Global Education Conference and Postgraduate Colloquium 2021
Education in Crisis : Global Education Amidst the Pandemic & The Way Forward
Date: 8 – 9 September 2021

AN APPLICATION OF FUZZY DELPHI TECHNIQUE TO MEASURE EXPERTS CONSENSUS ON COMMUNICATION SKILLS AMONG ENGINEERING GRADUATES

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Presentation Layout

- INTRODUCTION
- LITERATURE REVIEW
- METHODOLOGY
- FINDINGS

INTRODUCTION

- **The Fuzzy Delphi method**: Combining the traditional Delphi method and Fuzzy Set theory.
- **The standard Delphi method**:
  - To find answers within a set of questionnaires
  - Based on the use of linguistic terms
  - Because of the potential for misunderstandings between the meanings of the answers taken from the questionnaires and the interpretation of these answers by experts, in many situations, this approach resulted in uncertainty and was not properly able to reflect quantitative terms.
  - Experts attempted to address this „fuzziness" in terms of understanding the outputs of the Delphi method using the Fuzzy Set theory
- **The Fuzzy Set theory**:
  - Resemble human reasoning in its use of approximate information and uncertainty to generate decisions.
  - It was specifically designed to mathematically represent uncertainty and vagueness and provide formalized tools for dealing with the imprecision intrinsic to many problems
  - The efficiency of interpreting questionnaire results could be much improved through objective evaluation of the factors that the Fuzzy Set theory proposes.
  - To improve the weaknesses associated with theories,

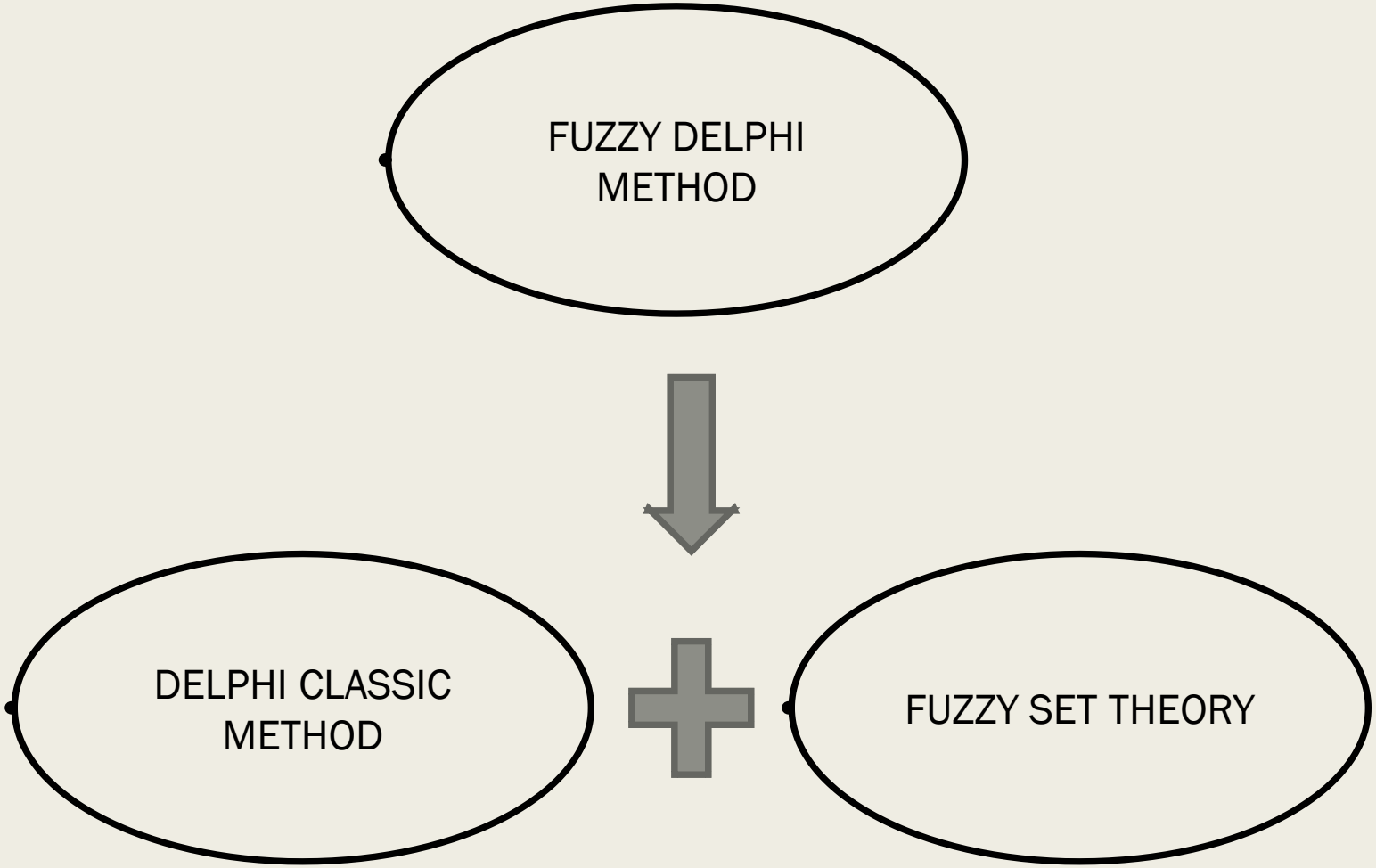
OBJECTIVE

To examine the level of consensus among 10 Malaysian experts in the field of engineering regarding the communication skills among engineering graduates, specifically in the Malaysian context using the Fuzzy Delphi Method

RESEARCH QUESTION

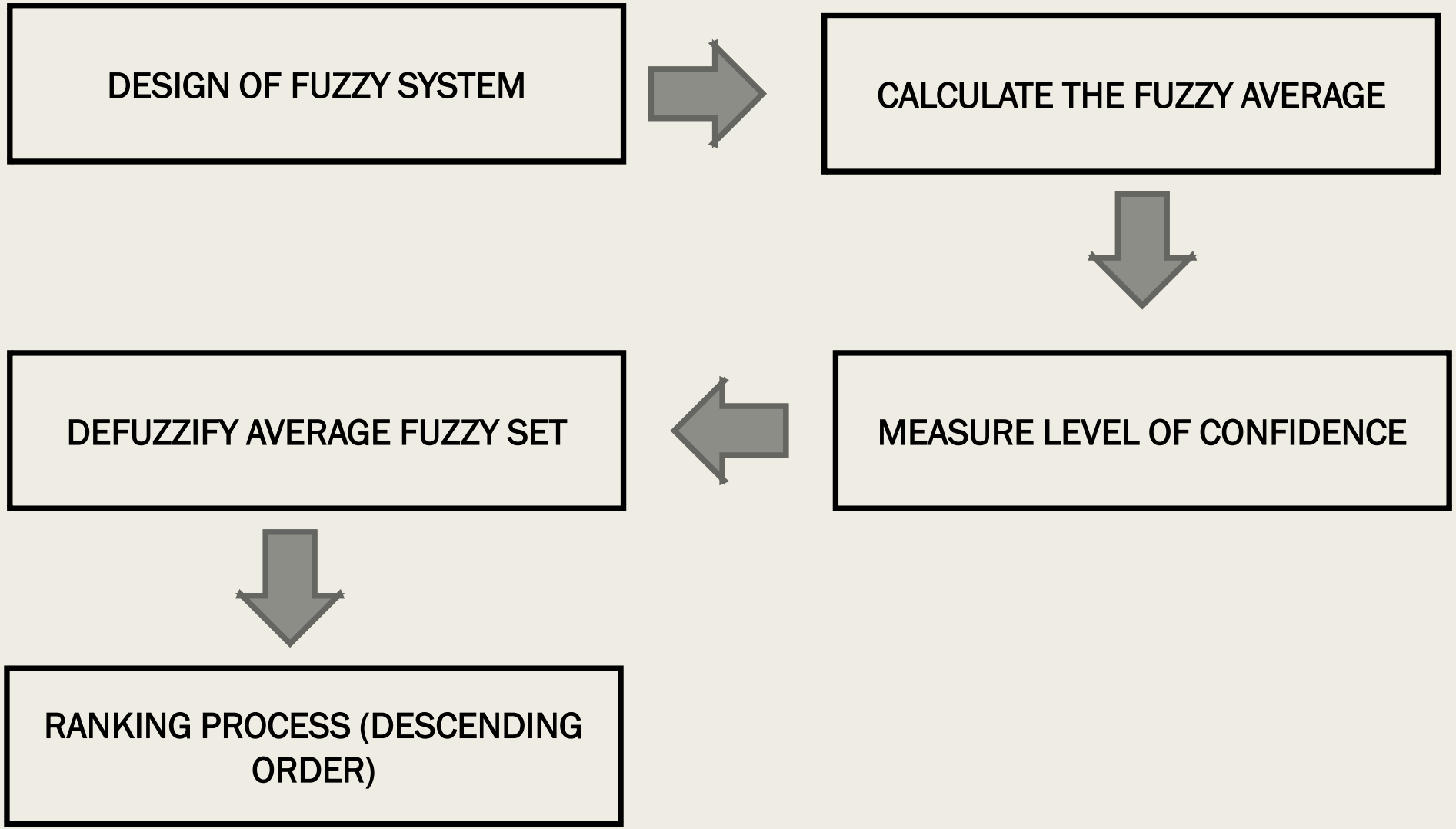
What do experts believe are the potential of communication skills in the context of engineering graduates?

LITERATURE REVIEW



METHODOLOGY

- The purpose of this study is to validate the content of communication skills among engineering graduates using Fuzzy Delphi Method (FDM) via experts‟ feedback.
- Ten experts who are experienced and have deep knowledge in engineering involved in this study.
- Fuzzy Delphi Method Procedure was selected to validate the content of the communication skills among engineering graduates.
- Fuzzy Delphi Method (FDM) is used to identify, evaluate and confirming all the key components and contents of the communication skills according to three terms of the experts‟ agreement which are threshold (d) value, percentage of expert agreement and the value of Fuzzy Score (A)
- Data analysis uses average of fuzzy numbers (defuzzification process). In this analysis is aimed to get the score of fuzzy score (A) to ensure the third condition is observed, the value of the fuzzy score (A) must be greater than or equal to the median value (α - cut value) of 0.5
- This indicates that the element is accepted by an expert agreement. Among other functions, the value of fuzzy scores (A) can be used as a determinant and priority of an element according to expert opinion views.


DESIGN OF FUZZY SYSTEM
CALCULATE THE FUZZY AVERAGE
MEASURE LEVEL OF CONFIDENCE
DEFUZZIFY AVERAGE FUZZY SET
RANKING PROCESS (DESCENDING ORDER)

THE CRISP VALUES FOR FOUR LEVELS OF CONFIDENCE AND THE RANKING

Level of confidence	Very Pessimistic (VP)	Neutral (N)	Very optimistic (VO)	Ranking
CS_5	0.340	0.540	0.740	$CS_2 = CS_3 > CS_1 > CS_4 > CS_5$
CS_4	0.460	0.660	0.860	
CS_3	0.520	0.720	0.920	
CS_2	0.520	0.720	0.920	
CS_1	0.500	0.700	0.900	

Notes: „>" means is „superior to", „=" means is „equivalent to"

APPROACH TO FUZZY DELPHI METHOD (FDM)

Sub-skill	Threshold Value (d)
CS_1 : Communication skills : [Speak in clear Sentences]	0.183
CS_2 : Communication skills : [Give clear direction]	0.147
CS_3 : Communication skills : [Listen and ask question]	0.147
CS_4 : Communication skills : [Ideas presented with confident and effective]	0.214
CS_5 : Communication skills : [Speak and understand more than one language]	0.189

FUZZIFICATION

- The aim of the fuzzification step is to determine the mapping degree of crisp inputs to fuzzy sets using membership functions.
- In the communication skills Fuzzy system, five inputs were used:

    1. Speak in clear Sentences;
    2. Give clear direction;
    3. Listen and ask question;
    4. Ideas presented with confident and effective
    5. Speak and understand more than one language

Result of experts" consensus using Fuzzy Delphi Method (FDM) for Communication Skills (CS)

Communication Skill (CS)								
Item	Sub-skill	*Triangular Fuzzy Numbers*		*Defuzzification Process*				Experts Concencus Decision
		Threshold Value (d)	Average Percentage of Expert Concensus (%)	m1	m2	m3	*Fuzzy Score (A)*	
1	1. Communication skills : [Speak in clear Sentences]	0.183	90.0%	0.50	0.70	0.90	0.50	ACCEPT
2	2. Communication skills : [Give clear direction]	0.147	100.0%	0.52	0.72	0.92	0.52	ACCEPT
3	3. Communication skills : [Listen and ask question]	0.147	100.0%	0.52	0.72	0.92	0.52	ACCEPT
4	4. Communication skills : [Ideas presented with confident and effective]	0.214	80.0%	0.46	0.66	0.86	0.46	REJECT
5	5. Communication skills : [Speak and understand more than one language]	0.189	80.0%	0.34	0.54	0.74	0.34	REJECT

Conditions for ACCEPT:

1) Threshold Value (d) ≤ 0.2
2) Average Percentage of Expert Consensus (%) $\geq 75.0\%$
3) Fuzzy Score (%) ≥ 0.5

FINDINGS

- The purpose of this study was to examine the extent of experts‟ consensus on the communication skills among engineering graduates.
- There are 5 communication skills which carried out employability skills elements in the engineering framework. Researcher has selected five sub-skills (CS1 – CS5) to show the result of experts‟ consensus in communication skills among engineering graduates.
- In order to strengthen each element in the main component to meet its requirements in the context of the study, the process of assessing and validating of the communication skills among engineering graduates, the agreement of experts was analysed by Fuzzy Delphi Method (FDM).
- The use of FDM approach in this phase is to evaluate and validate the developed elements.
- It is clearly shown the significant level of agreement requirements for each element in the employability skills framework.
- Therefore, the most significant contribution to the methodology involves in this study is the use of the Fuzzy Delphi (FDM) approach in developing a employability skills framework based on the views of a group of experts comprising of practitioners, management personnel in engineering and industrial representatives.
- As a result of the used of FDM, the findings show that there is an acceptable expert‟s agreement on the content of the communication skills among engineering graduates focusing on speak in clear sentences, give clear direction, listen and ask question.

THANK YOU