Analysing the Determinants of Job Selection Preferences among Quantitative Science Students in Malaysia using Multi-Criteria Decision Making (MCDM)

C.K. Ch'ng* and Z.W. Phang

Department of Decision Science, School of Quantitative Sciences, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia

Selecting a job is a crucial decision for university students, particularly those in quantitative science disciplines, given its profound impact on their future careers. However, students often face challenges in navigating job options, necessitating a deeper understanding of their preferences and decision-making processes. The factors influencing their job preferences are multifaceted and require thorough examination to support informed career planning. Understanding these determinants is important for both students and stakeholders, such as educators and employers, to develop effective strategies and programs that align with students' career aspirations. This study aims to identify and analyse the determinants of job preferences among undergraduate students in quantitative science disciplines. Specifically, Analytic Hierarchy Process (AHP) methodology is employed to rank job alternatives and evaluate the consistency of the AHP model in capturing students' preferences accurately. Data for this study were collected through online questionnaires distributed to undergraduate quantitative science students in their seventh semester at Universiti Utara Malaysia. The Analytic Hierarchy Process (AHP) methodology was utilised to assess the significance of various research criteria and rank available job alternatives based on students' preferences and priorities. The findings reveal that local job opportunities are preferred over other alternatives. The local job alternative received the highest weightage of 0.3504, closely followed by foreign jobs with a weightage of 0.3468 and jobs in hometown with a weightage of 0.3028. These results emphasise the significance of prioritising local job opportunities in students' career planning processes. They underscore the need for universities and industry employers to consider local job opportunities as a priority when designing career-related programs and initiatives to better align with students' preferences and needs.

Keywords: job selection preferences; career decisions; university students; analytic hierarchy process; multi-criteria decision-making

I. INTRODUCTION

Global economic activity is experiencing a significant slowdown, accompanied by rising inflation compared to previous years. The living cost crisis is exacerbating financial conditions in most regions (International Monetary Fund, 2022), leading to an estimated reduction in international progress from 6.0 to 2.7 percent between 2021 and 2023 (International Monetary Fund, 2022).

In Malaysia, the inflation rate surges to 4.7 percent in August 2022 from July 2022, reaching 4.4 percent overall. This increase is attributed to a 7.2 percent rise in food and non-alcoholic beverages prices, despite some food items, such as chicken, barramundi fish, and vegetables, experiencing price reductions compared to July 2022 (Department of

---

*Corresponding author's e-mail: chee@uum.edu.my

Statistics Malaysia, 2022). The high inflation rate leads to elevated living costs and standards for people (Islam *et al.*, 2017).

The situation worsens as many higher education students find themselves unable to secure employment. In 2021, despite ongoing efforts to combat the pandemic, the unemployment rate rises to 4.6 percent. This leads to an increase in the number of individuals without employment to 733 thousand, compared to the previous year, which sees 711 thousand persons facing a similar situation, as reported by the Department of Statistics, Malaysia (2022).

Unemployment significantly impacts various aspects of graduates' lives, particularly those burdened with study loans (Juliana *et al.*, 2020). In 2020, Malaysia's graduate population increases by 4.4 percent to reach 5.36 million individuals compared to 2019. Regarding unemployment duration, over 70 percent of graduates without employment total 158.4 thousand individuals, with 71.4 thousand being unemployed for less than 3 months. Additionally, 47.6 thousand and 23.5 thousand individuals remain unemployed for 3 to 5 months and 6 to 12 months, respectively. Furthermore, 16.0 thousand graduates experience long-term unemployment, while 44.0 thousand graduates are not actively seeking jobs in 2020 (Department of Statistics Malaysia, 2021).

The reasons for young people's lack of careers are influenced by factors such as pay, job quality, and workplace environment. Employer studies indicate that deficiencies in communication, technical, and professional skills contribute to unemployment (Lee, 2020). Additionally, according to the Ministry of Finance (2019), younger generations face challenges in securing employment due to a lack of work experience, education, and competitive skills (Shakur *et al.*, 2020).

Besides that, Evanezza and Geetha (2020) indicate that unemployment results in various social impacts, including skill loss, mental health issues, reduced standard of living, and financial obstacles. Furthermore, individuals without careers may struggle to provide sufficient income for their families, leading to decreased economic growth in the community and heightened crime rates (Picardo, 2022).

Based on the most recent available data, Malaysia's unemployment rate remains stable at 3.9 percent in May 2022, with 637.7 thousand individuals reported as unemployed. Concerningly, in 2021, over 106.9 thousand female and 90.5 thousand male graduates are without employment (Department of Statistics Malaysia, 2022). This unemployment issue, as emphasised by Baharom and Habibullah (2007), not only impacts economic activity but also the overall quality of life. Similarly, Cebula (1980) and Roback (1982) suggest a link between unemployment and crime rates, affecting the cost of living. Latimaha *et al.* (2019) further highlight unemployment as a major factor in Malaysia's street crime rates. Failure to address graduate unemployment could jeopardise economic development, a challenge seen globally. Many graduates, burdened by education loans, struggle to find suitable careers, as not all available opportunities match their skills or qualifications (Pragasam, 2021).

Gati and Kulcsár (2021) reveal that selecting a job is among the most crucial and complex decisions individuals face in their lifetimes, with university students especially finding it challenging. Difficulties in job selection and decision-making frequently plague students. The failure to make a career decision can prompt individuals to seek external input, fostering indecisiveness and potentially leading to temporary unemployment (Goh & Jamaluddin, 2021).

While previous research has extensively explored the prevalence and consequences of graduate unemployment in Malaysia, there's a critical need for deeper investigation into its root causes. Many studies have relied solely on survey data or secondary sources, potentially overlooking important nuances. Integrating quantitative research methods alongside qualitative approaches can provide richer insights into the complexities of this issue and inform more effective policy interventions.

The main purpose of the research is to analyse the determinants of job preferences among quantitative science students. To achieve this, the sub-objectives include

discovering the significance of the criteria used in the research, identifying the ranking for the alternatives using Analytic Hierarchy Process (AHP), and evaluating the consistency of the model. By addressing these objectives, the study aims to provide a comprehensive understanding of the factors influencing job preferences among quantitative science students and contribute to informed decision-making in career development strategies.

II. LITERATURE REVIEW

Occupation finding is a process with a clear goal process in which cognition and action are prepared for clarifying and seeking occupation opportunities (Hooft *et al.*, 2021). People must prepare themselves for the job selection process by motivating and improving their insights and behaviours to succeed in finding a suitable career (Wanberg *et al.*, 2020). In fact, financial reasons, and other unstated goals such as giving status, identity, personal development, and career advancement are always the preferences in selecting a job (Hooft *et al.*, 2021).

Every year, a large number of people actively engage in job seeking activities. There are either people who want to change their careers to upgrade their career environment or students who are going to look for a new occupation after graduating. Not only that, but caregivers also need jobs after finishing their caregiving roles. Therefore, it can be observed that many people are involved in job selection frequently in their lifespan (Wanberg *et al.*, 2020).

Gyarteng-Mensah *et al.* (2021) use the discrete choice experiment (DCE) to discover participants' occupation priority and indicate the criteria' scope that causes an effect on their preferences by using choice sets that comprise factors and their levels based on a particular group and secondary information. In this research, five factors that affect the career path decision: wages, location, workload, motivated management, and challenge that indicate the job involves challenging tasks are chosen. The result obtained reveals the most influenced attributes are salary with advanced expectation and economic theory.

Besides that, Liu *et al.* (2019) also undergo a DCE to obtain the career choice for 4 medical universities last year for undergraduate students of nursing in Shandong Province, China. Influenced factors consist of location, monthly pay, organisation's growth and training chances, work environment and professionals. Mixed logit models are performed, and the results show that economic factors and non-economic factors obviously impact the nursing student's job searching.

Dublin *et al.* (2020) delved into the employment preferences of younger students in higher education, examining the five key factors shaping their career choices: personality, parental influence, hobbies, job prospects, and peer input. Employing a relational study design combining descriptive and predictive analyses, the research reveals that students' course selections are predominantly driven by their interests.

Dejendran and Farid (2018) seek to investigate the factors that influence the career path decisions of 120 undergraduate students from an accounting school during recruitment. Their study utilises a unique set of independent variables, including organisational growth, income and benefits, organisational image, working environment, and job safety. To obtain a representative sample, the researchers select 40 participants from each of three bachelor's programs namely Finance, Accounting, and Investment Management at Management and Science University (MSU). The study reveals that job security is the most significant factor impacting participants' job preferences compared to the other independent variables.

In Bangayan's (2022) study, a descriptive survey method is utilised to gather information on the criteria that influence students' decision-making when selecting an occupation. Eight factors are considered, including course enrolment, school preference, location, social life/extracurricular activities, financial aspects, school attributes, career preferences, and other factors. The research findings suggest that an individual's job preferences are influenced by a multitude of factors beyond those initially identified, including family financial status, personal interests, and perceived opportunities. Moreover, the younger generation's

interest in white-collar occupations emerges as a significant influence on their future career expectations.

Esser and Lindh (2018) conducted a survey four times to evaluate and compare the work performed by nineteen countries between 1989 and 2015. This research applies the latest concept and a welfare-state institutional view to clarify the relationship between extrinsic and intrinsic work and individual and contextual factors. Eight central value dimensions, which are different from the study of Bangayan (2022), such as good security, good income, advancement opportunities, amused job, benefit others, benefit society, control work organisation, and working time, are chosen. The research findings explain that safe and amused occupations are the most favourable and desirable careers, followed by work autonomy, well-paid positions, advancement opportunities, and jobs that benefit society and others. The study concludes that people are oriented towards both intrinsic and extrinsic factors when choosing their occupation, irrespective of gender.

The research by Rajiah et al. (2020) selects a one-way variance analysis with Tukey's post hoc test to indicate the criteria that affect local people to be a pharmacist by undergoing a cross-sectional study for local private universities such as first-year medicine, dentistry, and pharmacy. It finds that economic status, personal history, and work-life balance affect first-year students to be pharmacists the most.

Furthermore, multiple studies explore the factors influencing undergraduate students' job choices in different fields. For example, Garver et al. (2019) use choice-based conjoint analysis to examine how logistics students select related occupations based on six attributes, which differ from the study by Rajiah et al. (2020) that includes starting salary, time required to reach the company, match with corporate culture, occupation environment, location, and type of business. Starting pay, organisational culture, and connection with friends and family are crucial factors for entry-level job positions. The company's locations in the outskirts, an office setting, and manufacturing firms attract more undergraduate students to join the company.

On the other hand, Al-Abri and Kooli (2018) argue that there are other techniques to investigate factors that have a huge impact on graduates. Five criteria, such as financial advantages, culture, job safety, job prospects, and interest, are tested, and the findings demonstrate that financial benefits have a significant impact on career choices.

Similarly, Akosah-Twumasi et al. (2018) explored the factors affecting job selection among the younger generation, with a focus on collectivist and individualistic cultures. By applying the Joana Briggs Institute's format, they identify external, internal, interpersonal factors, and emerging bicultural influences as the factors influencing occupational choices. The results indicate that in collectivist societies, parental intervention motivates children's efforts, while in individualistic societies, children's ideas are valuable for parents in selecting suitable occupations.

Suhi et al. (2021) administered a self-administered questionnaire (SAQ) to identify job selection preferences among Bangladesh students by identifying related determinants. 422 students from government universities are given the related data for multistage stratified sampling, chi-square analysis, and multivariate analysis. The result of the study reveals that boys favour working in the private sector, but girls prefer government jobs. Research shows that job preferences are not determined by gender, but rather by individual interests, skills, and opportunities.

Furthermore, the study by Jinadasa et al. (2021) applies frequency, the chi-square test, and conjoint analysis to examine the factors influencing career selection and identify the major factor influencing management undergraduates' job preferences in a selected national university in Sri Lanka. The sectors of manufacturing, banking, academia, and audit are set as the important occupation choices. The result reveals that the type of contracts is the major factor influencing management undergraduate job preferences. Additionally, future prospects of occupations, high salaries, and availability of occupations are also considered in students' job preferences.

Apart from that, Hamid (2020) uses correlational analysis and tests of difference to examine how starting pay,

organisation's image, and working environment influence career preferences for local accounting students. Six accounting professionals review and validate the survey questions before data collection commences. A total of 443 accounting students from both private and public universities in Malaysia are surveyed, and correlation analysis is conducted to examine the relationship between career selection preferences and various factors. The results indicate that the working environment is the primary factor influencing career selection preferences among accounting students.

III. MATERIALS AND METHODS

A. Research Design

The research process follows a specific flow, starting with defining the objective goal and establishing job selection preferences to develop a hierarchy in the model development phase. Subsequently, a pilot test is conducted, followed by the collection of data from quantitative students to use for pairwise comparison of job selection preferences. The AHP consistency value is then calculated by identifying the maximum Eigen value and computing the consistency ratio by dividing the consistency index by the random index (Teoh *et al.*, 2022; Chan & Ch'ng, 2022). If the consistency ratio is equal or less than 0.1, the model is considered trustworthy, and the final ranking is valid. However, if the consistency ratio exceeds 0.1, the model is deemed untrustworthy, and a re-evaluation of the collected data is necessary. The flow of the research is depicted in Figure 1.
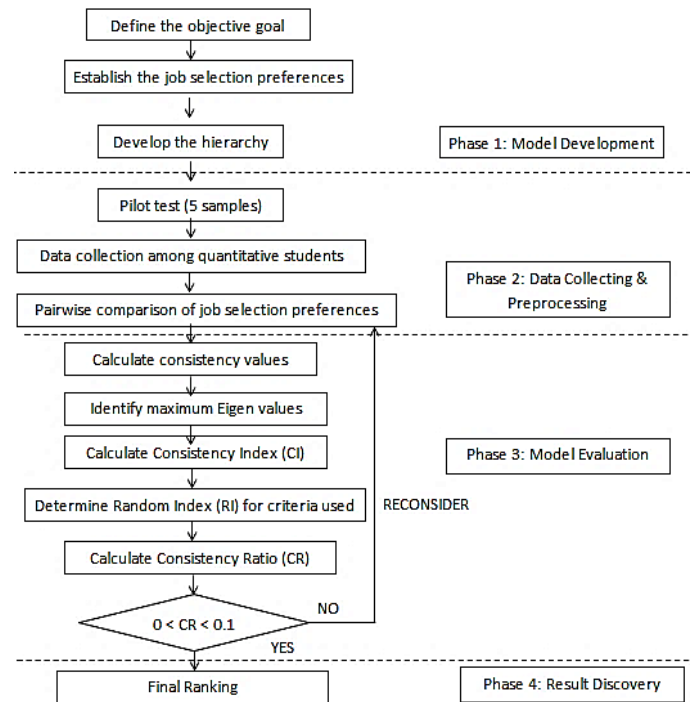

Figure 1. AHP flowchart

Figure 1 illustrates the flow of the research by dividing the process into four phases. Phase one encompasses model development, which includes defining the objective goal, establishing job selection preferences, and developing the hierarchy. Phase two involves data collection and preprocessing, encompassing conducting a pilot test with five samples, collecting data among quantitative students, and conducting pairwise comparisons of job selection preferences. Furthermore, phase three outlines the steps of model evaluation, including calculating consistency values, identifying maximum Eigen values, computing Consistency Index (CI), determining Random Index (RI) for criteria used, and calculating and considering Consistency Ratio (CR). The final phase, result discovery, illustrates the final ranking of the research.

B. Data Collection

In this study, a pilot test is conducted to assess the feasibility of the research design and identify any potential issues or limitations that may arise during the full-scale study. Following the pilot test, a link to participate in the study is distributed to 35 randomly selected quantitative science

students at the University Utara Malaysia. Participants are asked to fill out the survey, and the data collected is transformed into a pairwise comparison, which is presented in Table 1. A preferred scale is utilised to assign numerical values (NV) to different levels of preference, as shown in Table 2.

Table 1. Pairwise comparison table

	Criterion 1	Criterion 2
Criterion 1	1	NV
Criterion 2	1/ NV	1

Table 2. Preference scale

Preference Level	Numeric Value	Reciprocal
Equally Preferred	1	1
Moderately Preferred	2	1/2
Strongly Preferred	3	1/3
Very Strongly Preferred	4	1/4
Extremely Preferred	5	1/5

C. Model Development

The goal of the AHP model in the research is to analyse the determinants of job selection preferences among quantitative science students. Local jobs, foreign jobs or jobs in hometown based on satisfactory salary, interest, occupation security, type of contracts, job prospects and working environment are the important criteria that affect the students' decision. The hierarchy structure in the AHP method for analysing the job selection preferences is presented in the Figure 2 below.
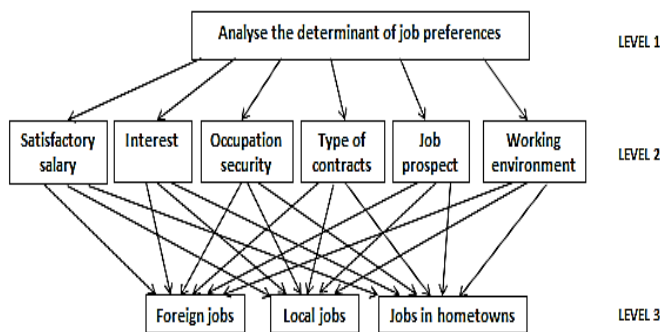

Figure 2. Hierarchy of criteria

D. Data Analysis

To initiate the evaluation process, the criteria of satisfactory salary (SS), interest (I), occupation security (OS), type of contracts (TC), job prospects (JP), and working environment (WE) need to be compared in pairs to facilitate a simpler comparison of preference levels. These paired comparisons will then be transformed into a pairwise comparison as illustrated in Table 3. Subsequently, comparisons between criteria and alternatives such as Foreign Jobs (FJ), Jobs in Hometown (JH), and Local Jobs (LJ) are conducted to determine preference levels and alternatives for criteria. An exemplar comparison table for criteria and alternatives is provided in Table 5.

Table 3. Comparison between criteria

Criteria	SS	I	OS	WE	TE	JP
SS	1	NV	NV	NV	NV	NV
I	1/NV	1	NV	NV	NV	NV
OS	1/NV	1/NV	1	NV	NV	NV
WE	1/NV	1/NV	1/NV	1	NV	NV
TE	1/NV	1/NV	1/NV	1/NV	1	NV
JP	1/NV	1/NV	1/NV	1/NV	1/NV	1

Table 4. Comparison between alternatives for each criterion

	SS		
Alternatives	**FJ**	**JH**	**LJ**
FJ	1	NV	NV
JH	1/ NV	1	NV
LJ	1/ NV	1/ NV	1

In Table 3 and Table 4, pairwise comparisons are illustrated, wherein the value compared among the same criterion or alternative equals 1. When comparing alternative 1 with alternative 2, a numerical value is obtained, while comparing alternative 2 with alternative 1 result in 1 divided by the numerical value. This method applies to both Table 3 and Table 4. For instance, when comparing foreign jobs with itself, the value equals 1, whereas comparing foreign jobs with jobs in hometown yields a numerical value. Conversely, comparing jobs in hometown with foreign jobs results in 1 divided by the numerical value.

Next, the columns of the pairwise comparison matrix are totalled and divided to obtain a normalised matrix. This process involves dividing each value by the total column value to determine the weight of each criterion, resulting in a total column value of 1. Additionally, the values in each row are averaged and summarised to create a single preference matrix. An example of a single preference matrix is provided in Table 5.

Table 5. Single preference matrix

Alternatives	Criteria					
	SS	I	OS	WE	TE	JP
FJ	NV	NV	NV	NV	NV	NV
JH	NV	NV	NV	NV	NV	NV
LJ	NV	NV	NV	NV	NV	NV

The overall ranking is established by consolidating respondent preferences for each alternative and preference vector for each criterion. The overall score for each alternative (local jobs, foreign jobs, or jobs in hometown) is obtained by multiplying the values in the criteria preference vector. Subsequently, the alternatives are ranked based on their scores, with the highest-scoring alternative receiving the first rank and subsequent alternatives ranked accordingly.

E. Model Evaluation

To ensure the consistency of data, the original pairwise comparison matrix of criteria is reviewed, and the preference vector for each criterion (including satisfactory salary, interest, occupation security, type of contracts, job prospects, and working environment) is multiplied with it. The resulting product is then divided by specific weights derived from the criterion preference vector. These values are subsequently averaged by adding them up and dividing by six, which represents the number of criteria being assessed. The Consistency Index (CI) for this comparison matrix can be calculated using the equation in (1):

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (1)$$

where,

n = the number of criteria being compared

λ_{max} = the maximum eigenvalue

In addition, the consistency ratio must be calculated by dividing the consistency index (CI) by the random index (RI). The formula of Consistency Ratio (CR) is shown equation (2).

$$CR = \frac{CI}{RI} \quad (2)$$

Table 6 displays the Random Index (RI) values corresponding to the number of items (n) being compared in the research. For example, if there are four items being compared ($n = 4$), the RI value would be 0.90.

Table 6. Random Index (RI)

n	2	3	4	5	6	7	8	9	10
R	0.0	0.5	0.9	1.1	1.2	1.3	1.4	1.4	1.5
I	0	8	0	2	4	2	1	5	1

A Consistency Ratio (CR) equal or less than 0.10 indicates that the AHP results are consistent and meaningful, suggesting that the collected data in this research are reliable and valid. Conversely, if the CR is greater than 0.10, the AHP results are deemed inconsistent and unreliable. In such cases, the collected data in this research are considered invalid and untrustworthy.

IV.   RESULT AND DISCUSSION

A. Demographic Respondent Analysis

In the study, a total of 35 respondents participated in the survey. Among them, 70% (28 individuals) were female, while 30% (12 individuals) were male, as illustrated in Figure 3.
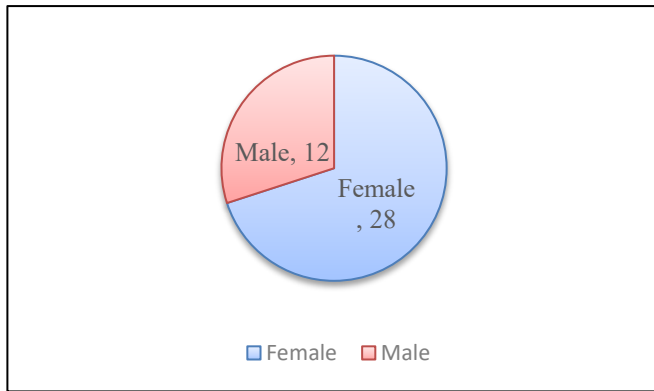

Figure 3. Gender

Figure 4 depicts the distribution of respondents, with 18 identifying as Malays, 17 as Chinese, 4 as Indians, and 1 as an international student.
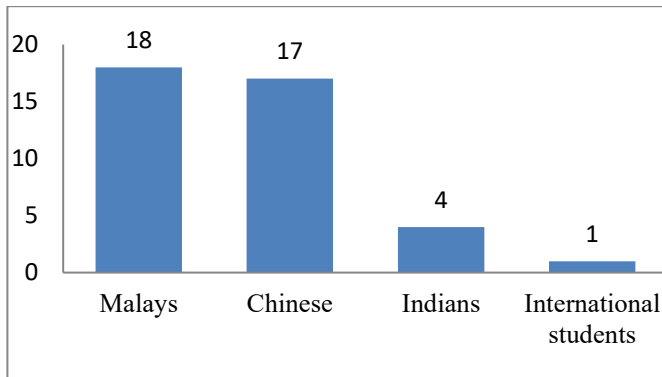

Figure 4. Races

B. Data Calculation

To obtain the overall results, the mean values of all pairwise comparison matrix are computed and then sum up the columns of each pairwise comparison matrix as shown in Table 7.

Table 7. Pairwise comparison matrix

Criteria	SS	I	OS	TC	JP	WE
SS	1.0000	1.2143	1.1238	1.0714	1.0095	1.0714
I	0.9238	1.0000	1.0333	1.2048	1.3143	1.2952
OS	1.1000	1.1429	1.0000	1.1500	1.3143	1.2381
TC	0.9952	1.1857	0.9429	1.0000	1.0857	1.4095
JP	1.0857	1.2405	1.0238	0.9571	1.0000	1.3667
WE	0.9952	1.1524	1.1143	0.9524	0.9238	1.0000
Column Sum	6.1000	6.9357	6.2381	6.3357	6.6476	7.3810

Table 8 captures the summation of each column for the pairwise comparison among the alternative of *satisfactory salary* where column 1 achieved the total of 4.1457, column 2 obtained 4.6900 and column 3 reached the total of 4.4719.

Table 8. Pairwise comparison matrix for satisfactory salary

SS	FJ	JH	LJ
FJ	1	1.7581	2.0795
JH	1.5781	1	1.3924
LJ	1.5676	4.6900	1
Column Sum	4.1457	4.6900	4.4719

Table 9 captures the summation of each column for the pairwise comparison among the alternative of *interest (I)* such that column 1 equal to 3.7214, column 2 result in 4.7390 while column 3 has the total of 3.7119.

Table 9. Pairwise comparison matrix for interest

I	FJ	JH	LJ
FJ	1	1.8271	1.6548
JH	1.2571	1	1.0571
LJ	1.4643	1.9119	1
Column Sum	3.7214	4.7390	3.7119

Table 10 captures the summation of column 1, 2 and 3 for the pairwise comparison among the alternative of *occupation security (OS)*. Column 2 achieved the largest number of 4.6295 followed by column 3 and column 1 that obtained 3.9105 and 3.4262.

Table 10. Pairwise comparison matrix for occupation security

OS	FJ	JH	LJ
FJ	1	1.7119	1.6881
JH	1.0738	1	1.2224
LJ	1.3524	1.9176	1
Column Sum	3.4262	4.6295	3.9105

Table 11 captures the summation of each column for the pairwise comparison among the alternative of *type of contracts (TC)* where column 1 achieved the total of 3.9833, column 2 obtained 4.2224 and column 3 reached the total of 3.7581.

Table 11. Pairwise comparison matrix for type of contract

TC	FJ	JH	LJ
FJ	1	1.3619	1.6471
JH	1.4490	1	1.1110
LJ	1.5714	1.8605	1
Column Sum	3.9833	4.2224	3.7581

Table 12 captures the summation of each column for the pairwise comparison among the alternative of *job prospects (JP)* such that column 1 equal to 4.5714, column 2 result in 3.8190 while column 3 has the total of 3.7105.

Table 12. Pairwise comparison matrix for job prospects

JP	FJ	JH	LJ
FJ	1	1.3286	1.1819
JH	1.8143	1	1.5286
LJ	1.7571	1.4905	1
Column Sum	4.5714	3.8190	3.7105

Table 13 captures the summation of column 1, 2 and 3 for the pairwise comparison among the alternative of *working environment (WE)*. Column 2 achieved the largest number of 4.8571 followed by column 3 and column 1 that obtained 4.1214 and 3.7714.

Table 13. Pairwise comparison matrix for working environment

WE	FJ	JH	LJ
FJ	1	1.8976	1.7057
JH	1.3857	1	1.4157
LJ	1.3857	1.9595	1
Column Sum	3.7714	4.8571	4.1214

Then, the values in each column are divided by its corresponding column sum and it formed a normalised matrix which is presented in Table 14.

Table 14. Normalised matrix

Criteria	SS	I	OS	TC	JP	WE
SS	0.1639	0.1751	0.1802	0.1691	0.1519	0.1452
I	0.1514	0.1442	0.1656	0.1902	0.1977	0.1755
OS	0.1803	0.1648	0.1603	0.1815	0.1977	0.1677
TC	0.1632	0.1710	0.1511	0.1578	0.1633	0.1910
JP	0.1780	0.1789	0.1641	0.1511	0.1504	0.1852
WE	0.1632	0.1662	0.1786	0.1503	0.1390	0.1355
Column Sum	1	1	1	1	1	1

Table 15 to Table 20 captures the normalised matrix for the alternative of each criterion (*SS*, *I*, *OS*, *TC*, *JP* and *WE*) that compared in pairs.

Table 15. Normalised matrix for satisfactory salary

SS	FJ	JH	LJ
FJ	0.2412	0.3749	0.4650
JH	0.3807	0.2131	0.3114
LJ	0.3781	0.4119	0.2236
Column Sum	1	1	1

Table 16. Normalised matrix for interest

I	FJ	JH	LJ
FJ	0.2687	0.3856	0.4458
JH	0.3378	0.2110	0.2848
LJ	0.3935	0.4034	0.2694
Column Sum	1	1	1

Table 17. Normalised matrix for occupation security

OS	FJ	JH	LJ
FJ	0.2919	0.3698	0.4317
JH	0.3134	0.2160	0.3126
LJ	0.3947	0.4142	0.2557
Column Sum	1	1	1

Table 18. Normalised matrix for type of contract

TC	FJ	JH	LJ
FJ	0.2510	0.3225	0.4383
JH	0.3545	0.2368	0.2956
LJ	0.3945	0.4406	0.2661
Column Sum	1	1	1

Table 19. Normalised matrix for job prospects

JP	FJ	JH	LJ
FJ	0.2188	0.3479	0.3185
JH	0.3969	0.6262	0.4120
LJ	0.3844	0.3903	0.2695
Column Sum	1	1	1

Table 20. Normalised matrix for working environment

WE	FJ	JH	LJ
FJ	0.2652	0.3907	0.4139
JH	0.3674	0.2059	0.3435
LJ	0.3674	0.4034	0.2426
Column Sum	1	1	1

After that, the row average for each row of the matrix is computed in Table 21. This table represents the matrix with row averages for criteria (satisfactory salary, interest, occupation security, type of contracts, job prospects, and working environment) compared in pairs. Occupation security attained the highest average row value, reaching 0.1754, while working environment achieved the lowest average value among the criteria, only reaching 0.1555.

Table 21. Matrix with row average

Criteria	SS	I	OS	TC	JP	WE	Row Average
SS	0.1639	0.1751	0.1802	0.1691	0.1519	0.1452	0.1642
I	0.1514	0.1442	0.1656	0.1902	0.1977	0.1755	0.1708
OS	0.1803	0.1648	0.1603	10.1815	0.1977	0.1677	0.1754
TC	0.1632	0.1710	0.1511	0.1578	0.1633	0.1910	0.1662
JP	0.1780	0.1789	0.1641	0.1511	0.1504	0.1852	0.1679
WE	0.1632	0.1662	0.1786	0.1503	0.1390	0.1355	0.1555

According to Table 22 through Table 27, foreign jobs obtained the highest average row values for criteria including satisfactory salary, interest, occupation security, and working environment. Conversely, local jobs only achieved higher row averages in type of contracts, while jobs in hometowns demonstrated the highest row average in job prospects.

Table 22. Matrix with row average for satisfactory salary

SS	FJ	JH	LJ	Row Average
FJ	0.2412	0.3749	0.4650	0.3604
JH	0.3807	0.2132	0.3114	0.3017
LJ	0.3781	0.4119	0.2236	0.3379

Table 23. Matrix with row average for interest

SS	FJ	JH	LJ	Row Average
FJ	0.2687	0.3856	0.4458	0.3667
JH	0.3378	0.2110	0.2848	0.2779
LJ	0.3935	0.4034	0.2694	0.3554

Table 24. Matrix with row average for occupation security

OS	FJ	JH	LJ	Row Average
FJ	0.2919	0.3698	0.4317	0.3644
JH	0.3134	0.2160	0.3126	0.2807
LJ	0.3947	0.4142	0.2557	0.3549

Table 25. Matrix with row average for type of contract

TC	FJ	JH	LJ	Row Average
FJ	0.2510	0.3225	0.4383	0.3373
JH	0.3545	0.2368	0.2956	0.2956
LJ	0.3945	0.4406	0.2661	0.3671

Table 26. Matrix with row average for job prospects

JP	FJ	JH	LJ	Row Average
FJ	0.2188	0.3479	0.3185	0.2951
JH	0.3969	0.2618	0.4120	0.3569
LJ	0.3844	0.3903	0.2695	0.3481

Table 27. Matrix with row average for working environment

WE	FJ	JH	LJ	Row Average
FJ	0.2652	0.3907	0.4139	0.3566
JH	0.3674	0.2059	0.3435	0.3056
LJ	0.3674	0.4034	0.2426	0.3378

Following this, the preference vector for each alternative and criterion is computed. Table 28 illustrates the preference vector of alternatives against each criterion, wherein the highest values for foreign jobs are interest, while for jobs in hometown, it is job prospects. Additionally, the most preferred vector for local jobs is type of contracts.

Table 28. Preference vector for each alternative against each criterion

	SS	I	OS	TC	JP	WE
FJ	0.3604	0.3667	0.3644	0.3373	0.2951	0.3566
JH	0.3017	0.2779	0.2807	0.2956	0.3569	0.3056
LJ	0.3379	0.3554	0.3549	0.3671	0.3481	0.3378

Table 29 presents the preference vector for each criterion, where the most preferred criterion is occupation security, attaining a value of 0.1754. Conversely, the working environment has the lowest preference values among the criteria, reaching 0.1555.

Table 29. Preference vector for each criterion

Criteria	
Satisfactory Salary	0.1642
Interest	0.1708
Occupation Security	0.1754
Type of Contract	0.1662
Job Prospects	0.1679
Working Environment	0.1555

C. AHP Results and Discussion

Finally, the alternative and their ranking are shown in Table 30 below.

Table 30. Ranking and alternative selection

Alternatives		Ranking
FJ	0.3468	2
JH	0.3028	3
LJ	0.3504	1

Based on the results in Table 30, it can be concluded that Semester 7 quantitative science students at University Utara Malaysia prefer local jobs over foreign jobs or jobs in their hometown. The job selection preference for local jobs attained the highest overall score of 0.3504, ranking first among the alternatives. Foreign jobs achieved a score of 0.3468, followed by jobs in hometown with a score of 0.3028.

D. AHP Consistency

The consistency of the model should be considered by multiplying the pairwise comparison matrix of criteria with the criteria weights that are shown in Table 31 below.

Table 31. Criteria weights

Criteria	SS	I	OS	TC	JP	WE	Criteria weights
SS	1.0000	1.2143	1.1238	1.0714	1.0095	1.0714	0.1642
I	0.9238	1.0000	1.0333	1.2048	1.3143	1.2952	0.1708
OS	1.1000	1.1429	1.0000	1.1500	1.3143	1.2381	0.1754
TC	0.9952	1.1857	0.9429	1.0000	1.0857	1.4095	0.1662
JP	1.0857	1.2405	1.0238	0.9571	1.0000	1.3667	0.1679
WE	0.9952	1.1524	1.1143	0.9524	0.9238	1.0000	0.1555

Table 32. Weighted sum values from multiplication of criteria weights with pairwise comparison matrix

Criteria	Weighted sum values
SS	1.0829
I	1.1260
OS	1.1555
TC	1.0990
JP	1.1092
WE	1.0246

Table 32 demonstrates the weighted sum values of each criterion, with occupation security reaching the largest value of 1.1555, while working environment resulted in the lowest value of the product at 1.0246.

Next, calculate the weighted sum values by multiplying each criterion by its corresponding weight and summing these values. Then, divide these weighted sum values by their respective criteria weights. Finally, obtain the average value (λ_{max}) by dividing the total by the number of criteria (which is 6 in this case). The relevant process can be found in Table 33.

Table 33. Calculating the average value (λ_{max})

Criteria	Dividing the weighted sum values by their respective criteria weights	Average value (λ_{max})
SS	6.5949	
I	6.5927	
OS	6.5881	
TC	6.6123	
JP	6.6064	
WE	6.5890	
		6.5973

The Consistency Index (*CI*) is,

$$CI = \frac{6.5973 - 6}{6 - 1} = 0.1195$$

To calculate the Consistency Ratio (CR), divide the *CI* by *RI*, and the resulting value is displayed below. The *RI* value in this case is 1.24 (refer to Table 6).

$$CR = \frac{CI}{RI} = 0.0963$$

The *CR* for the model is 0.0963 which is less than 0.10. Since the consistency and validity of the AHP model have been determined, indicating that the results of this research are reliable and trustworthy.

V. CONCLUSION AND FUTURE WORKS

In conclusion, the study reveals that the determinants of job preferences among semester 7 quantitative science students at University Utara Malaysia are the type of contracts offered by local companies, including full-time and part-time positions. Meanwhile, they preferred local jobs as their desired occupation after graduation. The respondents expressed a significant concern regarding occupation security, emphasising its importance for job satisfaction and mental stability. These findings can assist quantitative science students in making informed career decisions by identifying the key factors that determine their job preferences, including local jobs, foreign jobs, and jobs in their hometown. The study highlights several crucial criteria for job selection, such as satisfactory salary, personal interest, occupation security, contract type, job prospects, and working environment. However, future research should explore additional criteria that influence job selection preferences among middle-aged adults.

VI. ACKNOWLEDGEMENT

VII. REFERENCES

Akosah-Twumasi, P, Emeto, TI, Lindsay, D, Tsey, K & Malau-Aduli, BS 2018, 'A systematic review of factors that influence youths career choices-the role of culture', Frontiers in Education, vol. 3, no. 58. doi: 10.3389/feduc.2018.00058.

Al-Abri, N & Kooli, C 2018, 'Factors affecting the career path choice of graduates: A case of Omani. International Journal of Youth Economy, vol. 2, no. 2, pp. 105–117. doi: 10.18576/ijye/020203.

Bangayan, LM 2022, 'Influential factors among senior high school students' career preferences: A case of private school', Journal of Positive School Psychology, vol. 6, no. 3, <https://mail.journalppw.com/index.php/jpsp/article/view/3135>.

Cebula, RJ 1980, 'Geographic mobility and the cost of living: An exploratory note. Urban Studies, vol. 17, pp. 353–355.

Chan, SY & Ch'ng, CK 2022 'Analysis of Risk Factors Affecting Suicidal Ideation among Public University Students in Malaysia using Analytic Hierarchy Process', ASM Science Journal, vol. 17, pp. 1-10.

Dejendran A/L Rajendran & Farid, MS 2018, 'Factors that affect the job selection preference of undergraduate accounting students in university', Asia Pacific Journal of Social Science Research, vol. 2, no. 1. <www.abrn.asia/ojs/index.php/apjssr/article/view/30>.

Dublin, B, Logrosa, A, Rose, M, Sosing, D, Cornillez, J & Eduardo, E 2020, 'Factors influencing career preference of junior high school students for senior high school study', Journal of Educational Research and Technology Management, vol. 1, no. 1, pp. 29–38.

Department of Statistics Malaysia 2022, 'Consumer price index Malaysia August 2022', Department of Statistics Malaysia Official Portal, <https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat>.

Esser, I & Lindh, A 2018, 'Job preferences in comparative perspective 1989–2015: A multidimensional evaluation of individual and contextual influences', International Journal of Sociology, vol. 48, no. 2, pp. 142–169. doi: 10.1080/00207659.2018.1446118

Evanezza, M & Geetha, C 2020, 'Macroeconomic factors affecting youth unemployment in Malaysia. MJBE, vol. 7, no. 2, pp. 181–205.

Garver, M, Goffnett, S, Williams, Z, Divine, R & Davis, C 2019, 'Analysis of the job preferences for undergraduate supply chain students', Operations and Supply Chain Management: An International Journal, vol. 12, no. 1, pp. 31–41, <https://ssrn.com/abstract=3402590>.

Gati, I & Kulcsár, V 2021, 'Making better career decisions: From challenges to opportunities', Journal of Vocational Behavior, vol. 126, p. 103545. doi: 10.1016/j.jvb.2021.103545

Goh, M & Jamaluddin, H 2021, 'Influencers of university students' career decision', Issues and Perspectives in Business and Social Sciences, vol. 1, no. 1, p. 28. doi: 10.33093/ipbss.2021.1.1.4

Graduates Statistics 2020 2021, 'Department of Statistics Malaysia Official Portal, <https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat>.

Gyarteng-Mensah, H, Owusu-Manu, D-G, Edwards, D, Baidoo, I & El-Gohary, H 2021, 'An assessment of students' job preference using a discrete choice experiment: A postgraduate case study', Journal of Humanities and Applied Social Sciences, <https://doi.org/10.1108/JHASS-02-2020-0025>.

Habibullah, MS & Law, SH 2007, 'Crime and financial economic variables in Malaysia: Evidence from a vector error-correction model', Journal of Social and Economic Policy, vol. 4, no. 2, pp. 263–276.

Hamid, MA 2020, 'Job selection preferences: What do young adults want?', Global Business and Management Research: An International Journal, vol. 12, no. 4, <http://gbmrjournal.com/pdf/v12n4/V12N4-60.pdf>.

Hooft, EAJV, Kammeyer-Mueller, JD, Wanberg, CR, Kanfer, R & Basbug, G 2021, 'Job search and employment success: A quantitative review and future research agenda. Journal of Applied Psychology, vol. 106, no. 5, pp. 674–713. doi: 10.1037/apl0000675.

Islam, R, Ghani, ABA, Mahyudin, E & Manickam, N 2017, 'Determinants of factors that affecting inflation in Malaysia', International Journal of Economics and Financial Issues, vol. 7, no. 2, pp. 355–364.

International Monetary Fund 2022, World Economic Outlook: Countering the Cost-of-Living Crisis. Washington, DC.

Juliana, MAK, Navaz, N & Geetha, S 2020, 'Unemployment among graduates - Is there a mismatch?', International Journal of Asian Social Science, vol. 10. doi: 10.18488/journal.1.2020.1010.583.592

Jinadasa, PGPHK, Thayaparan, KA & Gunathilaka, GYN 2022, 'Preferences of job attributes and its determinants: A conjoint analysis', Sri Lankan Journal of Business Economics, vol. 10, no. 2.

Kansal, KG & Yadav, AD 2021, 'Career preference of secondary school students in relation to their parental involvement', Palarch's Journal of Archaeology of Egypt/Egyptology, vol. 18, no. 8, pp. 3915–3926.

Latimaha, R, Bahari, Z & Ismail, NA 2019, 'Examining the linkages between street crime and selected state economic variables in Malaysia: A panel data analysis', Jurnal Ekonomi Malaysia, vol. 53, no. 1, pp. 59–72. doi: 10.17576/JEM-2019-5301-6

Liu, T, Li, S, Yang, R et al. 2019, 'Job preferences of undergraduate nursing students in eastern China: A discrete choice experiment', Human Resources for Health, vol. 17, no. 1. doi: 10.1186/s12960-018-0335-3

Lee, HA 2020, 'Unemployment among Malaysia's youth: Structural trends and current challenges', ISEAS-Yusof Ishak Institute, vol. 65, <https://www.iseas.edu.sg/wp-content/uploads/2020/05/ISEAS_Perspective_2020_65.pdf>.

Makalesi, A 2019, 'Analysis of factors that affect the job choice of accounting students', Dergipark, <https://dergipark.org.tr/tr/download/article-file/746728>.

Pragasam, MR 2021, 'Frightening link between job loss and suicides', New Straits Times, <https://www.nst.com.my/opinion/letters/2021/06/702480/frightening-link-between-job-loss-and-suicides>.

Picardo, E 2022, 'How the unemployment rate affects everybody', Investopedia. <https://www.investopedia.com/articles/economics/10/unemployment-rate-get-real.asp>.

Rajiah, K, Maharajan, MK, Ingle, P, Thiruchelvam, L, Gunasagaram, R, Kanagaraj, K & Krishnamurthi, T 2020, 'Factors influencing choice of career: A comparative study among medical, dental and pharmacy students in a private university in Malaysia', Pharmacy Education, vol. 20, no. 1, pp. 273–281. doi: 10.46542/pe.2020.201.273281

Roback, J 1982, 'Wages, rents, and the quality of life', The Journal of Political Economy, vol. 90, no. 6, pp. 1257–1278.

Shakur, ESA, Sa'at, NH, Aziz, N, Abdullah, SS & Rasid, NHA 2020, 'Determining unemployment factors among job seeking youth in the East Coast of Peninsular Malaysia', The Journal of Asian Finance, Economics and Business, vol. 7, no. 12, pp. 565–576. doi: 10.13106/JAFEB.2020.VOL7.NO12.565

Shariq, M 2021, 'Analysis for employment preference of undergraduate accounting students in Oman', TEM Journal, vol. 10, no. 2, pp. 825–831. doi: 10.18421/TEM102-41

Suhi, SS, Oyshi, FJ, Mamun, MAA, Jahan, N, Shohel, TA, Rahman, MA et al. 2021, 'Public vs. private job dilemma: Influencing factors in career selection for university graduates', PLoS ONE, vol. 16, no. 10, p. e0258331. doi: 10.1371/journal.pone.0258331

Teoh, SC, Ch'ng, CK & Zaibidi, NZ 2022, 'Analysis of ICT Implementation in Teaching and Learning using Analytic Hierarchy Process (AHP): A Comparison of Rural and Urban Areas in Kedah', Cultural Management: Science and Education (CMSE), vol. 6, no. 1, pp. 55-69.

Wanberg, CR, Ali, AA & Csillag, B 2020, 'Job seeking: The process and experience of looking for a job'. doi: 10.1146/annurev-orgpsych-012119-044939.