0.816	0.383	0.583	0.783	0.500	0.700	0.900	0.433	0.633	0.833
	0.616			0.583			0.700			0.633	
	12			15			2			9	

Table G11

	H5 - 3			H5SH1 - 1			H5SH1 - 2			H5SH1 - 3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.400	0.600	0.800	0.466	0.666	0.866	0.433	0.633	0.833	0.400	0.600	0.800
	0.600			0.666			0.633			0.600	
	13			5			9			13	

Table G12

	H5SH2 - 1			H5SH2 - 2			H5SH2 - 3			H6 - 1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.350	0.550	0.750	0.400	0.600	0.800	0.333	0.516	0.716	0.300	0.483	0.683
	0.550			0.600			0.522			0.489	
	18			13			21			25	

Table G13

	H6 - 2			H6 - 3			H6SH1 - 1			H6SH1 - 2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.400	0.583	0.783	0.350	0.550	0.750	0.400	0.583	0.783	0.366	0.550	0.750
	0.589			0.550			0.589			0.555	

	14			18			14			17	
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Table G14

	H6SH1 - 3			H6SH2 - 1			H6SH2 - 2			H6SH2 - 3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.383	0.583	0.783	0.350	0.516	0.716	0.383	0.583	0.783	0.450	0.650	0.850
	0.583			0.527			0.583			0.650	
	15			20			15			7	

Table G15

	H7 - 1			H7 - 2			H7 - 3			H7SH1 - 1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.433	0.616	0.816	0.450	0.633	0.833	0.316	0.500	0.700	0.466	0.666	0.866
	0.622			0.639			0.505			0.666	
	11			8			24			5	

Table G16

	H7SH1 - 2			H7SH1 - 3			H7SH2 - 1			H7SH2 - 2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.400	0.600	0.800	0.400	0.583	0.783	0.416	0.616	0.816	0.450	0.650	0.850
	0.600			0.589			0.616			0.650	
	13			14			12			7	

Table G17

	H7SH2 - 3			H7SH3 - 1			H7SH3 - 2			H7SH3 - 3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.500	0.683	0.883	0.416	0.616	0.816	0.416	0.616	0.816	0.433	0.633	0.833
	0.689			0.616			0.616			0.633	
	3			12			12			9	

Table G18

	H8 - 1			H8 - 2			H8SH1 - 1			H8SH1 - 2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.433	0.633	0.833	0.450	0.650	0.850	0.433	0.633	0.833	0.433	0.616	0.816
	0.633			0.650			0.633			0.622	
	9			7			9			11	

Table G19

	H8SH1 - 3			H8SH2 - 1			H8SH2 - 2			H8SH2 - 3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.466	0.666	0.866	0.366	0.566	0.766	0.400	0.600	0.800	0.483	0.683	0.883
	0.666			0.566			0.600			0.683	
	5			16			13			4	

Table G20

	H8SH3 - 1			H8SH3 - 2			H8SH3 - 3			H9 - 1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3

0.483	0.683	0.883	0.483	0.683	0.883	0.433	0.633	0.833	0.433	0.633	0.833
	0.683			0.683			0.633			0.633	
	4			4			9			9	

Table G21

	H9 - 2			H9SH1 - 1			H9SH1 - 2			H9SH1 - 3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.483	0.683	0.883	0.450	0.633	0.833	0.366	0.566	0.766	0.450	0.650	0.850
	0.683			0.639			0.566			0.650	
	4			8			16			7	

Table G22

	H9SH2 - 1			H9SH2 - 2			H9SH2 - 3			H10 - 1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.383	0.583	0.783	0.383	0.583	0.783	0.450	0.650	0.850	0.416	0.616	0.816
	0.583			0.583			0.650			0.616	
	15			15			7			12	

Table G23

	H10 - 2			H10 - 3			H10SH1 - 1			H10SH1 - 2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.400	0.600	0.800	0.400	0.600	0.800	0.400	0.600	0.800	0.466	0.666	0.866
	0.600			0.600			0.600			0.666	
	13			13			13			5	

Table G24

	H10SH1 - 3			H10SH2 - 1			H10SH2 - 2			H10SH2 - 3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.433	0.633	0.833	0.416	0.616	0.816	0.450	0.650	0.850	0.350	0.533	0.733
	0.633			0.616			0.650			0.539	
	9			12			7			14	

Table G25

	H10SH3 - 1			H10SH3 - 2			H11 - 1			H11 - 2	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.400	0.600	0.800	0.416	0.616	0.816	0.450	0.616	0.816	0.433	0.633	0.833
	0.600			0.616			0.627			0.633	
	13			12			10			9	

Table G26

	H11SH1 - 1			H11SH1 - 2			H11SH1 - 3			H11SH2 - 1	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.383	0.583	0.783	0.450	0.650	0.850	0.433	0.633	0.833	0.333	0.500	0.700
	0.583			0.650			0.633			0.511	
	15			7			9			23	

Table G27

	H11SH2-2			H11SH3-1			H11SH3-2			H11SH3-3	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.400	0.583	0.783	0.400	0.583	0.783	0.366	0.550	0.750	0.466	0.650	0.850
	0.589			0.589			0.555			0.655	
	14			14			17			6	



## Appendix H

### Result Analysis

LINK OF SYSTEM	
Percentage	Remark
$\leq$ 74.99%	DECLINE
$\geq$ 75.00%	ACCEPT

No.	Items/ Evaluation Questions	Triangular Fuzzy Numbers		Fuzzy Evaluation				Consensus of Experts (Verdict)	Accept Element s	Ran king
		Average threshold Value (d) $\leq 0.2$	Percent age of Experts' Consens us	m1	m2	m3	Av. Fuzzy Value s (A)			
1	H1 - 1	0.103	83%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
2	H1 - 2	0.105	83%	0.350	0.550	0.750	0.550	ACCEPT	0.550	18
3	H1 - 3	0.126	83%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
4	H1SH1 - 1	0.100	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
5	H1SH1 - 2	0.076	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
6	H1SH1 - 3	0.117	83%	0.366	0.566	0.766	0.566	ACCEPT	0.566	16
7	H1SH2 - 1	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
8	H1SH2 - 2	0.128	75%	0.316	0.516	0.716	0.516	ACCEPT	0.516	22
9	H1SH2 - 3	0.111	83%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
10	H2 - 1	0.074	92%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
11	H2 - 2	0.077	92%	0.500	0.700	0.900	0.700	ACCEPT	0.700	2
12	H2 - 3	0.085	92%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
13	H2SH1 - 1	0.040	100%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
14	H2SH1 - 2	0.087	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
15	H2SH1 - 3	0.083	92%	0.366	0.566	0.766	0.566	ACCEPT	0.566	16
16	H2SH2 - 1	0.107	92%	0.450	0.633	0.833	0.639	ACCEPT	0.639	8
17	H2SH2 - 2	0.059	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
18	H2SH2 - 3	0.093	92%	0.333	0.533	0.733	0.533	ACCEPT	0.533	19
19	H2SH3 - 1	0.128	83%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
20	H2SH3 - 2	0.091	92%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
21	H3 - 1	0.040	100%	0.533	0.733	0.933	0.733	ACCEPT	0.733	1
22	H3 - 2	0.053	100%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
23	H3 - 3	0.076	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
24	H3SH1 - 1	0.100	92%	0.366	0.566	0.766	0.566	ACCEPT	0.566	16

25	H3SH1 - 2	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
26	H3SH2 - 1	0.092	92%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
27	H3SH2 - 2	0.111	83%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
28	H3SH2 - 3	0.076	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
29	H4 - 1	0.100	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
30	H4 - 2	0.160	67%	0.283	0.450	0.650	0.461	DECLINE	0.461	26
31	H4 - 3	0.117	92%	0.366	0.566	0.766	0.566	ACCEPT	0.566	16
32	H4SH1 - 1	0.076	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
33	H4SH1 - 2	0.093	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
34	H4SH1 - 3	0.076	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
35	H4SH2 - 1	0.124	92%	0.450	0.633	0.833	0.639	ACCEPT	0.639	8
36	H4SH2 - 2	0.111	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
37	H4SH2 - 3	0.094	92%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
38	H5 - 1	0.077	92%	0.500	0.700	0.900	0.700	ACCEPT	0.700	2
39	H5 - 2	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
40	H5 - 3	0.120	83%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
41	H5SH1 - 1	0.074	92%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
42	H5SH1 - 2	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
43	H5SH1 - 3	0.138	92%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
44	H5SH2 - 1	0.105	83%	0.350	0.550	0.750	0.550	ACCEPT	0.550	18
45	H5SH2 - 2	0.103	92%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
46	H5SH2 - 3	0.137	83%	0.333	0.516	0.716	0.522	ACCEPT	0.522	21
47	H6 - 1	0.207	58%	0.300	0.483	0.683	0.489	DECLINE	0.489	25
48	H6 - 2	0.153	83%	0.400	0.583	0.783	0.589	ACCEPT	0.589	14
49	H6 - 3	0.157	75%	0.350	0.550	0.750	0.550	ACCEPT	0.550	18
50	H6SH1 - 1	0.136	92%	0.400	0.583	0.783	0.589	ACCEPT	0.589	14
51	H6SH1 - 2	0.182	75%	0.366	0.550	0.750	0.555	ACCEPT	0.555	17
52	H6SH1 - 3	0.128	83%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
53	H6SH2 - 1	0.214	75%	0.350	0.516	0.716	0.527	ACCEPT	0.527	20
54	H6SH2 - 2	0.145	75%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
55	H6SH2 - 3	0.088	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
56	H7 - 1	0.052	92%	0.433	0.616	0.816	0.622	ACCEPT	0.622	11
57	H7 - 2	0.107	92%	0.450	0.633	0.833	0.639	ACCEPT	0.639	8
58	H7 - 3	0.138	75%	0.316	0.500	0.700	0.505	ACCEPT	0.505	24
59	H7SH1 - 1	0.091	92%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
60	H7SH1 - 2	0.138	83%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
61	H7SH1 - 3	0.153	83%	0.400	0.583	0.783	0.589	ACCEPT	0.589	14
62	H7SH2 - 1	0.094	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
63	H7SH2 - 2	0.071	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
64	H7SH2 - 3	0.117	92%	0.500	0.683	0.883	0.689	ACCEPT	0.689	3
65	H7SH3 - 1	0.093	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12

66	H7SH3 - 2	0.111	83%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
67	H7SH3 - 3	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
68	H8 - 1	0.105	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
69	H8 - 2	0.088	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
70	H8SH1 - 1	0.125	83%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
71	H8SH1 - 2	0.135	92%	0.433	0.616	0.816	0.622	ACCEPT	0.622	11
72	H8SH1 - 3	0.092	92%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
73	H8SH2 - 1	0.083	92%	0.366	0.566	0.766	0.566	ACCEPT	0.566	16
74	H8SH2 - 2	0.155	83%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
75	H8SH2 - 3	0.076	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
76	H8SH3 - 1	0.076	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
77	H8SH3 - 2	0.076	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
78	H8SH3 - 3	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
79	H9 - 1	0.100	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
80	H9 - 2	0.094	92%	0.483	0.683	0.883	0.683	ACCEPT	0.683	4
81	H9SH1 - 1	0.124	92%	0.450	0.633	0.833	0.639	ACCEPT	0.639	8
82	H9SH1 - 2	0.083	92%	0.366	0.566	0.766	0.566	ACCEPT	0.566	16
83	H9SH1 - 3	0.108	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
84	H9SH2 - 1	0.103	92%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
85	H9SH2 - 2	0.163	75%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
86	H9SH2 - 3	0.088	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
87	H10 - 1	0.076	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
88	H10 - 2	0.155	75%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
89	H10 - 3	0.086	92%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
90	H10SH1 - 1	0.086	92%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
91	H10SH1 - 2	0.074	92%	0.466	0.666	0.866	0.666	ACCEPT	0.666	5
92	H10SH1 - 3	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
93	H10SH2 - 1	0.076	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
94	H10SH2 - 2	0.088	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
95	H10SH2 - 3	0.135	83%	0.350	0.533	0.733	0.539	ACCEPT	0.539	14
96	H10SH3 - 1	0.103	83%	0.400	0.600	0.800	0.600	ACCEPT	0.600	13
97	H10SH3 - 2	0.076	92%	0.416	0.616	0.816	0.616	ACCEPT	0.616	12
98	H11 - 1	0.194	83%	0.450	0.616	0.816	0.627	ACCEPT	0.627	10
99	H11 - 2	0.117	83%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
100	H11SH1 - 1	0.094	83%	0.383	0.583	0.783	0.583	ACCEPT	0.583	15
101	H11SH1 - 2	0.088	92%	0.450	0.650	0.850	0.650	ACCEPT	0.650	7
102	H11SH1 - 3	0.083	92%	0.433	0.633	0.833	0.633	ACCEPT	0.633	9
103	H11SH2 - 1	0.182	75%	0.333	0.500	0.700	0.511	ACCEPT	0.511	23
104	H11SH2 - 2	0.119	92%	0.400	0.583	0.783	0.589	ACCEPT	0.589	14
105	H11SH3 - 1	0.153	83%	0.400	0.583	0.783	0.589	ACCEPT	0.589	14
106	H11SH3 - 2	0.165	75%	0.366	0.550	0.750	0.555	ACCEPT	0.555	17

107	H11SH3-3	0.112	92%	0.466	0.650	0.850	0.655	ACCEPT	0.655	6
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## Appendix I

### Instruments of Heuristic Evaluation Checklist Verification

#### PART C:

Step 1. Number of experts are identified in this research based on the requirements of the study. 10 – 15 experts are needed but only 12 experts responded

Step 2: #Fuzzy scale & likert scale

Likert Scale Scoring	Linguistic variable	Fuzzy Scale Scoring		
		n1	n2	n3
5	Strongly Agree	0.6	0.8	1.0
4	Agree	0.4	0.6	0.8
3	Neutral	0.2	0.4	0.6
2	Not Agree	0.0	0.2	
1	Strong Not Agree	0.0	0.0	0.2

Step 3: Feedbacks from the respondents

EXPERT	Consistency				Ease of use					
	1 - 1:	1 - 2:	1 - 3:	1 - 4:	2 - 1:	2 - 2:	2 - 3:	2 - 4:	2 - 5:	2 - 6:
1	5	5	5	5	5	5	5	5	5	5
2	5	5	5	4	5	5	5	5	5	5
3	4	4	4	4	4	4	4	4	4	5
4	2	2	2	2	4	4	4	4	4	2
5	4	4	4	4	5	5	5	5	4	5
6	4	5	5	5	2	2	4	4	5	4
7	5	5	5	5	5	3	5	5	5	5
8	3	4	4	4	4	1	2	3	3	3
9	5	5	4	4	4	4	5	5	5	5
10	5	5	5	5	4	5	5	5	5	5
11	5	5	5	4	3	5	4	5	5	5
12	5	5	5	5	5	5	5	5	4	5
13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



	Understandable			Verifiable		Overall				
	3 - 1:	3 - 2:	3 - 3:	3 - 4:	4 - 1:	4 - 2:	5 - 1:	5 - 2:	5 - 3:	5 - 4:
5	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5
4	4	4	4	4	4	4	4	4	4	5
5	4	4	4	4	5	5	5	5	5	5
4	5	5	5	4	4	4	4	4	4	4
4	4	5	5	5	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5
2	1	3	4	4	4	4	3	1	2	2
5	5	5	5	5	4	4	5	5	3	2
5	5	5	5	5	4	5	5	5	5	5
5	5	4	5	5	5	4	5	5	4	5
5	5	5	5	5	5	5	5	5	5	5
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Step 4: Average fuzzy value (m1, m2, m3) based on fuzzy scale (n1, n2, n3)

EXPERT	Consistency											
	1 - 1:			1 - 2:			1 - 3:			1 - 4:		
	n1	n2	n3									
1	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
2	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
3	0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
4	0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.4
5	0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
6	0.4	0.6	0.8	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
7	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
8	0.2	0.4	0.6	0.4	0.6	0.8	0.4	0.6	0.8	0.4	0.6	0.8
9	0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8	0.4	0.6	0.8
10	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
11	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0	0.4	0.6	0.8
12	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0	0.6	0.8	1.0
13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	m1	m2	m3									
AVERAGE	0.467	0.667	0.867	0.500	0.700	0.900	0.483	0.683	0.883	0.450	0.650	0.850



Step 5: Threshold value (d) representation

EXPERT	Consistency				Ease of use					
	1 - 1:	1 - 2:	1 - 3:	1 - 4:	2 - 1:	2 - 2:	2 - 3:	2 - 4:	2 - 5:	2 - 6:
1	0.046	0.026	0.035	0.058	0.072	0.099	0.035	0.018	0.026	0.026
2	0.046	0.026	0.035	0.006	0.072	0.099	0.035	0.018	0.026	0.026
3	0.011	0.026	0.018	0.006	0.003	0.000	0.018	0.035	0.026	0.026
4	0.561	0.644	0.602	0.522	0.003	0.000	0.018	0.035	0.026	0.644
5	0.011	0.026	0.018	0.006	0.072	0.099	0.035	0.018	0.026	0.026
6	0.011	0.026	0.035	0.058	0.484	0.420	0.018	0.035	0.026	0.026
7	0.046	0.026	0.035	0.058	0.072	0.107	0.035	0.018	0.026	0.026
8	0.183	0.026	0.018	0.006	0.003	0.820	0.602	0.258	0.232	0.232
9	0.046	0.026	0.018	0.006	0.003	0.000	0.035	0.018	0.026	0.026
10	0.046	0.026	0.035	0.058	0.003	0.099	0.035	0.018	0.026	0.026
11	0.046	0.026	0.035	0.006	0.140	0.099	0.018	0.018	0.026	0.026
12	0.046	0.026	0.035	0.058	0.072	0.099	0.035	0.018	0.026	0.026
13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
d value for each item	1.100	0.928	0.919	0.851	0.997	1.944	0.919	0.507	0.515	1.134

	Understandable				Verifiable		Overall			
	3 - 1:	3 - 2:	3 - 3:	3 - 4:	4 - 1:	4 - 2:	5 - 1:	5 - 2:	5 - 3:	5 - 4:
0.026	0.033	0.018	0.011	0.026	0.026	0.011	0.018	0.069	0.046	
0.026	0.033	0.018	0.011	0.026	0.026	0.011	0.018	0.069	0.046	
0.026	0.020	0.035	0.046	0.026	0.026	0.046	0.035	0.004	0.046	
0.026	0.020	0.035	0.046	0.026	0.026	0.011	0.018	0.069	0.046	
0.026	0.033	0.018	0.046	0.026	0.026	0.046	0.035	0.004	0.011	
0.026	0.020	0.018	0.011	0.026	0.026	0.046	0.035	0.004	0.011	
0.026	0.033	0.018	0.011	0.026	0.026	0.011	0.018	0.069	0.046	
0.644	1.078	0.258	0.046	0.026	0.026	0.046	0.258	0.919	0.561	
0.026	0.033	0.018	0.011	0.026	0.026	0.011	0.018	0.145	0.561	
0.026	0.033	0.018	0.011	0.026	0.026	0.011	0.018	0.069	0.046	
0.026	0.033	0.035	0.011	0.026	0.026	0.011	0.018	0.004	0.046	
0.026	0.033	0.018	0.011	0.026	0.026	0.011	0.018	0.069	0.046	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
0.928	1.401	0.507	0.275	0.309	0.309	0.275	0.507	1.490	1.512	

	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	2-5	2-6
Threshold value (d) for each item	1.100	0.928	0.919	0.851	0.997	1.944	0.944	0.507	0.515	1.134
Average threshold value (d) for each item	0.092	0.077	0.076	0.071	0.083	0.162	0.077	0.042	0.043	0.077
Σ Average threshold value (d) for each item	1.426									
Threshold value (d-construct)	0.006									

3-1	3-2	3-3	3-4	4-1	4-2	5-1	5-2	5-3	5-4
0.928	1.401	0.507	0.275	0.309	0.309	0.275	0.507	1.490	1.512
0.077	0.117	0.042	0.023	0.026	0.026	0.023	0.042	0.124	0.126

Step 6: Percentage (%) of consensus of each item and overall

0	1 - 1:	1 - 2:	1 - 3:	1 - 4:	2 - 1:	2 - 2:	2 - 3:	2 - 4:	2 - 5:	2 - 6:
0	11	11	11	11	11	10	11	11	11	10
0	92%	92%	92%	92%	92%	83%	92%	92%	92%	83%

3 - 1:	3 - 2:	3 - 3:	3 - 4:	4 - 1:	4 - 2:	5 - 1:	5 - 2:	5 - 3:	5 - 4:
11	11	11	12	12	12	12	11	11	10
92%	92%	92%	100%	100%	100%	100%	92%	92%	83%

Step 7: Score determination (rank of item)

The Defuzzification processes are based on 3 equations

		<b>1-1</b>			<b>1-2</b>			<b>1-3</b>	
	m1	m2	m3	m1	m2	m3	m1	m2	m3
Fuzzy Evaluation	0.467	0.667	0.867	0.500	0.700	0.900	0.483	0.683	0.883
Av. Fuzzy Values		0.667			0.700			0.683	
Ranking		6			3			5	

	<b>1-4</b>			<b>2-1</b>			<b>2-2</b>			<b>2-3</b>	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.450	0.650	0.850	0.433	0.633	0.833	0.417	0.600	0.800	0.483	0.683	0.883
	0.650			0.633			0.606			0.683	
	7			9			10			5	

	<b>2-4</b>			<b>2-5</b>			<b>2-6</b>			<b>3-1</b>	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.517	0.717	0.917	0.500	0.700	0.900	0.500	0.700	0.900	0.500	0.700	0.900
	0.717			0.700			0.700			0.700	
	2			3			3			3	

	<b>3-2</b>			<b>3-3</b>			<b>3-4</b>			<b>4-1</b>	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.500	0.683	0.883	0.517	0.717	0.917	0.533	0.733	0.933	0.500	0.700	0.900
	0.689			0.717			0.733			0.700	
	4			2			1			3	

	<b>4-2</b>			<b>5-1</b>			<b>5-2</b>			<b>5-3</b>			<b>5-4</b>	
m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3	m1	m2	m3
0.500	0.700	0.900	0.533	0.733	0.933	0.517	0.717	0.917	0.450	0.633	0.833	0.467	0.667	0.867
	0.700			0.733			0.717			0.639			0.667	
	3			1			2			8			6	

## Step 8: Result analysis

LINK OF SYSTEM	
Percentage	Remark
≤ 74.99%	DECLINE
≥ 75.00%	ACCEPT

N o.	CRITERIA	Items/Dimensions	Triangular Fuzzy Numbers		Fuzzy Evaluation				Consensus of Experts (Verdict)	Accept Elements	Ranking
			Average threshold Value (d) ≤ 0.2	Percentage of Experts' Consensus (%)	m1	m2	m3	Av. Fuzzy Values (A)			
1	Consistency	1 - 1:	0.092	92%	0.467	0.667	0.867	0.667	ACCEPTED	0.667	6
2		1 - 2:	0.077	92%	0.500	0.700	0.900	0.700	ACCEPTED	0.700	3
3		1 - 3:	0.076	92%	0.483	0.683	0.883	0.683	ACCEPTED	0.683	5
4		1 - 4:	0.071	92%	0.450	0.650	0.850	0.650	ACCEPTED	0.650	7
5	Ease of use	2 - 1:	0.083	92%	0.433	0.633	0.833	0.633	ACCEPTED	0.633	9
6		2 - 2:	0.162	83%	0.417	0.600	0.800	0.606	ACCEPTED	0.606	10
7		2 - 3:	0.077	92%	0.483	0.683	0.883	0.683	ACCEPTED	0.683	5
8		2 - 4:	0.042	92%	0.517	0.717	0.917	0.717	ACCEPTED	0.717	2
9		2 - 5:	0.043	92%	0.500	0.700	0.900	0.700	ACCEPTED	0.700	3
10		2 - 6:	0.077	83%	0.500	0.700	0.900	0.700	ACCEPTED	0.700	3
11	Understandable	3 - 1:	0.077	92%	0.500	0.700	0.900	0.700	ACCEPTED	0.700	3
12		3 - 2:	0.117	92%	0.500	0.683	0.883	0.689	ACCEPTED	0.689	4
13		3 - 3:	0.042	92%	0.517	0.717	0.917	0.717	ACCEPTED	0.717	2
14		3 - 4:	0.023	100%	0.533	0.733	0.933	0.733	ACCEPTED	0.733	1
15	Verifiable	4 - 1:	0.026	100%	0.500	0.700	0.900	0.700	ACCEPTED	0.700	3
16		4 - 2:	0.026	100%	0.500	0.700	0.900	0.700	ACCEPTED	0.700	3
17	Overall	5 - 1:	0.023	100%	0.533	0.733	0.933	0.733	ACCEPTED	0.733	1
18		5 - 2:	0.042	92%	0.517	0.717	0.917	0.717	ACCEPTED	0.717	2
19		5 - 3:	0.124	92%	0.450	0.633	0.833	0.639	ACCEPTED	0.639	8
20		5 - 4:	0.126	83%	0.467	0.667	0.867	0.667	ACCEPTED	0.667	6

## Appendix J

### The Evaluation/Validation Form

<https://forms.gle/qD6UC3kcidkwXeP99>

Questions Responses Settings

Section 1 of 10

## EXPERT ASSESSMENT AND VALIDATION FORM: A Heuristics Evaluation Checklist for Shopee M-Shopping Application

Dear Prof/Dr/Sir/Madam,

My name is Ihediohamma Raphael Uzoma, a MSc.(IT) research student specializing in Heuristics Evaluation at Universiti Utara Malaysia.

Firstly I would like to thank you for agreeing to be part of this study as an expert to validate the newly proposed heuristic evaluation checklist for m-shopping applications.

The main aim of this validation is to examine the accuracy and applicability of the proposed heuristic evaluation checklist into a real world environment for evaluation of m-shopping applications. The construction of the proposed heuristic evaluation checklist with appropriate heuristic categories, subcategories and evaluation questions is in attempt to ensure that the checklist is satisfactory and aligned with the intention of the targeted users. The heuristic evaluation checklist is aimed to serve as a guide for software/mobile applications designers and m-shopping applications development sector especially in evaluating the usability of the m-shopping applications.

This form contains THREE (3) parts;  
Part A: Expert Demographic,  
Part B: Heuristic Evaluation Checklist/Assessment Form, and  
Part C: Validation Form described as follows:

**Part A: Expert Demographic** - This part contains information of the experts. Kindly fill the form before proceeding to the validation and please enclose a copy of your curriculum vitae to this validation document. Be informed that all the information given is fully confidential and will only be used for research purposes.

**Part B: Heuristic Evaluation Checklist/Assessment Form** - This is an overview of the proposed heuristic evaluation checklist for m-shopping applications. The heuristic evaluation checklist have been amended by means of verification process that was conducted through expert review from both academic and industry in usability domain and application development. This form is meant for detailed data collection during a real world usability evaluation to be conducted on the chosen m-shopping applications. In this form, data collection method was also provided as reference for experts

**Part C: Validation Form** - This form consist of expert view on issues that validate the usefulness of the heuristic evaluation checklist for

## PART B: Heuristic Evaluation Checklist and Assessment Form

This section will be assessing the strength of the proposed heuristic evaluation checklist in identifying the usability issues of the chosen m-shopping applications. The proposed heuristic evaluation checklist contains the list of verified heuristic categories, subcategories, and their appropriate evaluation questions. Kindly verify with YES or NO or N/A responds and provide suggestions where applicable.

There are Eleven (11) heuristic categories, Twenty Seven (27) subcategories, and Sixty Six (66) evaluation questions in the proposed heuristic evaluation checklist.

The validation will be accomplished using the YES or NO or N/A options and SUGGESTIONS where applicable:  
(Yes, No, N/A)

On each item, please tick accordingly.

After section 3 Continue to next section

## Heuristics 1 – Recognition rather than recall (H1) and Heuristics 2 – User control and freedom (H2)

The following are items related to these heuristics.

Does the chosen m-shopping applications have:

	Yes	No	N/A
Actions (such as navigat...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Search history provided?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prompts, cues, and mes...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prompts formatted usin...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consistent color coding?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Items that are grouped i...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Back" button take the br...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have multiple menu level...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Link labels that match th...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Options for copying exist...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Options that enable user...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>