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TABLE OF CONTENT

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An Approach to Develop an Engineering Employability Skill Framework: A Methodological Proposal Based on Quantitative Study

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Abstract
Purpose of the study is to identify what are the relevant research activities in investigating engineering employability skills for Malaysian engineering graduates using the Design and Development Research (DDR) through the Malaysian Engineering Employability Skills (MEES). This article finds the issues of research method development comprise of philosophical research, approach, design and strategy inside the field of prospects contemplates. The article dissects orderly methodology for fostering an exploration philosophy in engineering education – the "research onion" model and inspects the pertinence and propriety of this model for possibilities considers.

Keywords: employability skill, quantitative approach, design and development research, methodological strategy

1. Research Philosophy

Philosophy of the study is attempted to develop, validate and evaluate skills the factor structures of a model of engineering employability skills, based on the Malaysian Engineering Employability Standard (MEES) framework, for strengthening the quality of human resource in engineering industry in Malaysia. This study involved the exploration, description and explanation of essential engineering employability skills in engineering industries. The purpose of the study is to develop an engineering employability skills framework to enhance engineering graduate employability skills build up upon the Malaysia Engineering Employability Skills (MEES) model developed by Zaharim et al. (2009). Data will be needed from a relatively large number of respondents at one point of time in model development and validation. The researcher needs to obtain the results from the data analyses relatively quickly, so the model can be developed and validated according to the predetermined stages.

This study adopted Richey and Klien (2007) idea in developing Design and Developmental Research (DDR) which asserted that the model employs a systematic process of designing, developing and evaluating a product being produced. Accordingly, this study will be implemented through three phases: (1) Phase I: Need analysis (2) Phase II: Model development and validation, and (3) Phase III: Model usability evaluation. The DDR approach allows researchers to obtain a systematic study of developing, validating and evaluating the framework which met the objectives of the current research. In design and developmental research framework, it is a typical strategy that all researchers ought to play out a ceaseless scholarly movement (e.g., observation, interview, focus group discussion, consultation, or seminar) to foster their exploration models, yet for validating the proposed model, the reality stays that the exercises are infrequently communicated

instead of the statistical assessment (Subiyakto et al., 2015) to investigate the associations between several factors using statistical approaches. Thus, a quantitative research design will be employed to serve the purpose of the study.

2. Research Approach

To address the previously mentioned research questions, this study utilized an instrumental research approach. In particular, this hypothesis planned a deductive reasoning that utilized the completely quantitative examination directed inside the setting of the errand assessment (Stake, 1995). Given the absence of theoretical advancement in the field of quantitative examination, deductive reasoning gives rich depictions and contextualized encounters about the cycle of consolidated information investigation. This section explains the research approach and methods used in assessing the technique stated the structure of the research, which comprised the research philosophy and approach (Poth, 2019). The research approach explained the data generalization through survey questionnaire and gathering the data based on human capital theory. Therefore, to achieve the objective of this research, data were measured during the field survey. Then, all data were analysed separately using Fuzzy Delphi method (FDM), Nominal Grouped Technique (NGT) and Structural Equation Modelling (SEM): this generated the results, which were then interpreted (see Table 1).

Table 1: Research approach

Method of Data Collection	**Approach**
Expert Consensus (FDM)	Inductive
Survey Questionnaire (NGT, SEM)	Deductive

In the literature of design and development research, mix-methodology research design is widely used by researchers to develop a new research model for its representatives in providing complementary completeness, expansion and confirmation of the model. Notwithstanding, execution of quantitative techniques is not required in the approval stages (Subiyakto et al., 2015). The constraints of qualitative methods are the significant reasons why contemporary researchers have progressively gone to Messick's (1989) proof get-together way to deal with validation test. Messick (1989) characterized validity as an incorporated evaluative assessment of how much experimental proof and hypothetical reasoning support the ampleness and activities dependent on test scores or other model consideration in interpretive methodological approval. As per Messick (1989) coordinated implies that validity is a unitary idea to incorporate emotional assessment dependent on qualities (for example finding assess). The degree implies that validity involves degree needed to give experimental proof and hypothetical reasoning to help the sufficiency of deductions and activities (for example engineering graduates' employability skill test). The use of quantitative approach in this study will help to validate the quantitative results of the MEES system in this manner possibly empowers the examination to address various parts of a similar research questions and expanding the component of the investigation (Kaplan, 2001). Quantitative method gives potentials that counterbalance the shortcomings of qualitative exploration (Jick, 1979). This is upheld by Kaplan (2001) that quantitative examination technique can prompt new bits of knowledge and methods of investigation. This methodology empowers the investigation to address various parts of a similar research questions along these lines expanding the component of the study. This research is a descriptive study that aims to analyze and explore the error of source in measurement. The survey using the questionnaire instrument and parallel-tests were performed to obtain the information from the respondents. The approach of this study also uses double-blind experiment sampling testing where researchers and respondents are not exposed to the expected results of this study (Robertson et al., 2016). Sampling selection is purposive and convenience technique to avoid bias or conflict of interest of any party.

3. Research Design

Quantitative research method is a methodological choice that includes philosophical hypotheses that guide the bearing of the assortment and investigation of information. It centers on gathering and examining

information in an introverted report. The utilization of quantitative methodology in this investigation is introducing a preferred comprehension of exploration issues over utilizing either approach. It assists with approving the quantitative outcomes for past investigation in creating Malaysian Engineering Employability Skills (MEES) framework which utilized quantitative strategy research design. Action research includes cycle to comprehend a technique as a limited framework (Stake, 1995), which infers that a procedure exists inside limits. Frequently, attempting to comprehend an interaction involves attempting to comprehend its unique context. As Figure 1 delineates, one part of planning an action research is to decide how to characterize the investigation within its context. Research onion model aides and reveals the importance and appropriateness of this model to legitimize three potential designs to discovering a research: method choice, strategy and time horizon.

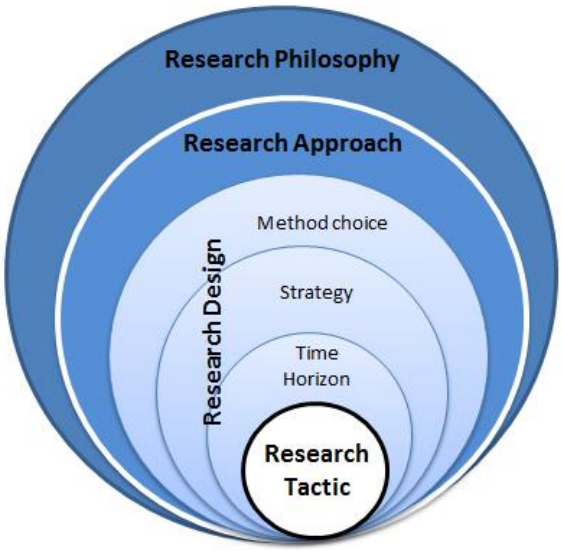

Figure 1: Research Onion Model

The research methodological framework and design procedure describes the measurement strategy, data analysis, findings and analysis at various stages of the research. Finally, the research methodological framework design and procedure regarding the process of developing an engineering employability skill framework (see Figure 2). The figure displays a summary of the methodological choice procedure involved in the quantitative method and research strategy used to initiate employability skill and time horizon exercised in designing strategies for the research objective. Consequently, this study will employ time horizon survey research method using cross-sectional survey design (Floyd & Fowler, 2013) to develop and assess the validity and reliability of the model. Surveys are the preferred approach for collecting data from large numbers of respondents about their perceptions and opinions (students about their college experiences (Cox & Cox, 2008). No attempt will be made to investigate the correlation between graduate level of soft skills with their employability status after several years of graduation that need longitudinal survey design, nor does it attempt to investigate the effectiveness of engineering programs that the graduates underwent that need experimental interventions. As such, the researcher perceived the cross-sectional survey design was more practical than other time horizon methods for conducting this study.

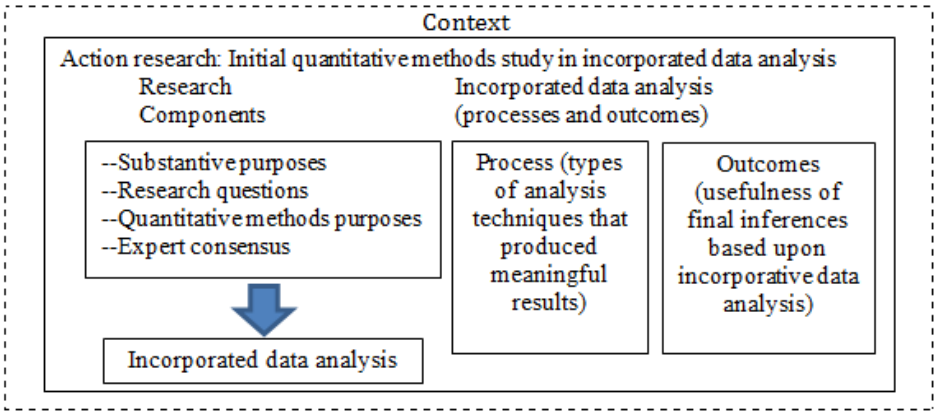

Figure 2: Diagram of the action research design

3.1 Method Choice (Quantitative)

Comprehensively, there are three methodologies or method choices in leading investigation: qualitative methods, quantitative methods and mixed methods (Creswell, 2003; Green et al., 2007; Teddlie and Tashakkori, 2009). As this exploration study includes collecting and analyzing completely, quantitative data approach is carried out to address the research questions. A quantitative technique includes an exploration and numerical investigation in a solitary report where the information is gathered indiscriminately, given a priority, and include the incorporation of the data at least one phases in the research process (Gutmann et al., 2002). Quantitative method choices give a more extensive picture by taking note of patterns and speculations in-depth knowledge of participants' perspectives. The findings on the quantitative sampling frame must be representative of the population.

The employability skill model illustrates in detail how the study was conducted as an action research strategy in the research design. It fills in as a guide during the data collection, data analysis and decision-making process (Chandel et al., 2006). The design for this research is additionally a model to make inductions of the factors contemplated. The advancement of this study is about human resources content information required the improvement of another arrangement of meaningful purposes, research questions, quantitative techniques purposes, and design. The program assessment utilized quantitative strategies to address key assessment questions, and utilized a solitary strategy in this exploration. Consequently, this examination study gave the chance to make a model of quantitative investigation occupied with information investigation, just as the chance to consider the cycles and results of executing incorporated data analysis. To help catch the expected complexity, this study depended on two significant kinds of information assortment; survey questionnaire and expert consensus. The aims and process of every one of these information assortment sources are examined straightaway.

3.2 Research Strategy (Action research)

This action research empowers the investigation to address various parts of similar research questions subsequently expanding the element of the investigation. Employability, as it is found in the figure 3 beneath, is affected by four expansive and interconnected elements or parts. These segments are Personal Attributes, Personal Skills and Knowledge, giving all together the name of the model ASK. The ASK model sums up the portrayal of employability. It tends to be seen from the model that the S segment covers over different elements in the model to summarize all together to the employability. It is as yet critical to remember that every one of these parts is fundamental for accomplishing the last mentioned (Knight & Sims-Knight, 2003).

The last letter K alludes to the arrangement and besides to the information that the individual has. This segment is for the most part a key result acquired from advanced education and obviously has a pivotal

influence in being employable. Skills being the second segment in the model exhibit that the skills of the individual are moreover a significant component of employability. In this model they are viewed as a part of employability rather than determinate accomplishments. Skills can be promptly estimated and with no issues moved from a setting to a setting. To be more rearranged, skills are viewed as a part with the goal that further prologue to expound them more exhaustively is not required (Knight and Sims-Knight, 2003). Skills and understanding are as yet insufficient to acquire employability. Despite the fact that many may feel that their prosperity comes from luck and being wise, while disappointments come from destructive powers and nonappearance of abilities. This perspective may be an outcome in deficiency of steadiness and surrendering when there is no definite rapid determination for attaining employment. Personal skills, the primary part of the model, are covering one's self hypotheses and individual characteristics. These have critical significance, as they are being degree to the purpose of influencing on one's thought about themselves and their capacities. Obviously, this is not the case without fail and with each individual yet it can likewise hinder seeing the genuine capacity that the individual has (Knight and Sims-Knight, 2003). Donabedian (1988) has gathered that designing engineering students put more weightage in interpersonal skills in their assessment and fulfillment with employability. Moira A. Stewart, (1995) found that effective communication which is an intuitive interaction applies a positive impact not just on the motional belief of the students yet additionally indication goal.

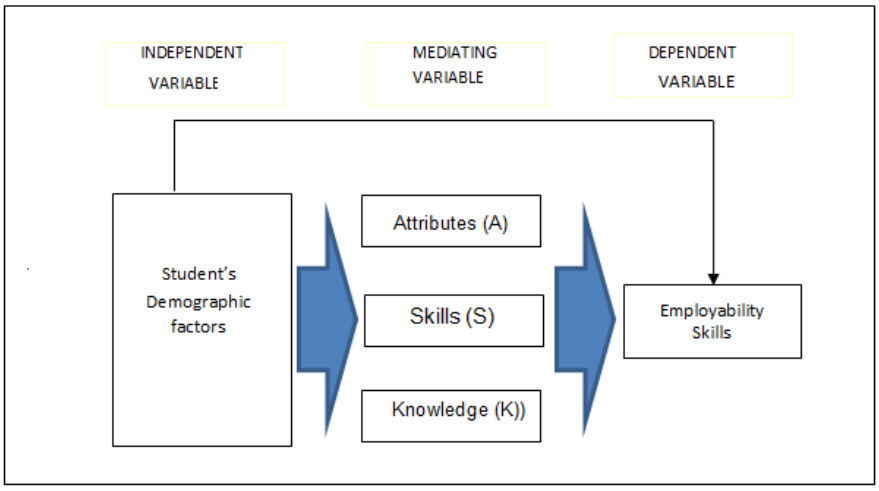

Figure 3: Conceptual Framework of this study

3.3 Sampling and Time horizon (Cross-sectional)

As to date, there are 552,720 number of students currently enrolled in public universities and colleges in (Department of Statistics Malaysia, 2020). Out of this number 127,697 enrolled in engineering, manufacturing and construction type of programs (Department of Statistics Malaysia, 2020). Sampling is essential to attain the sample size to represent the population size from which the sample was occupied. While there are quite a number of private universities offering engineering courses in Malaysia, this study will obtain data from the undergraduate students, alumni who are being employed and academicians of public universities to serve its purposes. According to QS World University Rankings by Subject 2019, 8 top public universities for engineering programs in Malaysia are University Malaya, University Technology Malaysia, University National Malaysia, University Science Malaysia, University Tenaga Nasional, University Putra Malaysia, University Technology Petronas and University Malaysia Pahang. Respondents representing these universities will be selected using two sampling methods: purposive and cluster random sampling methods.

a) *Purposive sampling method*.
Purposive sampling method is used to serve two purposes:

(i) to obtain employers opinions regarding the importance of engineering employability skills for the work place. The information gathered will be used to generate an item pool for the initial development of the framework and
(ii) to select academicians and engineering graduates from selected engineering industries and universities to assess the validity of the final framework of engineering employability skills derived from the NGT and SEM analyses. Purposive sampling method was recommended by measurement experts (Gay, 1986, Gay & Airasian, 2003; Wallen & Fraenkel, 2013) to choose an example whenever dependent on past information on a population and the particular motivation behind the study, the analyst conviction that the sample would be illustrative of the population and the researcher accept the sample have the skill in regards to the data required (Wallen & Fraenkel, 2013). Previous research studies in this area (Zaharim et al., 2009; Tejan & Sabil, 2019) provide evidence that employers have solid opinions on essential employability skills expected from engineering graduates. Furthermore Cristina Sin, Tavares O. and Alberto Amaral (2016) found that there are no significant differences in the opinion of engineering academicians and employers on the employability skills that are important for the workplace. Thus, the researcher believed that both employers and academicians who will be purposively selected to participate in this study would yield information regarding essential engineering graduates' employability skills. In the case of selecting academicians representing different engineering programs, statistics from the Ministry of Higher Education (2021) indicates that different public universities are offering different engineering program, thus selecting sample using random sampling method was not possible. As such, purposive sampling method was the most appropriate method to select respondents representing the different type of engineering programs.

b) *Cluster random sampling method*.
Cluster random sampling method will be used to select respondents to assess the validity and reliability of the final list of the employability skills. Since the respondent for this study was spread out in the 8 universities throughout Malaysia, cluster random sampling will be used because it is the most constructive sampling method when the population is very large to represent a wide range geographical area (Gay & Airasian, 2003). In this study, two-stage random sampling method (Gay & Airasian, 2003; Wallen & Fraenkel, 2013) will be used to select samples. This method involved selecting clusters within clusters (Gay, 1986; Gay & Airasian, 2003; Tejan & Sabil, 2019). Using this method, the data selection procedures involved selecting universities within the four geographic regions in the Malaysia randomly and then selecting engineering programs from each selected university randomly. The procedures used in selecting the classrooms within each selected teacher training college involved the following steps as suggested by Gay and Airasian (2003):

(i) Identification of the population. In this study, a list of students majoring in various engineering programs in the selected universities will be obtained from the Office of Student Affairs, from each University.
(ii) Determination of desired sample size. Generally, there are several methods of classification in determining the sample size of the study for known or unknown populations.

Yamane's techniques had gained popularity for its ability to reflect the basic trade-offs between precision, accuracy and sample size. In this study, Yamane's technique will be used to determine size of the sample in undergraduate engineering student's selection to be carried out throughout Malaysia. This technique was created in 1967 where a simple formula was introduced in determining the size of the sample if the size of the population was known (Levy & Lemeshow, 2013). In this situation, a 90% confidence interval is used to describe a 0.1 margin of error (Westland, 2010). For the calculation of the minimum sample size under the limited population method, convenience clustering sampling, n is 100. Through this Yamane method, 100 engineering employers will be identified for research purposes.

4. Research Tactic

As previously mentioned, data collection is based on survey questionnaires. Data from the questionnaire were stored in computers using SPSS software. After the test data and questionnaire were included in the software, researchers analyzed data based on two phases. Phase I involves an analysis using the Microsoft excel software to obtain a defuzzification process via Fuzzy Delphi Method (FDM). The purpose of the study is to develop an employability skills framework to enhance engineering graduate employability skills based on the Malaysia Engineering Employability Skills (MEES) model developed by Zaharim et al. (2009) and to validate the MEES model in Malaysia using Fuzzy Delphi Method (FDM) via experts' consensus. Ten experienced individuals in engineering industry such as contractor, consultant, manufacturer, service provider and developer will be involved in this study. Three indicators of the experts' agreement which are threshold *(d)* value, percentage of expert agreement and the value of *Fuzzy* Score (A) are employed Fuzzy Delphi Method (FDM) to identify, evaluate and confirming all the key components and contents of the MEES Module accordingly. Average of *fuzzy* numbers indicates analysis of data. To ensure the third condition is observed, this kind of analysis is aimed to get the *fuzzy* score (A), with the condition must be greater than or equal to the median value (α - cut value) of 0.5 (Wu & Tan, 2006; Bodjanova, 2006). This specifies that the component is recognized by an expert agreement. Alternatively, the value of *fuzzy* scores (A) can be used as a factor and priority of an element according to expert consensuses. Phase II involved Nominal Group Technique (NGT) and Structural Equation Model (SEM) analysis process using the Amos software to analyze and validate the proposed model.

5. Conclusion

The methodology used during the data collection phase includes the reasons behind the descriptive theory approach used in this study as well as the constructivist paradigm. The limitations of this approach are also discussed, as well as detailed descriptions of how the sample was selected and semi-structured interview questions for the expert participants. Data collection will be conducted consecutively through a quantitative survey questionnaire. The employability skill design of the study is the method of analysis applied to formulate a model. Data will be analyzed concurrently as a double-blind exploratory analysis to eliminate bias. Prior to the actual data gathering, a pilot study using survey questionnaire was conducted to certify the validity and reliability of the instruments used. By virtue of this exercise, the study is purposely to develop an employability skills framework to enhance engineering graduate employability skills build up upon the Malaysia Engineering Employability Skills (MEES) model. The methodology used in developing and validating the engineering employability framework, which will involve three phases of study: Phase I concerned with analyzing the need to conduct the study. Phase II will be the design and developing the framework build upon the data derived from phase I and Phase III concerned with the usability assessment of the engineering employability framework. The research philosophy, approach, design, and tactic were explained in detail for the implementation of the study. Furthermore, as a consequence of this exercise, in obtaining the desired objectives, the important finding is that this study strengthens the research done by Hanasyha J. et al. (2013) as to incorporate the employability skill as a dimension of engineering graduates.

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Employee Job Performance in Multinational Environment

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Abstract

Employees are considered key constituents of organizations as job performance of employees is one of the key determinants of the growth and progress of the organization. High levels of employee efficiency and effectiveness will help organizations achieve its objectives. Previous studies have demonstrated that there are various factors that may influence employee job performance. This research focuses on several factors which have been previously identified to impact employee job performance. However, in this instance the research focuses on a multinational electronics manufacturing company with 19,000 employees across 11 countries globally. A survey was conducted to collect data from employees with 200 employee questionnaires distributed. Findings of the study suggest that work experience is the most important factor that positively impacts job performance of employees, followed by motivation, technology advancement, workload, and lastly financial stress. The analysis and results support the contention that employees' job performance is integral to organization's performance as employees are the main factors of production

Keywords: Financial Stress, Job performance, Motivation, Technology Advancement, Work Experience

Introduction

Employee's job performance is defined as how an employee fulfills job duties and executes required tasks. It refers to the effectiveness, quality, and efficiency of output. Organizations monitor employee job performance and encourages them to incrementally perform better using performance management systems and reward mechanisms. Viswesvaran and Ones (2000) defined employee job performance as "scalable actions, behavior, and outcomes that employees engage in or bring about that are linked with and contribute to organizational goals". They further opined that job performance is linked to both employee-and organizational-level outcomes. Hammoud and Osborne (2017) in their paper on "Effective Employee Engagement in the Workplace" suggested that effective and efficient employee job performance leads to an effective and efficient organization hence the importance of employee job performance monitoring and enhancement per organizational requirements. The success or failure of the organization primarily depends on the performance of its employees (Latif, Ahmad, & Qasim, 2013). The efforts exerted by employees towards the achievement of assigned tasks is defined as job performance which in turn is the basis for the functioning of the organization and its success. Employee job performance is influenced by numerous factors at the workplace and there many factors that may increase or lower employee job performance (Yaseen & Nayab, 2013).

This study investigated different factors which influence employee job performance in a multinational electronics manufacturing environment. Employee's job performance can be further defined as the assessment of how employees fulfill the tasks allocated to them by the organization. Employee job performance refers to the effectiveness, efficiency, quality of the work done by the employees, and it helps define how valuable an employee is in an organization (Pradhan & Jena, 2016). Measuring employee job performance is not an easy task, the company needs to plan and execute it well using the appropriate performance management systems. The organization will need to manage the objective and expectation formulation and monitor them regularly. Consequently, resulting in a desired outcome or otherwise.

In the modern, rapidly changing workplace, employees must take charge of their performance for the variety of positions they will occupy throughout their lifetime. To not only survive, but thrive in this new reality, organizations need to be adaptive. The same is true for the employees within them. Therefore, employees need to enhance their job performance to achieve the organization's goal. Organizations must ensure that they get the best out of their employees by carefully analyzing the factors that affect the employee. According to Mahiswaran Selvanathan (2016), employee job performance is the most challenging issue faced by the organization and there are a lot of factors influencing employee's job performance. Wahab and Abdul (2020) stated that the outbreak of covid-19 has severely affected the national and global economy. Restrictions imposed on the workplace and constraints of movement due to the Covid 19 pandemic has resulted in a drop in employee job performance and productivity creating a negative effect on organizations. Vyas and Butakhieo (2021) in a study of working from homes (WFH) concluded that whilst WFH is highly desired it may not be the best option due to inadequacies of proper regulation, lack of necessary resources for this working arrangement and lack of guidance and training. According to Saeed and Waseem (2014), high job performance of the employee will encourage them to stay while low job performance will motivate them to leave the organization. This study intended to help employers formulate an effective human capital development strategy that is crucial to employee's job performance and sustaining business competitive advantage.

Literature review

Employee job performance is defined as the actions performed by employees towards the achievement of a set of goals in a job/role in an organization. Campbell (1990) defined employee job performance as behaviors related to meeting expected, identified or formal role requirements of organization members.

In examining the perceived value and the contribution of employee job performance to the organization, Motowidlo (2003), Motowidlo, Borman and Schmit (1997) opined distinct behaviors of employees over a period result in the expected value of the organization. Motowidlo et al. (1997) also suggested that employee job performance is behavioral, episodic, evaluative, and multidimensional. A deeper examination reveals that there are some distinct differences between behavior and performance; behavior being the action of employees and performance reflecting the value of what employees do. Given the evaluative nature of employee job performance, Koopmans (2014) theorized that employee job performance substantially contributes to the organization's efficiency and competitiveness. Consequently, element of employee satisfaction, personality and participation has become an area of great interest to industrial psychologist (Judge, Bono, Thoreson, & Patton, 2001).

The study of employee job performance particularly in the context of industrial and organizational psychology is very often viewed from the perspective of employee satisfaction and organizational performance. Borman and Motowidlo (1993) expanded employee job performance by examining task performance and contextual performance. Task performance involves all activities that an employee is expected to carry out on the job per job description or job specification. Contextual performance reflects employee behavior which influences organizational effectiveness within the context of psychological, social, and organizational context of work Motowidlo, (2003). Contextual performance may also manifest as an effect on other people, an employee's acquisition of knowledge and skills, or impacting an organization's resources. Contextual performance is exhibited in many forms such as offering to undertake additional assignments, tenacity in completing challenging tasks, and assisting other employees in completing their tasks, propagating organizational strategies, policies and objectives. Consequently, contextual and task performance will create a favorable/unfavorable effect on the organization. Motowidlo and Van Scotter (1994) discovered that both task and contextual performance independently impact the employee job performance. They tended to relate more closely to different conditions such as between work experience and task performance where else contextual performance demonstrated a stronger correlation to personality variables.

Job performance in a broader context is assessed in working groups and consequently reflects the performance of the organization. Huselid (1995) contended that employee job behaviors have a significant fiscal impact, one standard deviation increase in employee performance equated to approximately forty percent of an employee's salary. Brooks (2000) noted that organizations with a lower turnover rate recorded better employee job performance, leading to higher returns. This hypothesis supported Gould-Williams (2003)'s notion whereby in situations where employees work hard for an organization, employee job performance is seen to be superior.

Factors effecting employee job performance

The study of factor effecting employee job performance has been of perennial

interest amongst researchers given the significant value it brings to the organization. Diamantidis and Chatzoglou (2019), examined internal environmental factors such as organizational climate, environmental dynamism, managements support and training culture. Also explored were job-related factors such as job environment, job autonomy, job communication and employee-related factors, for example intrinsic motivation, skill flexibility, skill level, proactivity, adaptability, commitment. Result of this research revealed that organizational climate, management support and job environment played a critical role in employee job performance. Paethrangsi and Jamjumrus (2021) in their study similarly concluded that organizational behavioral factors for instance organization culture, organization structure, workplace ambience, leadership and teamwork have the greatest impact. Pandey (2019) summarized and categorized the work of several other researchers on factors effecting employee job performance into three broad categories namely.

Physical:

Campion (1988) evidenced the link between physical demand and physiological outcomes like discomfort and fatigue. Jobs requiring employee physical efforts was contextualized as part of the job characteristics by Uppal et al. (2014). Christian et al. (2011) linked the physical factor to attitudinal outcomes like job disengagement and job dissatisfaction.

Cognitive:

Demerouti et al. (2001) discovered that most job required a widespread use of cognitive faculties like information processing; leading to the classification of cognitive demands in jobs which affected employee job performance (Bakker & Demerouti, 2014).

Affective:

Hochschild (1983) contended that jobs which are service oriented require affective display as part of the job requirement. A further study by Greenidge et al. (2014) demonstrated the effect of emotional regulation, which is a form of emotional labor, a display of care and concern. Pandey (2019) referred to the above categories as resources which are valuable in enabling employee performance. An example of this was illustrated in the study done by Schmidt and Mckune (2012) on physical fitness and its correlation to employee job performance. Among the dimensions explored were strength, endurance, overall fitness, muscle mass and aerobic capacity. Another example in cognitive ability where Barros et al., (2014) established the relationship between mental and cognitive capability with job performance. This is supported by research

done by Gonzalez et al. (2014) which reiterates that general mental ability is a good predictor of employee job performance. Meta-analysis by Gonzalez-Mulé et al. (2014) evidenced the importance of contingent and context-specific procedural knowledge. In the area of affective resources, the aspects of emotional intelligence and research done by Lorente et al., (2014) on emotional competence and emotional intelligence by Cote and Miners, (2006); Farh et al., (2012); Greenidge et al., (2014); Joseph et al., (2014); Sy et al., (2006) are relevant. Zeigler-Hill et al., (2015) sums it up appropriately in the establishment of the emotional stability having a positive correlation with job performance.

Financial Stress

Garman et al. (2004) described financial distress as an intense physical or mental strain that includes concerns and worries about financial matters. The stressor triggers include notices from creditors, unpaid bills, and preparation for major life events such as retirement. Concerns about debts effects an employee's quality of life including health, family and workplace relationships and work productivity. Research revealed 53% of Malaysian experience financial stress especially during the covid-19 pandemic (Adnan & Zin, 2021). Employee's job performance will be affected by financial stress, as it reduces morale, hinder problem-solving abilities, and make it impossible for workers to work and negotiate efficiently due to moodiness or irritability caused by a lack of sleep.

Motivation

A study done by Islam and Nabi (2017) indicated that motivation and employee job performance are interrelated with each other. Performance of the employee depends on their feelings i.e., how they feel while performing the task. If employees feel demotivated or not satisfied, then the task is not performed to the full capability. Fatema and Ali (2019) opined that employee motivation is a psychological phenomenon that boost the morale of the employees, helping them perform with greater efficiency and effectiveness. It and guides the behavior of the employee towards achieving the group goals. Zameeri (2014) added the dimension of self-appraisal to the equation. His study theorizes, employees who self-appraise demonstrate a higher willingness to work harder with minimal supervision. Manzoor et al. (2021) examined the impact of intrinsic rewards on employee job performance and motivation. The research revealed a positive and significant impact of intrinsic rewards on the performance of the employee with motivation being a significant mediator in the association between intrinsic rewards and the performance of the employee. Intrinsic reward is mostly intangible and unique, as it very much depends on the characteristics of the individual. It is personalized to the individual and it may include components such as personal satisfaction in completing a meaningful task, acquisition of new skills and knowledge, being given the freedom to choose tasks and even a sense of belonging to a team. The intrinsic reward is usually complemented by tangible extrinsic reward such as increments, bonuses, benefits, commissions, awards or prizes. It's usually external to the task and controlled by other members of the organization. Performance of the employee also very much depends on the skills, educational qualifications, work experience, motivation to achieve the targets and the inner willpower and dedication to improve his/her performance for personal as well as the company's benefits.

Technology advancement

Technological advancement is defined as the pursuance and understanding of underlying science used to develop current materials, processes, and devices. Imran and Maqbool (2014) described technology advancement as the generation of information or the discovery of knowledge that improves the understanding of technology. A scientific breakthrough advances our knowledge of technology. Rapidly evolving technological advancement is greatly impacting the workplace. In terms of knowledge and skills enhancement, employees are expected to responsible and to take charge of their own knowledge and skill acquisition for the duration of their career. To not only survive, but thrive in this new reality, employees and organizations need to be adaptive to new technology. The study by Imran and Maqbool (2014) also examined the relationship between technology advancement and employee job performance in the banking sector and concluded that technology advancement had a strong influence on motivation and training of employees. Consequently, motivation resulted in a sizeable impact on employee job performance. However, interestingly training by itself did not impact employee job performance significantly. Employee morale is improved, and employee working commitment and task execution time are reduced consequent to technological innovation. Yuvaraj (2018) accurately described this as when employees use technology for the good of the company and following ethical principles, it improves human efficiency, facilitated job task, increase productivity and enhancing employee's job performance

Work experience

Work experience is defined as any experience a person acquires when employed in a particular area or career. The employee can apply their knowledge and skill from what they had learned from previous working experience to a new task. Employers tend to prefer experienced employees as it shortens the learning curve and transition period resulting in a savings and higher productivity for the organization. In today's competitive business environment, appropriate working experience will not only help to meet organizational performance but maintaining competitive advantages over the business competitor. Research from Ochonma and Nwodoh, (2018) opined that working experience will enhance employee's job performance over time and plays an important role in individual performance. Work experience is measured by the duration spent on various jobs during the career of the employee (Giniger et al., 1983; McDaniel et al., 1988; Quinones et al., 1995; Rynes et al., 1997); the accumulation of previous industry (PIE)/occupation (POE) experience (Dokko et al., 2009; Carr et al., 2006). Therefore, it can be concluded that work experience is made up of four components: total work experience, company experience (months spent in current organizations), PIE, and POE. Work experience in this study consists of both PIE and POE. In a study to understand the relationship between work experience and job performance Uppal et al. (2014) discovered that there is a positive relationship between these two variables, however individual factors/personality traits are a major influencing factor. Among the personality examined were openness, conscientiousness, extraversion, agreeableness, and neuroticism. Openness and conscientiousness were found to have a positive impact on job performance while neurotic employees demonstrated a negative relationship between work experience and job performance.

Workload

Shah and Jaffari (2011) defined workload as the amount of job assignment an employee must do at work. It can be categorized as either quantitative, the sum of work to be done or qualitative, how well the work is done in terms of accuracy, thoroughness, and competence. Employees' stress and job performance is often associated with workload. Changes in levels of workload will result in changes to levels of stress and job efficiency. The key will be to find the right balance between workload and job performance to ensure that the employee potential is realized, and under-utilization of human resources doesn't occur. Bruggen (2015) in his study of the relationship between workload and quantitative and qualitative job performance contends that the relationship is inverted U-shaped. Employees out put increases up to a certain point then it starts decreasing. The same is true for the quality of work with the quality being the highest with moderate workload. It can thus be concluded that there will be a tradeoff between quantity and quality of work. Workload pressure can enrich employee exposure and it can positively lead to increasing employee experience, skill, and performance. However, if workload becomes a negative impact, it will create job dissatisfaction, impact job performance and the health on the employees. Spagnoli et al. (2020) in a study on workload, workaholism and job performance discovered that perfectionistic concerns and work engagement mediated the relationship between workload and job performance. Perfectionistic concerns resulted in a positive relationship between workload and workaholism. Another discovery was lower level of work engagement resulted in a negative link between workaholism and job performance. In conclusion, work engagement is a critical fact that needs to be monitored closely and promoted by managers Findings suggest work engagement should be monitored and promoted by managers, especially when workload is high and risk of workaholism, cannot be avoided.

Conceptual Framework and Hypotheses

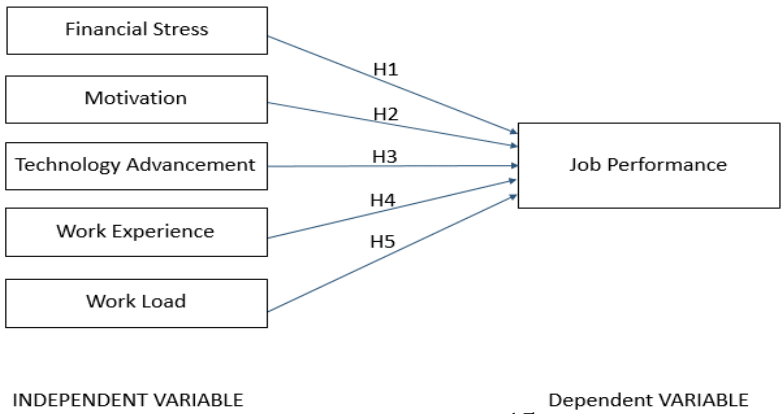

Figure 1: Conceptual framework

H1: There is a positive relationship between financial stress and job performance among employees in the organization
H2: There is a positive relationship between motivation and job performance
H3: There is a positive relationship between technology advancement and job performance
H4: There is a positive relationship between work experience and job performance
H5: There is a positive relationship between workload and job performance
In this framework, five independent variables, which are Financial Stress, Motivation, Technology Advancement, Work Experience and Workload which contribute to Job Performance are tested.

Research Methodology
In this quantitative research, data was obtained from the respondents using survey forms. Data collected was used to quantify opinions, behavior and other defined variable that were set in the survey questionnaire. All the research questions and objectives in this research paper was examined based on the data provided by the respondents using data provided by the respondents and analyzed using the method that is prescribed in this research method. The findings of the research enable a scientific exploration of the issues and problems indicated in this research which otherwise would have been based on speculation.

Factor analysis
The factor analysis was conducted using principal component analysis to analyze the validity of test. The research data was tested using Kaiser-Meyer-Olkin and Bartlelett'test, according to Hadi and Abdullah (2016), the sampling is sufficient or adequate if the value of Kaiser Meyer Olkin is larger than 0.5. The value between 0.6 and 0.7 are mediocre, the value between 0.7 and 0.8 are good, the value between 0.8 to 0.9 are great and value greater than 0.9 and above are superb. The result indicates that the value of KMO of this research is 0.910 and the Barlett's test was found significant at P<0.001 and thus this is good for factor analysis and supported the factorability of correlation matrix. Table 1 show the factor analysis along with factor loading.

Table 1: KMO and Bartlett's Test Results

Kaisr-Meyer-Olkin of Sampling Adequacy		0.910
Bartlett's Test of Sphericity	Approx. Chi Square	5810.009
	df	861
	Sig	0.000

Reliability Analysis
Cronbach's alpha reliability coefficient was calculated to test the reliability analysis of measures across all construct items. According to Ursachi et al. (2013), when the coefficient alpha is greater than 0.60, it indicates the high internal consistency of all instruments, hence convergent validity is supported. Table 2 shows Cronbach's alpha coefficient for all variables. The results revealed that all the variables have acceptable reliability (internal consistency). Finance stress Cronbach's alpha value is 0.629, followed by employee motivation which is 0.742, technological support (0.890), work experience (0.911), workload (0.859) and job performance is 0.903. In summary, most instruments had high internal consistency (>0.60).

Table 2: Reliability Cronbach's Alpha, α. Cutt-off Value (>0.70)

Items	Constructs and Measurement	Cronbach's Alpha, α
	Finance stress	0.629
	Employee motivation	0.742
	Technological advancement	0.890
	Work experience	0.911
	Workload	0.859
	Job performance	0.903

Multiple Regression

The R-value shown in Table 3 is 0.728 it shows the strange positive correlations of the model and the reliability up to 73%. R square represents the variation and the outcome that can be explained by the independent variable. The coefficient of determination (R Square) is 53% of the changes in the explanatory variable can be explained by the predictor variable. This leaves only 47% unexplained by the model. The adjusted R square in this study is 0.518 hence the explanatory variables can explain well the changes in the predictor variable. Based on the findings of the results, we can conclude that all hypotheses are accepted, and they play a significant role in employee's job performance. The research proves that the hypothesis is statistically significant in the findings, providing good analytical data for discussion. Hence everything in the research is relevant in only some part of the continuum and needs to be reviewed based on the current research and findings. Validation is needed from time to time so that research can be concluded as relevant in the current time. Every hypothesis stated above has its weight that leads to employee's job performance, and one of the major factors that can play a role in the research is the time frame of when the research is done. It can be said that different group of respondents have different perspectives, but when it comes to a time where there is not much to choose from, most of the respondents will have almost the same answer. As an example, COVID 19 which globally affects employee routine and activities in relation to their performance. The results in the regression analysis show that the R square of independence variable that financial stress, motivation, technology advancement, work experience and workload could be the influencing factors toward employee's job performance up to 72%. Apart from that, the Sig value from the Coefficient table shows that the p-value is .000 < 0.05 and thus it could be assumed that these factors influence the employee's job performance in this sector.

Table 3: Multiple Regression Table

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.728a	.530	.518	.49193

Predictors: (Constant), Workload, Experience, Finance Stress, Motivation, Technology

Research Implication

Below are some research implications that could be derived from this research:

This study demonstrates that multinational companies can act early and take necessary actions that could help minimize or prevent the problems that will lead to low-level job performance of the employees.

This study encourages groups that are responsible for managing human resources to find the best ways possible to maintain or enhance the positive effects of factors that significantly influence employee's job performance.

Limitation of the study

This study uses a unique set of data from the Malaysian subsidiary of a large American multinational company with a global workforce of over 19,000 employees, which limits generalizability, but adds to an important stream of literature.

The relatively small sample of 200 participants who participated in this survey as a ratio of 19,000 employees working in the multinational company does not provide an accurate general reflection of the actual industry. Furthermore, the discoveries cannot be generalized as being the same for all multinational companies due to the same outcomes from this survey. Hence, it only can be gauged as part of the discovery that needs more study to prove its validity and reliability. As the research was done with an abnormal context when the world is facing the Covid-19 which restricted the ability to conduct the survey, the survey was limited to the usage of online Google Form. The study focused on 5 hypotheses identified from studies conducted by past researchers and literature review on employees' job performance.

Conclusion

Overall, it can be concluded that the five factors identified may influence employee's performance in multinational environment. It is established that motivation has a strong correlation to employee job performance. High employee motivation levels will help employees avoid negative stressors which decreases

job performance. Similarly, as technology varies and improves it is critical to keep employees current and knowledgeable in this area. Employees themselves may not necessarily be motivated to acquaint themselves with new technologies, preferring to work with whatever knowledge and skill they have. Therefore, the organization needs to take the initiative to induct and encourage employees to learn new technologies. Dedicated training and development will also foster employee engagement and employee retention. This will directly affect the opportunities, development, and growth of the organization. The combination of factors mentioned above forms employee experience which has been identified in this research as a key determinant of employee performance.

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The research of 3DSMAX technology in interior design based on aesthetic principle

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Abstract

Nowadays, science and technology are advancing by leaps and bounds. Digital technologies such as big data and internet plus are changing the development of all walks of life, especially in the highly competitive ranks of building home improvement. In recent years, the application of 3DSMAX software in home decoration design is also very common. In the living environment and living space of contemporary people, we can see that people have higher and higher requirements for home decoration, and it is very important to use digital software design to improve people's living space. Therefore, I analyze the application of 3DSMAX software in interior design based on aesthetic principles, hoping to make some improvement and reference for the development of interior design.

Key words: aesthetic principle, 3DSMAX, interior design

Introduction

With the continuous development of modern science and technology, 3DSMAX software has been generally recognized in design and development, and people pay more and more attention to it during the development process. this software is indispensable in interior design. from the increasingly affluent life of modern people, it can be found that more and more people begin to seek comfort and individuality, and use computers for design and analysis. It has greatly increased people's convenience for the form of life transformation scheme, and it is also a great performance of changing people's lives with science and technology at present. However, good software is only a tool. How to add aesthetic principles in the design process, so that the scheme designed by designers is not an empty manuscript, but an artistic work, which is very important. It is the core of the rapid growth of designers at present to organically combine design software with aesthetic knowledge. This paper mainly analyzes the application of 3DSMAX software in interior design, hoping that through this paper, the application and development of 3DSMAX software can be promoted more effectively. As for 3DSMAX software, it is an effect software capable of 3D space simulation design, which covers many aspects such as interior design, industrial products, animation, etc. It was designed and launched by Autodesk Company, and it is also the most widely used 3D design software in the development and interior design of modern and contemporary world. Interior design is a subject that combines many factors such as light, color, design aesthetics, etc. 3DSMAX software can well control the performance of decorative design and achieve satisfactory results. It is precisely because of these characteristics that an important foundation has been built for interior design and development.

1. "Colorful" in Design

Contemporary street art and design are active and full of vitality. Such diverse styles, unique innovations and strong artistic appeal make people feel very energetic and make designers feel excited. Designers vent their emotions heartily in their works of art, let their imagination gallop in infinite space, and express their desires, fantasies and various desired tangible entities one by one. They fully express the beauty of various structures, forms, materials and crafts, and greatly expand the design inspiration of modern people. We can feel the beautiful effects of light, color, texture and transparency. Whether it is three-dimensional or semi-dimensional sculpture or plane or semi-dimensional sculpture, it can awaken people's interest and excitement. Artists try their best to break through the visual order of ordinary people and regard space as an entity. The material, block and color are freely manipulated, thus highlighting the artist's personality. These artistic charms in life are the truest, most intuitive and most touching aspect of our life, bringing the design inspiration into the interior design works. The inspiration from generate is infinite, which is the limited to infinite in design.

Philosophy holds that the development of things is accomplished through constant negation, and the development of design style is no exception. The development form of design style also presents a spiral rise. With the advancement of the times, the advancement of culture and the continuous development of design style through its own ideas. There is an interactive trend between the development of minimalism and the development of culture. In order to seek for development, minimalism needs to adapt to the global atmosphere, which requires the mutual integration of other cultures. The truth of the information age mainly involves new possibilities brought about by simplicity, which is a fierce collision between the new and the old. The information age brings new possibilities to minimalism. In order to realize the new development trend, minimalism requires geometric modeling, and the interior design style has developed closely. Of course, the advanced design model needs the combination of science and technology to achieve the most favorable support. Here, 3DSmax is a powerful design guarantee to promote the development of the present design.

As a powerful 3D software, 3D is a model creation in a virtual 3D space. As one of the powerful functional software in the application of computer technology, 3D can build several modern 3D models in computers, which seems to be a flying wing inserted for designers' inspiration, so that designers are not restricted by space, objects, manpower and funds, and can show their design achievements more quickly. Technically speaking, designers should first have the computer operation ability, such as AutoCAD, 3ds max, photoshop and three major software. The use of 3DSMAX software enhances the artistry of interior space. In the process of interior design, the application trend of 3DSMAX software in interior design is accompanied by the gradual change of the home improvement orientation of human appreciation level. The design scheme to be displayed in the process of interior design is the formal rule of beauty to be displayed in the whole design process. The design and application of 3DSMAX software should be targeted according to different needs of consumers and consumers with different ages, hobbies and personalized needs.

1.1 Spatial Change

The first thing people need to meet for interior design is the demand for space. Realizing the rationalization of space is the basic requirement of interior decoration design. While realizing the rationalization of space, people should also feel the beauty in it, because the purpose of design is to serve people, and the design should focus on people's subject, which requires designers to break the previous concept of space and explore the space image of the new era.

1.2 Color Requirements

Indoor colors can affect people's vision, and can also affect people's mood and emotional changes. The scientific design of colors makes people healthier physically and mentally. Therefore, colors should not only meet the functional requirements, but also meet the requirements of beauty.

1.3 Light and Shadow Requirements

People are more eager to return to nature in a closed environment, especially the fast-paced life in modern cities. People are more yearning for the natural and relaxed theme. The warm and comfortable lighting design can simulate the effect of sunlight entering the room, and the bedroom is equipped with comfortable and natural lighting effects, which can make people feel more relaxed.

Second, "ever-changing" in software. Using 3DSMAX software to design interior scheme is to model according to drawings, design 3D model, then select decoration materials and preview decoration renderings, which can adjust the materials of interior decoration according to your own preferences, so as to better display the design style of interior decoration, and then adjust the lighting to improve the decoration effect.

2. Model Establishment

The modeling of 3DSMAX software is combined with the original plan drawn by CAD, and after importing, the space sandbox is built and the wall is designed in the top view interface. The space to be designed is outlined through the tracing points of lines, and then the corresponding room height is squeezed out. Then, the functions of back vanishing and model wall turning over are used. When building the house model, attention should be paid to the knowledge points of "points, lines and surfaces" in the aesthetic concept for the design of ceiling and wall decoration. In this way, the hard-fitting of indoor space also highlights the effect of rhythm and rhythm, and uses basic commands such as extrusion, contour, chamfering, etc. to complete indoor basic modeling.

2.1 Endowing Materials

3DSMAX software has a powerful material modulation function, because the distribution of materials is closely related to renderers, so we should choose a good renderer before designing materials. The most commonly used renderer is V-RAY renderer, which has a very good effect, is very realistic in restoring indoor effects and is relatively convenient to use. The commonly used renderings in interior design are as follows: 1. Latex paint, which generally reflects 20-25, diffusely reflects 245-250, and highlights 0.3, can be modulated into the effect of interior walls; 2. Tile, whose reflection color is generally adjusted to light blue reflection, which mainly simulates the color of skylight and is subdivided into 20, diffusely reflects 245-250, and glossiness is 0.8-.

2.3 Lighting Effects

The lighting design in the software is very important, which is equivalent to the finishing touch in the whole design scheme. In the scheme design, we use the most commonly used V-RAY light source, which is very convenient to operate. Different display effects can be achieved by setting different lighting parameters. After setting the V-RAY shadow, the display effect is more realistic. When designing the ambient light, we first set the ambient light, such as skylight, and then we can set the main indoor light source and ceiling lamp. Then, the downlight is set, and the performance effect of the downlight is similar to the effect of filling light, which can make the indoor effect richer and the indoor material feedback more refined. With the abundance of indoor light sources, the performance effect is more beautiful in the high-definition output renderings.

2.3 Camera Erection

There are many kinds of cameras set in 3DSMAX software, among which VR physical cameras are common. The settings are adjusted according to scaling, short-distance cutting, long-distance cutting and depth of field, and more cameras can be freely adjusted according to the needs of indoor space display, so the display effect is very good.

2.4 Rendering of Renderings

Rendering skills of renderings should be scientific and reasonable; the manager should restore the interior design effect in real situation, so as to make customers feel immersive; rendering lights should be more indoor layout to adjust the number of lights and the degree of exposure; in the test stage of renderings, the second entry should be lowered to speed up rendering; instead, the design entry should be raised as much as possible when the pictures are really high-definition. Here, we should combine the changes of warm and cold colors in aesthetics. The color of the living room is set to warm light, and the color of the bedroom can be adjusted to neutral tone. Combining aesthetic knowledge, we can restore the indoor space better. Of course,

after getting the final renderings, we should also use photoshop and other software for post-image processing, and adjust the saturation and hue of colors to make the renderings more realistic.

Third, the "old tune and new play" in the case. Aesthetics in design is closely related to painting, and the simple form of expression is deeply influenced by modern abstract painting. Kandinsky's combination of points, lines and planes greatly shows the basic principle of aesthetic composition. Minimalism in painting is an aesthetic form with great functionality, which greatly promotes the development of aesthetics and makes the form of pictures move people's hearts.

Traditional indoor space effect software for making 3D real scene includes 3dsmax, Interior design is a branch of design art, which is an artistic design that creates an indoor environment with reasonable functions, suitable for human habitation and meeting people's material and spiritual needs according to the nature, characteristics, environment and corresponding standards of buildings, and uses physical and technical means and architectural aesthetic principles. Through reasonable design, the space on which we live can not only meet our physical and material needs, but also meet our aesthetic and spiritual needs, and strengthen our love for life.

When an interior design is completed, the design is presented in an aesthetic way. There are sketch relations and color relations. The effect presented here is based on aesthetic principles, that is, we often discuss the combination of points, lines and planes, the collocation of colors, the change of light and shade, and so on.

There are two main reasons for the performance of interior design renderings, among which interior designers can scrutinize and improve their own designs through renderings, and build communication bridges with customers through concrete graphics, and designers can constantly improve their own schemes. Secondly, the performance of renderings can enable designers to better control the whole design direction, and make the design of the schemes more concise and direct, because with this bridge, customers can also save more time to understand the concept of human settlements.

For designers, design is an emotional activity, and an excellent designer often needs many design modifications to determine his own design scheme. Therefore, interior renderings can enable designers to achieve the best design results at the lowest trial and error cost, and constantly revise their design concepts, thus saving a lot of manpower, material resources, time and construction costs.

Design is an emotional activity, and a designer's excellent works often have to undergo repeated modifications from the composition stage to achieve the final satisfactory effect. Therefore, interior renderings can let designers know their creativity in advance. In today's decoration market, customers hope to see the creativity given by design intuitively when talking about the order. Design renderings can be said to be the key to open the hearts of customers. Excellent interior renderings can show the real environment in advance to impress customers and thus stand out from the increasingly motivated decoration market.

In the early indoor performance, due to the lack of popularity of computers and software, most indoor renderings were hand-painted by designers, and most of the designers who drew renderings were students of the Academy of Fine Arts with solid artistic foundation. However, with the popularity of design software, the advantages of computer software gradually began to replace hand drawing, and the computer renderings were restored with their authenticity, which made customers feel immersive when they looked at renderings. It can be said that this is a means of talking about orders that can impress customers very much. The most important design software is American 3dSmax, 3dSmax, which is a very famous sandbox software for modeling and effect expression in computers. It is an effect software integrating modeling, lighting, material and rendering.

With the rapid development of computer software, hardware and software, the production level of indoor and outdoor environmental effects has been continuously improved. In recent years, indoor effects have well demonstrated the propagation of indoor light under various lights. This is an era of popularization of computer software. With the development of various softwares, such as C4D, Autocad, Photoshop, Coreldraw and other softwares have appeared. Designers have become more and more efficient in the design process, and have solved various problems in interior design more quickly. With the increasing maturity of marketization, various online interior design softwares based on cloud data have emerged nowadays, especially 3D Home, Kujiale, Zhaikili, etc., with simpler operation flow and more optimized rendering, and the

ability of rendering interior renderings is no longer unattainable, but more approachable, especially the online rendering design software, which is based on the computing power of network and cloud server. It takes several hours to render a good indoor rendering, and it can render 4K image quality in just 10 minutes, which greatly improves the clarity of the picture, restores the display of indoor effects, and highlights the real design feeling. After being exposed to the above offline and online software, the author deeply admires the development of science and technology. In the future, 3D design platform based on VRY glasses may appear immediately. Designers and customers wear 3D smart devices at the same time, coexist with the virtual 3D environment, and carry out design service work in a three-dimensional and real way. The whole process is relaxed and happy, which can restore the effect of staying at home naturally and fresh, find the shortcomings of design, and achieve real one-to-one private customization to meet people's higher demand for home.

Conclusion

With the continuous progress of social sciences, 3DSMAX software has been widely used in interior space performance. In the process of interior design, relevant designers can use the software to design excellent interior works more conveniently, and can quickly adjust to meet the needs of customers, so as to create different needs of consumers and express the space. However, no matter how convenient the tools are, the aesthetic concept and people-oriented design thinking in the design cannot be lost, so as to keep moving forward and allow designers to create a richer and more diversified charm of interior space.

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Soft TQM practices & organizational performance in the manufacturing and service sector

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Abstract
The main aim of this paper is to examine the role of various total quality management practices (customer feedback, human resource, relationship management, quality culture) on organizational performance. A survey interview is conducted to gather the necessary information with regards to the soft TQM practices. The empirical results reveal that customer feedback is rated as excellent (rating 5) which means the selected companies pay attention to customers' need and their satisfaction. Similarly human resource aspects are utilized properly in all organization as it is rated as very good (rating 4) and excellent (rating 5). However, companies are not paying attention to relationship management with partners and quality culture. Most of the ratings for these two aspects are fair (rating 2) and good (rating 3).

Introduction
Total Quality Management (TQM) is a management philosophy which highlights the need to improve the quality of goods and services for better utilize the resources of organizations [6]. Or it can be defined as TQM is an approach for continuously improving the quality of goods and services delivered through the participation of individuals at all levels and functions of an organization [7]. In past years, large amount of research has been conducted on TQM. Especially, most of research was based examining the relation between TQM practice and organizational performance. This study will investigate the relation between the soft TQM practice and organizational performance in manufacturing sector by using qualitative research and with one short survey. According to research [8], TQM can be viewed in two ways. The first approach conceptualizes TQM as a limited set of technical tools (such as statistical process control and Pareto analysis) while the second approach views TQM as part of broader changes to human resource (HR) practices. First approach is based on quality control, quality assurance of process, product, or service. However, the second approach focuses on human resources practice like commitment, teamwork, training etc. The successful implementation of TQM practice is the combination of hard TQM and soft TQM. However, hard, and soft TQM has direct impact on organizational performance. For this, in most of the investigations, they examined the impact each dimension of TQM on organizational performance individually. Therefore, the study regarding exploring relation of soft TQM (considering most of elements) with organizational performance. Analysis of data is conducted by using graphical method. Also, in this study, through short survey, with objective to investigate degree to which extend soft TQM practice is implemented and used in service and manufacturing sector.

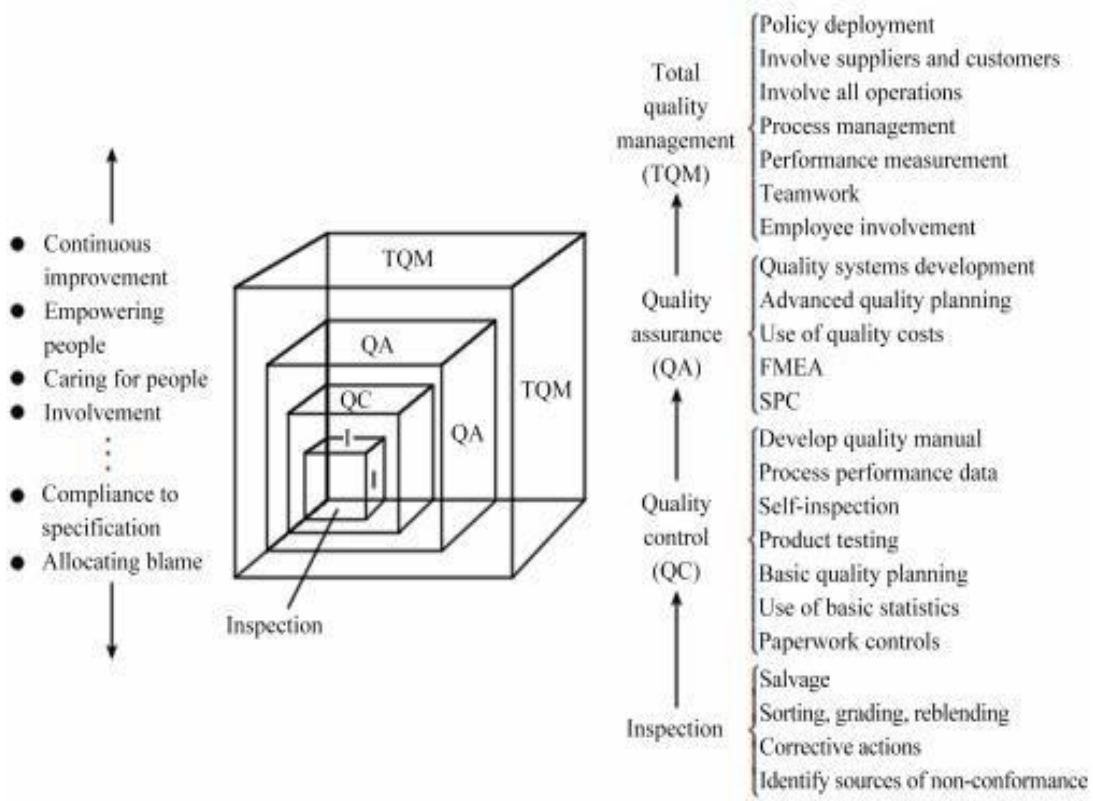
Literature review
The purpose of this section is to provide theoretical information related to the given topic, which is as follows:
Quality management which is also kwon as Total Quality Management. Quality management is concept which is use for goods and service to maintain or improve their quality to meet customer's needs. Roots of quality are made by Japan [9] which at the beginning highlighted on product and performance and then later they

started considering customer satisfaction. Afterwards, quality improvement was introduced by US and then practiced by Japanese. Later, by W. Edwards Deming fixation of quality [10] was introduced. Instead of inspecting quality of product or service after it is manufactured or completed, it focuses on doing correct job at the first time. Implementation of this organization is very difficult. Changes occurs in firm's takes time to implement and practice it. According to [9] some experts say that adopting QM changes may require ten years in an organization. [4]

Total Quality Management (TQM) has changed the management practice over past decades. As most of the principles of TQM are introduced by people who were working in operation management area [11]. Therefore, this bring us to aspects of TQM – "hard" TQM which is production-oriented aspect and "soft" TQM which is related to human resource management (HRM) aspect. Organizations has been less focused on HRM issues like payment system, teamwork, etc. Half of corporate respondents as well as one third of managers think that techniques and managerial changes which are suggested will have big impact on future of TQM. There are many problems arise which are related to human resource (HR) issues such as management style, culture. Reason behind this are organizations only focuses on "hard" measurable aspects like cost, production performance and neglected "soft" aspect. In this way, the restrictions of TQM can be unquestionably somewhat ascribed to the disregard of HR approaches in the association and an inability to adjust the HR strategies to TQM to guarantee coordination. [4]

From past decades till now, organizations have witnessed the evolution of quality in main four stages which are inspection, quality control, quality assurance and total quality management. Inspection is based on confirming the characteristics of products, service, or activities to it set standards. Quality control is based on quality of product and quality assurance focus on products and process whereas total quality management tends to focus on whole organization as one single unit. TQM is widely used in various organization to increase the performance of product and services. In this soft TQM is also a vital part which was not previously considered. Therefore, many organizations failed to implement TQM practice due to lack of understanding and attention to soft TQM. [1]

Figure 1. Evolution of TQM [1]



To understand the TQM, we need to go through the definitions. There are many definitions of TQM that exists, "Total Quality Management may be defined as managing the entire organization so that it excels in all dimensions of products and services that are important to the customer" [12]. As per the definition, evolvement of every employee in producing quality and value for product and service to meet and increase

the expectations and need of the customers. According to the research, [13] defined the abbreviated term TQM, "Total indicates that quality is the responsibility of all employees of the organization and the various activities in it. Quality: refers to achieving and exceeding customer's expectations. Management: refers to planning, organizing, leading, motivating and controlling resources with the aim of continuous improvement" [1]

Basically, TQM is management philosophy and set of guiding principle which are defined by ISO9000 (2000) [14]. First is customer focus, firms are dependent on customers and therefore it is important to understand their current and future needs and requirements and company should strive to exceed customer expectations. Second principle is leadership, leaders create unity and give direction to internal environment of organization, so that they can participate fully and contribute with their abilities for organization's benefits. Third principle is process approach Involvement of people, full participation of all employees will result in organization's benefit. fourth principle is regarding process approach. Desired result can be achieved more efficiently if activities and resources are managed as process. Next principle is system approach to management. As system is contributing to organization's effectiveness and efficiency to fulfill its goal, therefore identifying, understanding, and managing interconnect process of system is important factor. Continual improvement should be permanent goal of the firms. Next is factual approach to decision making, as decision making depends on analysis of data and information. Last principle is mutually beneficial supplier relationship. Every organization is highly dependent on suppliers, partners. Therefore, mutual beneficial relationship will improve ability of to make value to customers. [1]

Following table shows all dimensions of soft and hard TQM.

Key dimensions	*Dimensions*	*Author (yrs)*
Soft dimensions	• Leadership commitment • Customer perspectives • Total customer satisfaction external cooperation employees perspectives • Workforce focus • Employee involvement • Training and education • Reward and recognition, teamwork • External cooperation • Learning employee fulfilment culture • Adoption and communication of TQM • Communication • Partnership and resources • People results • Society results	Saylor (1992), Wilkinson et al. (1992), Anderson et al. (1994), Oschman (2002) and EFQM criteria (2003)
Hard dimensions	• Tool and techniques • Reduction of variability • Ensuring conformance to performance standards • Key performance results • Flexible manufacturing strategic planning • Continuous improvement • Zero defects mentality • Measurement analysis and knowledge management	Saylor (1992) Wilkinson et al. (1992), Anderson et al. (1994), Oschman (2002) and EFQM criteria (2003)

Figure 2. Dimension of soft and hard TQM [4]

Relation between soft, hard TQM and organizational performance [15]. There are many research articles were published relationship among Total Quality Management (TQM) and organizational performance. Most

of study is based on impact of one element of TQM on performance separately. The result of the studies shows only few soft TQM elements (Human Resource – commitment, teamwork) have impact on organizational performance [22], [23], [24]. According to the [15], soft TQM plays an important and various role in organizations. One way is form environment in organization where seamless diffusion and implementation of hard TQM is possible and other is to directly affect performance of organization similarly as soft (human resource management practice). According to [2] TQM has two aspects one which is includes limited set of technical tools (like statistical process control, pareto charts) and other aspect includes human resource practice. After thorough examination of various sectors, it is found that hard TQM is mostly adopted in those companies which adopts strategies to increase stakeholder commitment and integrate employee's reviews in decision making processes.

Therefore, there is one research based on 6 elements of soft TQM investigated and some 5 elements of hard TQM examined and several variables of organizational performance by [16] [17] [18] This research includes detail study of following aspects:

Relation between Soft TQM and Organizational performance [6]. According to [19], executive commitment, open organization an employee empowerment, (soft TQM elements) are more correlated to corporate performance. For this study Powell used various elements to measure organizational performance. Whereas in [16] [20] considered limited set of quality focused elements to measure the performance. As per [16] also conducted investigation of Australian manufacturing companies it is found that out of nine elements only three elements have positive significance with quality and performance of organization. These three elements were workforce commitment, share vision, customer focus. Similarly, [20] also conducted study in automotive manufacturing and component manufacturing companies and reached to same result that performance in terms of product quality was highly significant to soft TQM elements such as employee training, employee involvement and employee empowerment.

All these studies showed that there is direct relation between soft TQM and organizational performance.

Relation between Hard TQM and organizational performance [6]. According to [21], hard TQM includes guiding principles like continuous improvement and considering organization as one system. As soft TQM has direct relation with organizational performance then it is important to examine role of hard TQM. Therefore, as per examination conducted by [16] [20] [17] Statistical process control (SPC), benchmarking, flexible manufacturing systems shows no direct relation with performance. However, there are many managements literature suggested that hard TQM elements has direct impact on organizational performance. For example, effect of six sigma process at Motorola company and other organizations, QFD in Toyota, seven simple tools in Honda, SPC in Motorola, etc. As per these studies hard TQM elements shows direct impact on organizational performance.

Relation between Soft TQM and Hard TQM [6]. Companies accomplishes excellent organizational performance by considering quality factor into products and services, assuring quality in whole process by using various tools to prevent defects and continuous improvement as well as other quality information by customer feedbacks, benchmarking, and charts. Thus, for successful implementation of TQM, organization should be customer focused, have reliable and flexible supplier relationship, and have motivated atmosphere and active participation of all employees in decision making process. Only upgrading technology and focusing on hard TQM does not always increase competitive advantage. Attention to process, product and technology will help to improve quality but at the end it is achieved by people. Thus, employee motivation, education and organizational culture plays vital role in improving quality. There are many studies suggested that successful organization performance can be achieved if organization implement hard and soft TQM polices in combined form, whereas underperforming organization only focuses on new technologies to improve operational outcomes instead of considering customer satisfaction. According to [8], quality is not only about set of technical engineering changes but also broader strategy of organizational change. Also,[8] found that best

quality system is the engage employee and are embedded within team-based HR system. Therefore, these studies suggested that there is direct impact of soft TQM due to adoption and utilization of hard TQM elements and practice. Positive impact of soft TQM on performance can be achieved by connecting them with hard TQM elements. Additionally, these studies found that Soft TQM impact indirectly to organizational performance through its effect on hard TQM elements.

Survey

After extensive literature review on four main elements of soft TQM- Leadership, HR focus, relationship management with partners, and quality culture. This was followed by one small survey. The objective of this survey is to understand degree to what extend organizations use soft and hard TQM. For this survey, set of questions related to main elements of soft TQM were finalized and survey was conducted. In total, there were 22 questions and are referred from one research paper [4]. Six questions were based on leadership, five items were based on HR and similarly six questions related to relationship management with partners and five question related to quality culture. In this respondent asked to mark degree to which extend soft and hard TQM practice is implemented and used. Questions are provided with rating from 'very weak' (1) and till 'excellent' (5).

Targeted company

I approached several managers through my connections. In this survey I have considered manufacturing as well as service sector. I have collected data from 4 companies – Amazon, Bosch, BSH and QIMA. I approached these companies as these all are leading industries in service and manufacturing sector.

Amazon: Amazon is multinational technology company with major focused on online business and cloud computing company, AI and digital streaming. It is largest retailer which majorly focuses on customer experience and provide vast variety of products and services to the customers. The survey was conducted in sortation center of Amazon in Berlin.

Link: https://www.amazon.com/amazonprime

Bosch: Bosch is leading global supplier of technology and services. It has 4 major business sectors: mobility solutions, Industrial Technology, consumer goods, energy and building technology. The survey was conducted in Nashik, India. This plant manufacturers the nozzles and injectors for classical and Euro series. It is continuously taking efforts for customer satisfaction in area of quality, cost and delivery.

Link: https://www.bosch.com/company/

BSH: BSH is a leading manufacturer of the home appliance and no. 1 in Europe. BSH deals with worlds class brands like Bosch, Siemens, Gaggenau, Neff and other 17 local brands. BSH has 38 factories worldwide. We majorly focus on purchasing, logistics and demand and supply chain management. BSH is solely working on customer satisfaction and delivery of smart solutions to the home care.

Link: https://www.bsh-group.com/

QIMA: QIMA which stands for Quality Inspection Management, it is leading provider of supply chain compliance solution and provide quality management services to partners, retailers, importers and brands to secure and improve quality. It has on- ground experts in 85 countries for quality inspection , audits, certification, lab testing etc.

Link: https://www.qima.com

Targeted group and sample size

Targeted audience are more experienced people and designated at high level in those organizations. This includes managers from various departments like supply chain, logistics, production, and operations, change management, etc. Due to data protection, I cannot enclose the name of the respondents. Total sample size is 11.

In leadership aspect, questions were based on vision and mission of alignment towards TQM, quality practice, some questions were based on characteristics of leaders and employee participation. In this most of respondent rated the soft TQM elements from 'good' (rating 3) till 'excellent' (rating 5). In this, top executive involvement in quality management practice is rated as good with 18.2% out of 100% of respondents. Similarly, vision mission alignment to TQM and organization focuses on quality excellence is rated as good with 9.1% out of 100%. Other all elements are rated as good (rating 3) and very good (rating 4).

Human Resource

In Human resource aspect, questions were related to flexibility system for employee, employee recognition, compensations, employee education and training. In this, all respondents rated very good (rating 4) and excellent (rating 5) only in employee adequate compensation, good was rated which has 9.1% out of total.

Relationship Management with partners

In relation management with partners aspect of soft TQM shows different percentage rate as compared to other aspects. For, partners involvement in decision making process, 54.5% of respondents gave good (rating 3) rating . Similarly, performance evaluation has fair (rating 2) and good (rating 3) rating with each 9.1%. Partners and associate's participation for managing system has good (rating 3) rating which is 27.3%. Customer feedback and suggestions have 90.9% of excellent rating (rating 5), that means all companies focuses on customer satisfaction.

Quality culture

Quality culture aspect of soft TQM shows similar response as relation management with partners. Rating for External and internal information related to TQM collection and maintenance has good (rating 3) rating by 50% of respondents. Similarly, statistical tools and techniques usage has good (rating 3) rating by 27.3% of respondents. Formal information sharing has fair (rating 2) rating by 9.1% of respondents.

Result

The SCP objective was to investigate how soft TQM helps to improve organizational performance. For these three hypotheses were considered and it gives result as follows:

Soft TQM elements have direct impact on organizational performance.

Hard TQM elements and soft TQM are interconnect with each other.

Soft TQM elements have direct impact on hard TQM through its adaptation and utilization

Therefore, for successful implementation, organizations should pay more attention to soft TQM as well as hard TQM.

Another survey to investigate current soft TQM usage in leading organization shows that companies are more focusing on human resource and leadership aspect of soft TQM. These companies are customer focused and pay attention to customer need and satisfaction. However leading organizations are not concentrating on relationship with partners and quality culture. These the area where companies need to improve to achieve their goals and objectives of organization.

Future Scope

Due to lack of time, proper survey was not conducted to study the hypothesis with new data from manufacturing sector and its analysis. Also, short survey gave an overview about future survey. In future survey, performance can be measured by financial and non-financial aspects. That survey will include detail analysis of data by using various tools and formation of questionnaires by referring to previous study, will help to conduct effective survey. This type of survey will help to provide one implantation model for TQM to manufacturing companies.

Conclusion

As per survey, it is observed that organizations are less focused towards some of the soft TQM elements. As per the survey customer feedback and suggestions system is rated as excellent (rating 5) means these companies pay attention to customers need their satisfaction. Similarly human resource aspects are utilized properly in all organization as it was rated as very good (rating 4) and excellent (rating 5). However, companies are not paying attention to relationship management with partners and quality culture. Most of rating for these two aspects are fair (rating 2) and good (rating 3). To implement TQM in organization, organization must pay attention to all aspect of soft TQM as well as hard TQM to achieve the organizational goals.

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Content Validation of an Islamic Leadership Model for Preschool Children using the Nominal Group Technique

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ABSTRACT

This article discusses the Nominal Group Technique (NGT) as an alternative strategy for assessing the content validity of a leadership model for preschool children. Nominal group technique, established collegial discussion among a group of participants to agree on essential leadership elements appropriate for inclusion in the model. The strengths and limitations of the technique are discussed The findings of the study had identified a total of 34 elements of ethics and values related to leadership competencies, at the initial stage of the model development. Further group discussion resulted with only 30 elements of ethics and values suitable to be considered for the next development phase of the model. This study establishes the appropriateness of NGT procedures to validate the content of the Islamic Leadership Model for preschool children and greater utilization of the technique is encouraged especially in research studies involving design and developmental research methodology.

Keywords: Nominal Group Technique, Leadership, Preschool Children.

Introduction

Leadership in young children is a component of social interaction and is necessary for children's social development (Mullen, Kydd, Fleming & McMillan, 2019; Liang, 2019; Nesloney, 2020). In the early childhood classroom, children's relationships with each other and with adults, matter and are at the heart of the theoretical and curricular foundations in education (Schneider, 2016; Ridgway, Quinones & Liang Li, 2020). A growing body of developmental research supports the connections of positive relationships in early childhood in healthy brain development, social growth, and academic success in long term studies (Stobaugh, 2019; Bergen, Li, DiCarlo & Burnett, 2020). Most research on leadership focuses on workplace leadership and ignore the importance of understanding leadership qualities among children (Rodd, 2013). This study is part of an effort to design, develop and evaluate the validity of an Islamic Leadership Model for preschool children. It has been implemented in three phases: Phase 1 (need analysis), Phase 2 (the design and development of the model) and Phase 3 (evaluation of the model). This paper presents the methodology used in Phase 3 (evaluation phase) of the research, which was aimed to establish the content validity of the model using the Nominal group technique. The Nominal Group Technique (NGT) is commonly referred to as consensus methods (Yahaya, 2020). It aims to achieve a general agreement or convergence of opinion around a particular topic. Consensus methods are used in research that is directed at problem-solving, idea-generation, or determining priorities (Mullan, 2021). The purpose of this paper is to present the application of this technique for the generation of ideas and decision making in a controlled small group, where research-based evidence about children leadership

competencies is absent or inconclusive (Manira, Hanson, Gutman & Tong, 2019). The systematic process of NGT allows a group consensus to achieve based on individual responses in a face to face environment (McMillan, King & Tully, 2016). This survey technique is increasingly being used for the development of consensus and agreement among a group of participants related to the development of guidelines, standard, framework or model in the field of education (Mullen, Kydd, Fleming & McMillan, 2019)

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In this study, the Nominal Group Technique was utilised to answer the following research questions:
1. What are the experts' agreements on the list of components of values, characteristics and skills of the Islamic Leadership model for Little Caliphs Kindergarten children?
2. What are the experts' agreements on the classification of the Islamic Leadership model for Little Caliphs Kindergarten children?
3. What are the experts' agreements on the suitability of the proposed Islamic Leadership model for Little Caliphs Kindergarten children?

Literature Review

The NGT is an approach that was first described in the 1960s as a procedure to facilitate effective group decision-making in social and psychological research (Delbecq and van de Ven 1971). Since that time it has been applied in a wide range of fields, including education, health, social service, industry, and government organizations. The purpose of the NGT is to generate information in response to an issue that can then be prioritized through group discussion. Participants involved in the NGT take part in a highly structured face-to-face meeting, usually lasting up to two hours. The suggested size of a group is five to nine participants, although some researchers have effectively utilized the NGT with larger groups (Lloyd-Jones et al 1999, Thomas 1983, Twible 1992).
Given the desirability of the attribute list contained in Table 3.10., when comparing the NGT with other group processes such as Delphi (Delbecq et al 1975), focus groups, and brainstorming (Stewart and Shamdasani 1990), the NGT has a number of advantages over other group processes. The advantages are compared below.

The major advantages of NGT are: (1) the clarity and usability of the output (which is typically a list of prioritized actions/options), (2) the easy comparison between different groups with possibly divergent opinions, (3) the quality of the participatory process which minimizes dominance effects and considers all participants' views equally, and the (4) limited requirements in terms of time and resources. These advantages are acknowledged by the literature (McMillan et al., 2014; Rankin et al., 2016). As NGT typically reaches a clear outcome, it also provides a sense of achievement for participants (Harvey & Holmes, 2012). Moreover, the method enables one to reach consensus on complex issues (Hutchings et al., 2013; Rankin et al., 2016), and minimizes researcher bias (Van der Laenen, 2015). A potential disadvantage of NGT is facilitator bias. The structuring of NGT by non-participants may limit the participants' creativity (Smith et al., 2012). The success of the method is dependent on goodwill of stakeholders (Kazmierow et al., 2000), and it is difficult to generalize the findings of NGT to a larger population (Jacobson et al., 2005). People willing to participate in an NGT may also have particular attachments to the place, or to the issue at hand, and so their reflections may not be representative (Jacobson et al., 2005). Although NGT is often presented as a time-efficient method, the lack of time to reach consensus is perceived as a limitation in some studies (Kazmierow et al., 2000; Smith et al., 2012). Only three studies explicitly deal with the limitations of NGT, although other studies only use NGT in combination with other methods. In the general literature on NGT, facilitator skills is very important. Facilitators may need to provide assistance to participants with lower literacy levels or health conditions, ensuring that their opinions are heard (McMillan et al., 2014), and should not attempt to overcome the diversity of opinions in order to create artificial consensus (van Teijlingen, Pitchforth, Bishop, & Russel, 2006). Furthermore, the creation of a safe space that is culturally appropriate needs to be supported.

The physical layout of the meeting room should also be conducive to an atmosphere of exchange (Harvey & Holmes, 2012).

Attribute	Delphi	Focus group	Brainstorming	NGT
Face-to-face group meeting process	no	yes	yes	yes
Generates a large number of ideas	Yes	Maybe	Maybe	yes
Avoids focusing on a single train of	Yes	Yes	No	yes
Encourages equal input from all	Yes	No	No	yes
Highly structured process	Yes	Maybe	No	yes
Meeting time usually 1-2 hours duration	No	Yes	Yes	yes
Avoids 'quick' decision making	Yes	No	No	yes
High degree of task completion	Yes	Maybe	No	yes
Provision of immediate feedback	No	Maybe	Maybe	yes
Measures the relative importance of ideas generated	Yes	No	No	yes
Should be facilitated by an experienced	No	Yes	No	Yes

The size of the group of participants is also mentioned as a key issue to keep NGTs manageable, e.g. McMillan et al. (2014) cite a maximum of seven participants. The small group size of NGT exercises minimizes the "participation paradox", which states that the greater the number of participating actors, the smaller the role each plays and the lesser the importance of traditional individual participants (Suarez de Vivero, Rodriguez Mateos, & del Corral, 2008).

NGT samples

There have been disputes and debates as to what would be the optimal size of group for NGT. Van de Ven and Delbecq (1971) suggest that NGT groups should be made up of no more than five to nine participants, but that large group (nine to more than 200) can be accommodated within this process. Whereas, Horton (1980) identified his groups as ranging from seven to ten individuals, whilst Steward (2001), in her work with Occupational Therapy and Physiotherapy students, had groups of between five and eight. Allen et al (2004) worked on a number of participants between nine and twelve, noting that this afforded the researcher a group that would be manageable, but that would also allow for the generation of a range of opinions, whilst Harvey and Holmes (2012) suggested that a group of between six and twelve would have been ideal. Interestingly, Carney et al (1996) noted that from their pilot project findings, that a minimum of six participants was required, in order to engender a sense of 'safety' within the group, illustrating this point by outlining that one of the pilot groups in the study had only contained five members and it was perceived that

this could be felt as 'mildly threatening'. The table below shows further debates on how many participants should take part in NGT.

Name of researcher	Number of participants
Van de Ven dan Delbecq (1971)	5 – 9 participants & 9 – 200 participants
Horton (1980)	7 – 10 participants
Steward (2001)	5 – 8 participants
Allen et al (2004), Odu and Okereke (2012)	9 – 12 participants
Harvey dan Holmes (2012)	6 – 12 participants
Carney et al (1996)	Minimum 6 participants
Dang (2015)	6 participants
Kuo-Hung et al. (2006)	13 participants
Mohd Ridhuan (2016)	21 participants
Abdullah & Islam (2011)	7 – 10 participants
Habibah et al. (2016)	7 – 14 participants

Experts, for the purpose of this study, are referred to as participants; they are responsible providing information to answer the research questions of the validity phase. In particular, this phase requires experts from early childhood education centres. Thus, from this perspective, early childhood educators who are teaching children aged four to six years old, and who have teaching experience of more than five years are selected to be the expert participants of this phase. Sampling subjects of this study consisted of eleven preschool practitioners who were intentionally selected. They have been operating the Little Caliphs program Kindergartens, they have been teachers and operators and also hold the post of principal for their school. As Denzin and Lincoln (1994) put it, many qualitative researchers employ purposive rather than random, sampling methods. Within the context of this study, the operators of Little Caliphs program that are consultants, auditors, and trainers were purposely selected because they might show differences in ideas and practices, due to their different characters and experiences.

Methodology

The Five-Step Process to Conduct NGT for the Little Caliphs expert participants

1. Introduction and explanation

The participants were welcomed. The purpose and procedure of the meeting were explained. The time limit was set, and they were informed that the session would be recorded.

2. Generating Ideas

The moderator presented The Islamic Leadership Model to the group in written form and let the group read in silence. The moderator directed everyone to write ideas in brief phrases or statements and told them to work silently and independently. Each person silently generated ideas, which they wrote down on sticky notes. The notes were then pasted on a mah-jong paper.

3. Sharing and Recording Ideas

Group members engaged in a round-robin feedback session, so each idea was recorded without debate. The moderator wrote an idea from a group member on a flip chart visible to the entire group, and proceeded to ask for another idea from the next group member, and so the process continued. No idea could be repeated, but if any of the group members felt that a particular idea could be interpreted in a variety of ways, or that different aspects of the idea could be emphasized, they were free to include the idea again. This process was carried out until the ideas of all the group members were documented.

4. Discussing Ideas

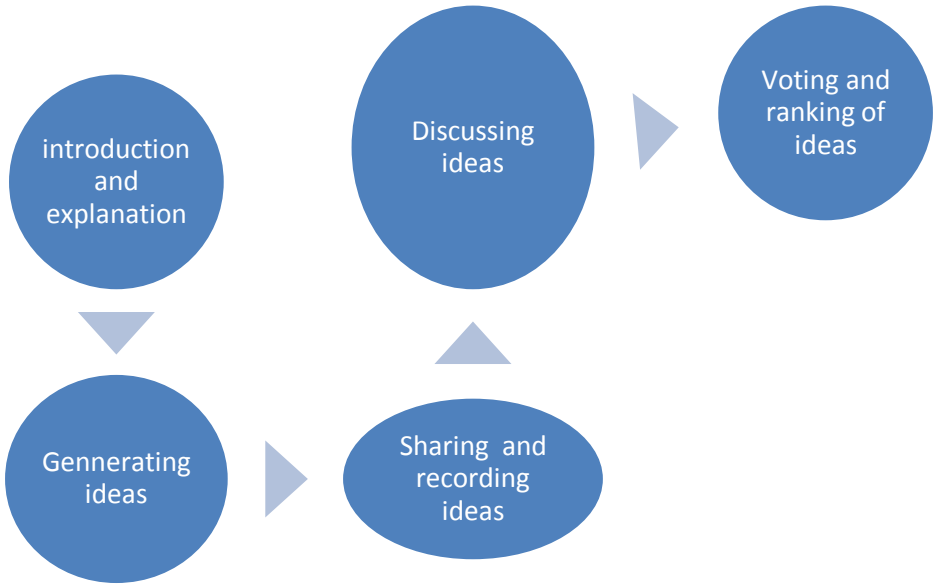
Each recorded idea was later discussed to determine clarity and importance. For each idea, the moderator asked, "Are there any questions or comments that group members would like to make about the item?" This step provided an opportunity for members to express their understanding of the ideas shared and the relative importance of the item. The participant who gave the idea was not obliged to clarify or explain the item; any member of the group could explain or clarify.

5. Voting and ranking of ideas

The ideas given were voted on. The vote counts were recorded. Next, to help prioritize the ideas, the individuals voted privately in a given Google form on how important these ideas were (the rating ranged from not important to very important). The votes were tallied to identify the ideas that were ranked highest by the group as a whole. The moderator established what criteria to use to prioritize the ideas.

1. Introduction and explanation	Welcomed experts and explain to them the purpose and procedure of the meeting	10 mins
2. Generating ideas	Provided the Islamic Leadership model and told them to write down any ideas that came to mind. They were not allowed to consult or discuss their ideas with others	10 mins
3. Sharing and Recording Ideas	Invited the experts to share their ideas by writing on post notes provided and to paste it on the mah-jong paper provided. Then a round robin process was done until all ideas have been presented. There is no argument at this point. It was ensured that all participants get the opportunity to contribute ideas. A written record of all ideas generated by the participants were recorded	20 mins
4. Discussing Ideas	Participants were invited to explain about their ideas. The process was ensured to be as neutral as possible avoiding judgement or criticism. Their suggestions were recorded and combine into categories, and no ideas were eliminated.	30 mins
5. Voting and ranking of ideas	The participants were then given the questions in Google form and the results were shared and ranked accordingly to reach a specific outcome	20 mins

The steps are further simplified in the figure below:



Range of acceptance for measurement in NGT

There are many ways identified to interpret the NGT data, collected from the NGT face to face workshop. Between the range of acceptance for measurement in the NGT frequently used the percentage score must be at the range of 70.0% and above. (Mohd Ridhuan Mohd Jamil 2017; Williams et al. 2006). The range decided is similar to a group scholars whom states that percentage of acceptance of an element is based on the percentage score where an element measured usability shall at least have the percentage of 70.0% based on the opinion of the expert participants of the study (Deslandes et al. 2010; Dobbie et al. 2004).Example in calculating the percentage score

_____

Numbers of participant= 9
Highest score in Likert scale is 5
Numbers of participant x Highest score in Likert scale: 9 x 5 = 45

Example of element:	Score
Students use many varieties of information to get ideas	43

_____

Result:
Percentage of the score: 43/45 x 100% = 96%

Results

Descriptive Analysis for NGT

The analysis of data from the NGT and reporting of results can be carried out using a combination of both qualitative and quantitative methods, hence reference to the NGT as being a mixed method approach. Inductive content analysis (Patton 1990) of data enables verification of information collected in the meeting process. The individual comments from participants was checked against their individual response in the Google form given (please refer to Appendix P). The comments were also written on a post note and pasted on the mah-jong paper. The facilitator has recorded the valuable insight gained from the individual experts'

comments and discussion. From this qualitative analysis, quotes from participants were extracted from the transcripts to help explain both individual and group thinking to provide improved clarity in the explanation of results. A high quality video recorded was done and this was very helpful to code data so that individual participant's comments can be readily identified for cross checked against written information.

Qualitative Results in NGT

The Islamic leadership model are divided into 3, the values, the skills and characteristics. On the values needed to have in the Islamic leadership model, most of the participants agreed that good spiritual qualities should be ranked no 1. Below is the transcribed script of the respondents.

Respondent 10 agreed that having love and care should be ranked no 1 because they are children. Children should receive love and learn to give love as in Maslow hierarchy of needs. All the respondents agreed to her suggestion

Respondent 2 said that five pillars of Islam should be ranked no 1 together with the six pillars of Iman. She mentioned that the children should know the five pillars of Islam and at least know how to recite shahadah, know the movement and recitation that is obligatory in solat, knowing the importance of solat and know that as Muslims we need to fast and be trained in fasting during the month of Ramadhan. The children need to only know that zakat and hajj is in the five pillars of Islam and they will be able to do that when they are much older and if they are able.

According to the experts' discussion, the children need to know, practice and also encourage their family to do the same even though they are young. This is a very clear sign of an Islamic leader.

Respondent 1 asked why spiritual qualities are ranked no 6. Respondent 8 mentioned that five pillars of Islam and six pillars of Iman are the good spiritual quality and the question is a bit confusing.

According to the experts as the participants, these knowledges will become the values that are extremely essential and the basis of humanity of becoming a leader.

When taking a vote, 83.3% participants which is 7/12 agreed into this idea. The argument is that it is the basic pillars of an Islamic leadership values. This is the value that are able to differentiate between Muslims and non-Muslim leaders

Islamic leadership skills

Respondent 2 mentioned that the word 'Influence others' should be positive; the word positively should be added. All respondents agreed to the suggestion of putting in the word positively to the word influencing others.

Respondent 8 insisted that listening skills should be ranked first. It is according to the language development of children which is to acquire listening skills before others. This is according to the nature of kids and align with the Quranic words mentioned in Surah as Sajdah vs 9.

Respondent 2 agreed too that listening skills should be ranked no 1 this is backed up with the agreement other respondents.

Respondent 11 is to the agreement that listening skill is very important because it will lead to the development of other cognitive skills like speaking, reading and communication.

Respondent 3 mentioned and emphasized that having good listening skill, good communication, critical thinking, being able to solve problems and able to express their feelings are very important skills to be embedded in children so that they grow up to be good leaders.

Respondent 4 said expressing one's feelings is a necessary skill and should be ranked first. This is because "If you can't express yourself you can't lead others"

Respondent 9 suggested that instead of the word 'express' change it to the word 'acknowledge' She further said that if the children can acknowledge their feelings, they will understand which emotion than they can express.

Respondent 11 agreed to the suggestion of respondent 9 because what is important is for children to acknowledge how they feel and what are they feeling. This is because children experience complex feelings just like adults. They get frustrated, excited, nervous, sad, jealous, frightened, worried, angry and embarrassed. She agrees that before knowing how other feels they should know and acknowledge their own feeling first. They don't have to know others feelings yet at this preschool age.
Respondent 3 added that young children usually don't have the vocabulary to talk about how they are feeling. Instead they communicate their feelings in other ways. So if they are able to acknowledge these feelings then they can communicate it through facial expressions, through their body, their behaviour and play. Sometimes they may act out their feelings in physical, inappropriate or problematic ways.

All the respondents agreed to change the word from 'express' to 'acknowledge'.
Respondent 7 asked why public speaking skill is the last in the ranking because leaders should have good public speaking skills.
Respondent 1 said that public speaking is not really a major skill needed to become a good leader.
Respondent 8 did not agree with respondent 1's opinion. She said that public speaking skill is needed depends on the leader's position. Some ranking and position need to have good public speaking skills and some don't.
When taking a vote, 10/11 respondent agreed that listening skills and acknowledging feelings should be ranked together as the most important skills needed in Islamic Leadership model
For the Islamic leadership characters that children must have
Respondent 8 asked why is having responsibilities ranked as no 4 instead of no 1? Having the sense of responsibility will make them better and be more positive. For example, children should have the responsibility to be clean at all time. They are responsible of their own things and this character is important once they get to primary school
When taking a vote, 100% of the respondents agree having responsibility to be higher ranked or no 2 instead of the last
Respondent no 2 asked why is resilience important?
Respondent 7 said that leaders must be resilience like Nabi Yusof alaihi salam. Prophet Yusof was very reliance going through all the tests bestowed upon him.
Respondent 1 said that resilience is a very critical characteristics needed in this world right now, especially in the global digital issues. Resilience is an issue that is much discussed as a character that is lacking in children and teenagers nowadays.
Respondent 11 answered the question why is patience not ranked high in the characteristics of leadership in children? Preschoolers understand the word patience differently from adult. To them the word patience is to procrastinate for example when they say "Wait teacher, please be patient, I will play and then do the work later." The word patience is more of a verb rather than an adjective. Children's vocabulary is not that high and with less life experiences, what they understand the word patience is not the same as adults' understanding of the said word.
Respondent 1 agreed to respondent 11's explanation.
Respondent 5 asked why persistence is important in children
Respondent 2 said that the meaning of persistence is not consistent. Persistence means doing something until they succeed to do it. For example, they are persistence to try to colour the ball even though it takes a long time to do so.
Respondent 9 explained that children are unable to relate persistence in life as persistence in playing games that they like. For example: "if you don't like to go to school you must be persistent as you are persistent in playing games."
Persistence is a much-needed character in a leader.
After going through the process of asking the experts opinions,
the facilitator then asked: "Are all of you strongly agree that this Islamic leadership model for preschool be adopted in all Little Caliphs kindergartens"

100% said yes, they totally agree.

Quantitative results

The quantitative analysis of data results from the scoring and ranking methods used to conclude the meeting process and identify group priorities. In the system described by Delbecq et al (1975), scoring can occur in two stages. The first stage involves rating the importance of the items from 5 (very important) to 1 (not important). The single most important item will be the one receiving the most points. This process implies that the question being addressed, and the items generated are clearly understood by all participants and that it is possible to reach a single solution. However, Frankel (1987) makes the point that complex, or ill-defined problems often require multiple solutions. To accommodate this perspective, Frankel used multi-dimensional scaling methods to analyse data from the NGT. Other researchers have also made adaptations to the original scoring methods (Bartunek and Murninghan 1984, Cook 1980, Hares et al 1992). The degree to which group dynamics influence the NGT and the interpretation of findings has also drawn some discussion (Hares et al 1992, Lomax and McLeman 1984). However, as Jones and Hunter (1995) point out, the findings from consensus methods are rarely an end-point, and are more likely to be an exploratory step from which the outcomes can be further tested. This exploratory step may then lead to a research question being identified that may be addressed through further qualitative and quantitative research design. Analysis of findings for this purpose using a 5-point scale measurement. Based on the analysis of these poll findings, the percentage of votes of agreement of each element for every component of values, skills and characteristics elements listed.

Based on the quantitative result, knowing the six pillars of Iman, understanding the five pillars of Islam and having good spiritual qualities are the top 3 of the ranking list. On the skills that are needed to have Islamic leadership 91.7% agreed to have good listening skills as the most important skills, followed by able to express feeling. From the discussion stated in NGT qualitative descriptive analysis, the respondents suggest the word 'able to express feeling' changed to 'able to acknowledge feelings' which is more appropriate for preschool aged children. All the expert participants unanimously agreed that able to influence others is an important skill but the word positively should be added because influence can be positive or negative.

From the NGT consensus calculation, having good public speaking skills and creativity in doing their work are unaccepted skills for the Islamic Leadership Model. For the characteristics in Islamic Leadership Model, the expert as respondents voted resilience, empathy, honest, resistance as the top characteristics that a leader should have. From the NGT consensus calculation, brave and not shy are unaccepted characteristics for the Islamic Leadership Model.

Conclusion

Nominal Group Technique (NGT) is an evaluative methodology, which allows the generation of ideas and thoughts from a group of participants, through the posing of a single question in a face -to -face session. Unlike the Fuzzy technique where study participants were in isolated places, the Nominal group technique allowed for the direct involvement of participants in giving views democratically. The advantage of this technique is that, it has the capacity to generate a lot of data from just one session with participants, that is highlight the cost -effectiveness of the approach. This approach has its own flexibility, in which it can be modified according to the needs of the study without changing the basic principles of its implementation. This paper presents the application of the technique to obtain consensus views from stakeholders in early childhood education, on key Islamic Leadership model for preschool children. The participants were asked to evaluate the elements of the model in terms of its appropriateness and compliance to Islamic teaching.

Using this method, three qualities were seen as important elements that defined Islamic Leadership competencies namely, values, skills and characteristics. The main qualities that defined leadership values are love and care for others as well as understanding the five pillars of Islam. Listening skills were ranked as the

most essential competencies representing the skill component. Having good listening skills shows caring towards others, opening to new ideas, and building relationships. It can help build empathy skills. As a leader, empathy and listening go hand in hand. These are some of the reasons that having good listening skill is the most important element in the component. Some of the essential children's leadership skills that can be gleaned from the NGT exercise were the ability to express one's feelings, influencing skills, creative thinking and public speaking skill. The top characteristics components that defined children's Islamic Leadership as nominated by the expert panellists are resiliency, empathy, honesty and resistance. Based on the results, it can be concluded that, when applied systematically, NGT enables researchers to collaborate in a meaningful and engaging way with participants and generate tangible outcomes relatively quickly

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Private Higher Education Institutions (PHEIs) in Malaysia: An Assessment of Service Quality and Students' Satisfaction

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ABSTRACT

In confronting with multiple challenges, higher education institutions need to know how they are doing in order to attract and retain students. This empirical study reports the results of a study university, UNIRAZAK in determining the service quality and students' satisfaction. **Methodology**: Employing Parasuraman's SERVQUAL-scale, the paper attempts to answer the main research question: Is there a relationship between service quality (reliability, assurance, tangibles, empathy and responsiveness) and student's satisfaction? The paper also takes a close look at their learning experience before and during the pandemic Covid-19. A total of 220 completed questionnaires were collected. **Findings:** Results show that UNIRAZAK students perceived Empathy to be the best dimension of service quality, and that there was a significant difference in the Tangibles dimension comparing pre and during MCO. **Implications**: The study implies that preparedness for eventualities had paid off during the pandemic. Although the findings pertain to UNIRAZAK, it should help other Malaysian PHEIs to better understand their current state of its services.

Keywords; Private Higher Education Institutions, service quality, students' satisfaction, online learning,

1.Introduction

Education sector used to be considered a public good and had clear societal mission, free from market pressure. However, in an increasingly globalised world, the sector is now in a competitive environment (Wee and Thinavan (2013). Even before the pandemic due to corona virus, higher education institutions are finding themselves thrust in an increasingly competitive industry. Now that higher education sector is pummeled by the Covid-19 pandemic, the environment has speeded up tremendous changes that present steeper competition. As such, universities around the world are making adjustment as they confront with multiple challenges, not just the competitive market but also in their teaching and learning (Sia and Adamu 2020). It is therefore compelling, for private higher education institutions (PHEIs) to know what are the factors that could give them the edge over their competitors and know how well they are doing.

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This paper aimed to identify factors that determine the service quality of PHEIs in Malaysia and students' satisfaction. It attempts to determine the relationship between service quality and students' satisfaction, by taking a case study at one of Malaysia's PHEIs, Universiti Tun Abdul Razak (UNIRAZAK). The aim is to find out if students are satisfied with the services provided. Employing Parasuraman's SERVQUAL-scale, the paper attempts to answer the main research question: Is there a relationship between service quality (reliability, assurance, tangibles, empathy and responsiveness) and student's satisfaction? In this context the key questions are: What are the critical factors that attract and retain students? To find out how the experience of online learning, the paper also takes a close look at their learning experience before and during the pandemic Covid-19 and the Movement Control Order (MCO).

This paper is structured as follows: First, it presents the problem statement and background of the Higher Education Institutions (HEIs) in Malaysia, followed by the literature review and the methodology. Finally, it concludes with the discussion of the findings and its contributions.

2. Problem statement and background

PHEIs worldwide are competing for students from local and abroad as student numbers determine their survival. They adopt aggressive strategies to promote their brand to attract and retain students. The global competition started in 2003 by Shanghai Jiao Tong University Institute of Higher Education with the title Academic Ranking of World Universities, followed by the London Times World University Rankings in 2004, which "triggered the transformation of world higher education" that aimed for a global ranking position in higher education (Marginson, 2010).

Asian universities are also competing to be world class universities. Some Malaysian public universities are research universities, intent on being world class universities. The Malaysian PHEIs also need to compete in terms of quality assessment practices. With limited resource, their major challenge is in producing research and providing quality teaching.

The Malaysian National Higher Education Strategic Plan Beyond 2020 recognized the potential of international student recruitment and formulated a policy in 2011 outlining the aspiration for Malaysia to become an international educational hub. The target was to increase the contribution of private education 1.5 times to 2 % of GDP in 2015 and attract 150,000 international students by 2015 (MOHE, 2012) and by 2025 the number of international students to increase to 250,000.

Many of these PHEIs are highly dependent upon the revenue from the international students. An estimate of 20,000 to 30,000 new international students are taken yearly. In 2017, statistics from Education Malaysia Global Services (EMGS) showed the international student enrolment in HEIs were: 103,198 in PHEIs and 33, 095 in public universities. From the statistics, the PHEIs seemed to be doing much better in attracting foreign students. This could be due to the medium of instructions in PHEIs which are fully in English, whilst the public universities adopt the national language policy.

Currently, with the worldwide pandemic, the Malaysian government implemented the Movement Control Order (MCO) from 18 March 2020 and continued with further extensions, till current date. With the movement restrictions, many private colleges and universities all over the world are feeling the heat. In a global survey conducted on close to 10,000 HEIs from 109 countries indicated that HEIs worldwide are affected greatly in many ways. Malaysia is no exception. With the lockdown due to the onset of covid-19, and the government control over the inflow of the international students, the crisis further strains the cash flow and exacerbated further the outlook of the PHEIs in the country which are already in deep trouble (Malay Mail, 22 May 2020). The President of the Malaysia Association of Private Colleges and Universities (MAPCUs) estimated that about 100 PHEIs could close by 2020 (University World News, 2020).

Even before the pandemic, many of the PHEIs in Malaysia were already ailing. In a newspaper report (New Straits Times, Dec 3, 2018), majority of these PHEIs were operating in the red. Even before 2013, 41% of these PHEIs were making losses. After 2013, this number rose to 55%. In fact, it was reported that since 2010, the average profit before tax fell 54% and profits after tax fell 78%. Around 44% of these are technically insolvent, with increasing debts. In 2018, 53% of them were making losses before tax and 55 % of them after tax. Many are in financial debt.

2.1 Higher Education Institutions in Malaysia: Background

PHEIs in Malaysia began in the early 1970s as private colleges offering diploma courses (Sivalingam 2007). By 1990s, there were mushrooming of private universities and colleges, with the enactment of the Private Higher Education Institution Act, 1996, and Act 555 Private Higher Education. These Acts were to facilitate educational reform to produce quality graduates, to transform Malaysia into an industrialized and to enhanced the competitiveness of the economy. The goal is to achieve the target of 40% of participation rate in tertiary education and 25% in the postgraduate in 2010. The public higher education institutions alone could not meet this projected increase, and since then the number of PHEIs expanded.

Malaysia aspires to be among the world's leading education system (MOE 2015). It is now one of the leading countries in providing higher education in Asia-Pacific region (Knight & Sirat 2011; Lee 2014), and has become one of the famous study destinations for international students.

There are 20 public universities, established between 1962 and 2007, controlled and fully-funded by the government. Besides the public universities there are 53 private universities, 38 polytechnics, community colleges and university colleges and 350 colleges (MOHE; 2018), plus 10 other private universities that are branches of reputable universities from the UK, US, Australia, Ireland and China.

Public universities are regulated by Act 30 of the Universities and University Colleges Act (AUKU) whilst Private Higher Education Institution Act, 1996, and Act 555 Private Higher Education regulate the PHEIs. The regulatory bodies are the Ministry of Education, and the Malaysian Qualifications Framework (MQF). Established in September 1996, the MQF sets standards for all qualifications and accreditations of academic and training programmes. All Malaysian HEIs are subjected to a national rating known as SETARA and Malaysian Research Assessment Instrument (MyRA).

Over the last four decades, the enrolment to tertiary education has increased to approximately 44 % of Malaysians, compared to only 14% in the 1970s and 1980s (New Straits Times, May 14, 2019). In 2019, more than 1.3 million Malaysians are pursuing tertiary education, with 500,000 enrolled in the 20 public universities and more than 600,000 in the PHEIs (New Straits Times May 14, 2019). Majority of the students are financially assisted by the National Higher Education Fund Corporation (PTPTN) loan system.

2.2 Universiti Tun Abdul Razak (UNIRAZAK)

UNIRAZAK, the case study for this paper, is one of the pioneers of PHEIs, established on 18 December 1997, with two campuses: the main campus at Kelana Jaya and city campus at Kuala Lumpur city centre. It had its regional centers, and has more than 25,000 alumni.

With six schools, Bank Rakyat School of Business, Tun Abdul Razak School of Government, Centre for Foundation Studies, Graduate School of Business, School of Education and Humanities, and the newly-minted School of Auditing and Taxation, UNIRAZAK has over 30 programmes, all certified by the Malaysian Qualifications agency (MQA).

UNIRAZAK is a small university by any measure. Albeit student enrolment of less than 2000, it is big on collaboration with the globally-renowned professional bodies such as the CPA Australia, Chartered

Management Institute of the UK (CMI), Malaysian Association of Tax Accountants (MATA), and Chartered Tax Institute of Malaysia (CTIM). It received several awards for meeting the highest standard in tertiary education, and the Ministry of Education's grand award for 'Entrepreneur Private University of the Year' in 2015. In 2017 it achieved 4-star ratings for MYRA and SETARA. Recently, UNIRAZAK has achieved a 5-star rating, the highest rating for SETARA, a huge feat for a small PHEI. UNIRAZAK has huge products, with its students awarded Fulbright scholarships, Perdana Fellows, Diplomatic and Administrative (PTD) officers, Ministers Special Officers, and many successful entrepreneurs.

UNIRAZAK has invested in Learning Management Systems (LMS) a few years on, which enables the academics and students to switch from traditional teaching and learning to fully. Hence, it was seamless for UNIRAZAK in adopting with the new way of delivery of teaching and learning, despite the sudden transition during the MCO period. The concerns remain, however, as shared by many other HEIs globally, of the unequal learning opportunities among students that some students have good access while others do not; as well as the competence and pedagogical approach to maintain the quality of teaching and learning as in the face-to-face approach (Sarea et al 2021).

3. Literature Review

Service quality entails anticipation of what customers expect from the service provider that will lead to customer's satisfaction (Howcroft 1991. If customers perceive service quality as unsatisfactory, they may turn to other providers. With the advent of internet and social media, it is becoming even more critical for companies to provide great service quality. The longer the company keeps improving its service performance the more it meets the expectations of customers (Parasuraman et al.,1988). Providing high service quality means achieving success in competing services, and more importantly provision through services differentiation is often said to be of forceful competitive tool and highly competitive advantage (Parasuraman et al., 1988). Therefore, it is important for companies to measure their service quality and find out the expectations and perceptions of customers and to know which dimensions of service need improvement (Anselmsson, 2006).

The tools used in gauging and measuring the quality is SERVQUAL instrument developed by Parasuraman et al (1988). It measures five specific dimensions of service quality, namely: reliability, assurance, tangibles, empathy, and responsiveness (Parasuraman et al., 1988). Reliability means the company delivers its promises about its delivery, keeps its promises to service provision and solution to problems. Assurance is the ability of the firm and its employees to inspire trust and confidence from the customers. Tangibility is the appearance of physical facilities, equipment, personnel and communication materials It also captures the flexibility of the company and ability to customise service. empathy which means to provide caring individualised attention to customers and to meet the demand of customers to increase customer loyalty. The final dimension is Responsiveness which emphasises attentiveness and promptness in dealing with customer's requests, questions, complaints and problems.

4. Research Methods and Data Analysis

The study attempts to explore the aspects of service quality and the level of satisfaction among students, taking UNIRAZAK as a case study. The research employed a quantitative approach with structured questionnaire. Using Parasuraman's five dimensions of service quality, the survey questionnaire requires respondents to respond to the five dimensions of service quality, with statements about each of the dimensions, as in Table 1 below:

Table 1: The five Dimensions of Service quality and Statements

Dimensions of Service quality	Statements of indication
(1) Reliability of services provided	a. the services are provided as promised;
	b. the services are provided within the promised time
	c. the teaching adheres to course curriculum and its objectives
	d. UNIRAZAK has clearly specified policies
(2) Assurance of Services	a. I am assured of services by my lecturers in their teaching.
	b. I am assured of services by the staff
	c. I am assured of services by the Property Maintenance & others
	d. I am assured of fair grading of my work
(3) Tangibles	a. The equipment are up-to-date
	b. The facilities are visually appealing
	c. The staff members are neat in appearance
	d. The materials associated with the service are visually appealing
	e. Academic support facilities are good
(4) Empathy	a. I am given individual attention
	b. My lecturers give me personal attention
	c. The support staff knows my needs as student
	d. The staff has students' best interest at heart
	e. UNIRAZAK is sympathetic and helpful with students' problem
	f. The staff are available for guidance and advice when I seek them
(5) Responsiveness	a. Students are well-informed of what is going on at the University
	b. UNIRAZAK gives prompt services when needed
	c. The staff is willing to help students
	d. The staff is ready to respond to students' request
	e. Ease of contact/access to lecturers /administrative staff
	f. UNIRAZAK handle complaints well

The survey as a primary source was used to collect the relevant data to study the impact of service quality on customer satisfaction in PHEIs in Malaysia, before and during the MCO. The respondents selected were students who studied at UNIRAZAK before the pandemic and the Movement Control Order (MCO) to ensure that they have both the learning experience before and during the pandemic and the MCO. The survey was conducted in April 2020, during the MCO period. Before the final distribution of the survey, a pilot testing was conducted on a number of academics to obtain feedbacks on the appropriateness of the questions. All items constructed was rated on five-point Likert Scale ranging from (1) strongly disagree to (5) strongly agree. The study applied convenience sampling, using online survey to get responses. A total of 225 responses received but after eliminating the incomplete responses, the valid number completed questionnaires collected was 220.

4.1 Results and Discussion

Demographic analysis

As shown in Table 2 the number of males and females were 39.09% and 60.91 % respectively, with the local students as the dominant group (97.73%) and international students only 2.27%. Majority (48.64%) of respondents were from the bachelor degree level, followed by master degree (37.73%), the Foundation level (10.91%) the PhD level (2.27%).

Majority (47.27%) were from low-income level (between RM2000 and RM3,500 per month), followed by respondents (29.55%) from the middle-income bracket (between RM3,501 and RM8,000 per month).

Table 2: Number of students participated in the survey

	Frequency	Percent
Gender		
Male	86	39.09
Female	134	60.91
Total	**220**	**100.00**
Nationality		
Malaysia	215	97.73
Others	5	2.27
Total	**220**	**100.00**
Level of Study		
Bachelors	107	48.64
Masters	83	37.73
PhD	6	2.73
Others	24	10.91
Total	**220**	**100.00**
School/Centre		
Tun Abdul Razak School of Government (TARSOG)	32	14.55
Bank Rakyat School of Business and Entrepreneurship (BRSBE)	66	30.00
Centre for Foundation Studies (CFS)	13	5.91
Graduate School of Business (GSB)	82	37.27
School of Education and Humanities (SEH)	27	12.27
Total	**220**	**100.00**
Level of Household Income		
RM2,000 and below per month	60	27.27
RM2,001- RM3,500 per month	44	20.00
RM3,501 - RM5,000 per month	35	15.91
RM5,001 - RM8,000 per month	30	13.64
RM8,001 and above per month	38	17.27
Total	207	94.09
Missing	13	5.91
Total	**220**	**100.00**

4.2 Findings and Research Analysis

The regression models could not be run as the dependent variable students' satisfaction is not collected in questionnaire. Hence higher statistics like Regression and SEM could not be applied.

Only paired sample t test is possible to test the following hypotheses.

Null: The service levels are all equal before and during Corona. There is no difference in service levels like Tangibility etc before and during Corona at UNIRAZAK.

Alternate: The service levels declined substantially during MCO at UNIRAZAK.

Table 4: Mean and Std. Deviation before and during MCO

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Reliability before MCO	3.86	220	3.88	0.26
	Reliability During MCO	3.88	220	3.60	0.24
Pair 2	Assurance before MCO	3.87	220	3.50	0.24
	Assurance During MCO	3.88	220	3.38	0.23
Pair 3	Tangibles before MCO	3.77	220	4.66	0.31
	Tangibles During MCO	3.83	220	4.27	0.29
Pair 4	Empathy before MCO	4.46	220	5.63	0.38
	Empathy During MCO	4.45	220	5.58	0.38
Pair 5	Responsiveness before MCO	3.77	220	5.73	0.39
	Responsiveness During MCO	3.80	220	5.64	0.38

Results indicated that Empathy is the best dimension of service quality. However, this dimension showed a slight reduction. All the other dimensions show that the service levels improved during MCO.

Even with the switch to online teaching and learning, the students' level of satisfaction remain consistent with the ones pre-Covid 19 days. Results indicated that learning continues at UNIRAZAK even with the many challenges of the switch.

At the onset of the switch and during the implementation of the unlearning learning during the pandemic, there were, and continue be many factors, that could negatively impact on the students, the academic team and the university:

The adaptability (and the traits required) to switch and maintain consistency in teaching and learning via online mode, the ability to deliver and achieve learning outcomes in a non-conventional mode

The availability of technology, process and systems and the speed of adoption by the students, the academic team and the university.

For the vast majority of students, they signed up for conventional mode of learning.

From the sample size, as many as 82% of the respondents are in the B40 and M40 family income categories, which is a reflection of the student population at UNIRAZAK. The MCO and the pandemic has far-reaching consequences and affect the bottom 80% the most.

The learning challenges imposed by factors outside of the university control such as the availability of IT infrastructure and hardware, the teaching and learning environment imposed by the living conditions of the students among others. Given the challenges above, the findings indicated a major positive for UNIRAZAK.

Table 5: Correlation Coefficients before and during MCO

Paired Samples Correlations	N	Correlation	Sig.
Reliability before - Reliability During MCO	220	0.85	0.00
Assurance before - Assurance During MCO	220	0.79	0.00
Tangibles before - Tangibles During MCO	220	0.87	0.00
Empathy before - Empathy During MCO	220	0.85	0.00
Responsiveness before - Responsiveness During MCO	220	0.87	0.00

Correlations are very high and significant. The service levels are moving in tandem.

Table 6: Significance level of mean differences

	Mean Difference	Std. Error Mean	t	Sig. (2-tailed)
Reliability before - During MCO	-0.10	0.14	-0.71	0.48
Assurance before - During MCO	-0.07	0.15	-0.45	0.65
Tangibles before - During MCO	-0.35	0.16	-2.26	0.03
Empathy before - During MCO	0.03	0.20	0.13	0.89
Responsiveness before - During MCO	-0.10	0.20	-0.49	0.63

The Tangibles show a significant difference. All others show the same service levels though there is a small difference. Students perceived Tangibles to be better during the pandemic.

In this study students are effectively assessing two different "beasts" of before Covid-19 and during Covid-19. It would be useful to look into the context to the study, especially in terms of the challenges confronting most HEIs, including UNIRAZAK and their response to the challenges. HEIs all over the world have moved to change from physical to online delivery mode, and some are cut unprepared whilst some are proactive have their online tools at hand. Nonetheless, the online delivery of teaching and learning is new and requires upskilling and reskilling on the academics. This is not to mention the limited learning facilities, the internet connection that students face particularly for those in the remote areas with little access to broadbands. All these causes mental stress not just among academics but to students too. The result indicated that UNIRAZAK has shown its agility to the sudden change, despite the challenges.

Conclusion

This paper was designed to address the specific aspects of PHEIs services. The constructs in the research model were adopted from the literature by considering conceptualization's of service quality, using Parasuraman et al (1985) instruments.

The findings suggest that the service levels are all equal before and during the MCO at the university under study, i.e UNIRAZAK. There is no difference in service levels before and during the MCO. However, two dimensions stood out: Empathy as the best dimension and Tangibles have shown a significant increase during the pandemic.

The preparedness of UNIRAZAK in terms of its UROX system in preparation for online learning had paid off during the pandemic. Although the findings pertain to UNIRAZAK, it should help other Malaysian PHEIs to better understand their current state of its services.

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Employing Fuzzy Delphi Method to Validate Communication Skills among Engineering Graduates

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Abstract

Delphi method is a technique and structured approach used to review and collect opinions of a group of experts, however, has its own weaknesses. The Fuzzy Delphi Method (FDM), derived from a modifications of Delphi method, considered by many researches as more superior in providing evidence of human linguistic (which is the signature of Delphi Technique). In this paper, Fuzzy Delphi Method was used to assess the content of communication skills among engineering graduates. This development phase is a part of a project to develop an engineering employability skill framework in Malaysia. The paper presented the result of the experts' view and the appropriateness of Fuzzy Delphi Method as an important tool to provide information about the validity of communication skills content. Experts' perceptions have shown incongruity with respect to speak and understand more than one language among engineers. The experts agreed with engineering graduates might be give a clear direction, listen and ask question in their employability skills proficiency. This phase involves the view of 10 experts who are experienced and have deep knowledge in engineering. It is a rigorous statistical analysis to validate the validity of abstract concept of the communication skills.

Keywords: Fuzzy Delphi Method, Validation, Communication Skills, Engineering Employability

Introduction

The Fuzzy Delphi method was proposed by Murray, T., Pipino, L., & Vangigch, J. (1985) with the idea of combining the traditional Delphi method and Fuzzy Set theory. The standard Delphi method developed by Dalkey and Helmer (1963) was the most relied upon methodology used to find answers within a set of questionnaires (Lin & Hwang, 1987; Reza & Vassilis, 1988). This method was based on the use of linguistic terms. However, 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 (Ansari et al., 2019). The Fuzzy Set theory is an approach that can 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 (Zadeh et al., 1996; Ung et al., 2006; Bozbura et al., 2007). In this

analysis, 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, Murray, T., Pipino, L., & Vangigch, J. (1985) proposed to integrate them. However, it was Ishikawa et al. (1993) who combined specialists' opinions with fuzzy numbers based on the concepts of cumulative frequency distribution and the fuzzy integral. This process is called the Fuzzy Delphi method (FDM). The main steps of FDM include the following: 1) Fuzzification; 2) Fuzzy evaluation; 3) Triangular fuzzy numbers; and 4) Defuzzification. To date, FDM has been extensively used in diverse fields of studies, including urban planning, regional road safety, urban road safety, service industries, and health, among others (Yusoff et al., 2021).

The purpose of this study was 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. The following was the research question: What do experts believe are the potential of communication skills in the context of engineering graduates?

Literature Review

Fuzzy Delphi Method is a combination between Delphi classic method and fuzzy set theory. The method was introduced by Lotfi Zadeh in 1965, an expert in mathematics (Zadeh, 1965). The Fuzzy set theory mechanism act as a leeway of the classic set theory in which each element in a set is evaluated based on the binary set of "Yes" or "No". According to Bodjanova (2005) the values for numbering fuzzy are between 0 to 1 or if in the unit interval of (0, 1). It has been proven in previous literature review that FDM has been used as a method in various areas, as in engineering, education and many other professional fields. In addressing this issue, an introduction of communication skills is pivotal. Communication is a strategic sill that exclusively considers purpose, content and context of communication to effectively deliver information in working field (Cook et al., 2002; Lappalainen, 2010; Rau et al., 2014). These skills can be categorized into five: a) speak, b) give direction, c) listen and ask question, d) ideas and e) understanding skills (Cook et al., 2002; McMurrey, 2002; Brinkman & van der Geest, 2003; Reaves et al., 2005; Lappalainen, 2010; Rau et al., 2014). Findings of previous studies have appointed its importance in preparing students for real communication in industry (Reaves et al., 2005; Lappalainen, 2010; Rau et al., 2014).

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 (Bodjanova, 1997; Bodjanova, 2006; Tang & Wu, 2010;). 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.

Approach to FDM

After the questionnaires were administered, the third phase of the study was the application of the FDM. Based on the questions asked in the questionnaires, the main criteria and their ranking of importance were selected by 10 professionals in different fields of studies, such as executive, civil engineers, businessman, and technical & vocational.

Step 1: The first fuzzy system was designed to understand communication skill quality among engineering graduates, the second one was to understand the engineering student's quality, and the third one was to understand if there was a real need for engineering programme restructuring.

Table 1: Communication Skills Assessment Threshold Value

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

Based on Table 1, there is one threshold value highlighted in red that is passed over the threshold cut-off value of 0.2 (> 0.2) and four threshold value is below than 0.2. If the average value of threshold (d) is less than 0.2, the item has reached a good expert agreement (Chang et al., 2000; Chang, Hsu and Chang, 2011; Kharuddin et al., 2019).

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, namely: 1) Speak in clear Sentences; 2) Give clear direction; 3) Listen and ask question; 4) Ideas presented with confident and effective; and 5) Speak and understand more than one language. These input yielded one output: communication skills assessment. The level of agreement for the communication skill among engineering graduates were highly important, important, somewhat important, least important and not important at all. The levels of the expert consensus on communication skills were very optimistic, neutral and very pessimistic.

Step 2: Calculate the fuzzy average $A\tilde{V}G_{ALL}$ and re-examine (if necessary for each dataset which represent consensus adjustment obtained as

$$A\tilde{V}G_{ALL} = \begin{bmatrix} 0.700 \\ 0.720 \\ 0.720 \\ 0.660 \\ 0.540 \end{bmatrix}$$

Step 3: Measure the level of confidence results using alpha (α)-cuts concept via three linguistic variables as defined in Table 3 and employ by Equation (2) as shown in Table 4.

Table 3: Threshold Value (d), Percentage of Expert Consensus (%) And Fuzzy Score (A) for Communication Skill

EXPERTS	Communication Skill (CS)				
	1	2	3	4	5
1	0.2	0.2	0.2	0.4	0.5
2	0.2	0.1	0.1	0.2	0.2
3	0.2	0.1	0.1	0.2	0.1
4	0.5	0.2	0.2	0.4	0.1
5	0.2	0.1	0.1	0.2	0.1
6	0.2	0.1	0.1	0.1	0.4
7	0.2	0.1	0.1	0.2	0.1
8	0.2	0.1	0.1	0.2	0.1
9	0.2	0.2	0.2	0.1	0.2
10	0.2	0.2	0.2	0.1	0.1
Average of Threshold Value (d)	0.183	0.147	0.147	0.214	0.189
Percentage of Experts Consensus (%)	90.0%	100.0%	100.0%	80.0%	80.0%
Fuzzy Score (A)	0.700	0.720	0.720	0.660	0.540

While this percentage of the overall agreement is at a value of 90% of the agreement above 75% means meeting the terms of the expert agreement on this item. The highest value of defuzzication evaluation is 0.720 and the lowest is 0.540. In addition, all Alpha-Cut defuzzication (average of fuzzy response) exceeds α-cut ≥ 0.5. According to Mamat et al., (2018) and Hashim et al., (2020) the cut-off value should exceed 0.5. If the value is less than 0.5, the item should be dropped. This show the subjects of subjective norms have good experts' agreement on item assessment. The items agreed by the expert consensus are arranged according to the ranking as shown in Table 4.

Step 4: Defuzzify average fuzzy set using Equation (3), and apply adjustment the results (if necessary).

Table 4: 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'

Step 5: Ranking process by descending order. As we can see that, from Table 4 (see last column) issue CS_2 (Give clear direction) are preferred and the last choice is the fifth issue (CS_5 – Speak and understand more than one language) in terms of their consent on engineering students' communication skill. This ranking result is consistent at every level of confidence that it was imposed.

Table 5: 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

Based on table 5, the Fuzzy Delphi analysis identified that a significant number of experts had strongly negative consent about communication skills among engineering graduate. Experts' perceptions have shown incongruity with respect to speak and understand more than one language (lowest defuzzification score of 0.34). They also held contradictory opinions on the ideas presented with confident and effective in the Malaysian context (0.46 points). This stipulates a mismatch between the rhetoric of integrating communication skills into the field and the reality of its implementation. This is parallel to the Zaini and Mansor (2010) study findings that Malaysian engineering graduates still need to improve their communication skills, although they were mainly aware of the potential of employability preserve. The experts agreed with engineering graduates might be give a clear direction, listen and ask question in their employability skills needed (highest defuzzification score of 0.52). They also acknowledged speak in clear sentences as an element of communication skills needed for engineering graduates (Kharuddin et al., 2018). The positive views collected are in line with a study by Antheunis et al. (2013), where the key barrier in communication skills among most engineer practitioners was its effectiveness.

Discussion

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 (CS_1 – CS_5) 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.

Theoretical and Contextual Contribution

This research comprises a selection of variables from an engineering employability skill framework in Malaysia on theoretical advances and applications of fuzzy logic computing. These variable name communication skills were selected from over 14 competency skills and constitute an important contribution to the theory and applications of fuzzy logic methodologies. Fuzzy Delphi computing consists of several computing paradigms, including fuzzy logic, neural networks, genetic algorithms, and other techniques, which can be used to produce powerful intelligent systems for solving real-world problems. Applications range from pattern recognition to intelligent control and sow the advantages of using fuzzy delphi computing theory and methods. This paper also makes a contribution to this goal.

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