

The effect of career exploration on employability skills, career adaptability and work readiness of Indonesian engineering students moderated by teacher support

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ABSTRACT: Career exploration affects job preparedness, employability and career adaptability, moderated by perceived teacher support. This study was focused on career exploration among engineering students from the University of Surabaya in the 2021/2022 academic year. Quantitative research methods were employed, with questionnaires for data collection. There were 258 respondents to the questionnaires. SmartPLS version 3.3 was used to examine the research data utilising PLS-SEM analysis. According to this study, career exploration improves employability, flexibility and job preparedness. The better students' career exploration, the higher their employability skills, career adaptability and work readiness. Further, employability skills and career adaptability can mediate the effect of career exploration on work readiness, increasing students' job readiness in the future. Also, perceived teacher support strengthens the influence of career exploration, employability skills and career adaptability on work readiness.

INTRODUCTION

Higher education helps students move from school to employment [1]. Engineering graduates have to be job-ready to enter the industry. Thus, engineering schools must ensure their graduates meet job requirements. At a coordination meeting on the downstream metal industry and natural resource development across ministries and higher education, the Ministry of Research, Technology and Higher Education in Indonesia projected that in 2025, the country would need 276,298 engineering graduates and 458,876 technical-vocational graduates, but only 27,721 S1-type engineering graduates [2]. This forecast is an opportunity and a request for all engineering-major tertiary education institutions in Indonesia to satisfy the future job market needs for engineering graduates. Engineering schools must prepare graduates for the workplace to help them integrate swiftly.

One of Surabaya's state institutions, the University of Surabaya (UNESA), offers four engineering majors: mechanical, electrical, informatics, and civil. According to the university data, only 74% of UNESA engineering graduates were absorbed by the industry in 2021. Based on observations and interviews with student groups, there are several reasons for graduates not being absorbed into the industrial world, including students continuing their studies to a higher level or students not interested in looking for work for personal reasons. However, the most common reason is the lack of acceptance of many companies to which students apply. Students lack some skills, making it hard for them to adapt to the workplace. Of course, these factors are tied to their job preparedness, and the employer perceives them as not ready to work yet.

Work preparedness is referred to as a physical, mental and maturity state that increases a person's will and capacity to do their job [3]. Responsibility, communication, flexibility and self-reflection comprise job preparation. Work preparedness requires solid understanding of job duties, good communication, flexibility and self-reflection. Job preparedness increases a person's chances of being hired. Higher education institutions should facilitate job readiness - they prepare students for jobs. Lecturers are crucial to work preparedness, and experienced, highly-skilled lecturers can have huge impact on the work preparedness of their students.

Many studies have examined work readiness factors. Career exploration before entering the workforce is positively linked to job preparedness [4]. Career exploration before joining the workforce increases job preparedness, while the lack of such exploration - decreases it. Career exploration provides workplace and organisational knowledge [5]. Career development includes career exploration [6]. Also, career growth follows good career exploration.

Students' employability skills, together with career exploration, predict work preparedness. Job skills are developed from personal traits, skills, knowledge, and also from institutional understanding that graduates must be prepared for the workforce [7]. Due to insufficient employability skills, graduates have become less employable in recent decades [8]. Businesses prefer graduates with already developed good employability skills since they are more ready to work and help the organisation [9].

Work preparedness is linked to career adaptability. Career-adaptable students are work-ready. Today, research on career adaptability and work readiness of college students is less common, with research mostly focused on people that are already working. Another aspect is career flexibility that helps students get jobs [10]. Professional adaptability helps working graduates set professional objectives and overcome transitional problems.

During a pandemic, as the recent Covid-19 circumstances indicate, more effort is needed to prepare students for employment, but in any situation, students must be work-ready before graduating. Career flexibility helps students choose a career. Students with more robust career flexibility are better prepared to make realistic job choices [4]. Career flexibility prepares students for widespread employment shifts facilitating job transition and readiness to work [11].

In view of these factors, this study explored how job flexibility affects student preparation during a pandemic. In the UNESA context, the researcher was interested in studying the effect of career exploration on employability skills, career adaptability and work readiness of UNESA Faculty of Engineering graduates moderated by lecturer support.

LITERATURE

Relationship between Career Exploration, Employability Skills, Career Adaptability and Work Readiness

Career exploration can be characterised as a constant self-development process, which students perform to find a job that fulfils their ambitions [12]. Career exploration helps students pick a career path before graduation and entering the industry [4]. It encourages students to explore various careers to find their dream job [13]. Career discovery takes time, and career exploration involves the following steps: getting career information, solving professional issues and learning about careers while studying [4].

Teachers help students discover careers. They can also assist students in getting actual jobs. It is essential that students explore careers thoroughly as proper exploration prepares them for the dangers and challenges of their future jobs [14] and facilitates their new employment adaptation [5]. Also, career exploration helps students adjust to employment and become more productive. This background is a basis for the following hypotheses:

- H1 Career exploration has a positive effect on employability skills.
- H2 Career exploration has a positive effect on career adaptability.
- H3 Career exploration has a positive effect on work readiness.

Relationship between Employability Skills with Career Adaptability and Work Readiness

Employability skills are students' pre-work knowledge, skills and talents [9]. Students must graduate with employable skills to be prepared for the workforce [15]. Employability includes personal qualities, problem-solving, decision-making, relationships, communication, task-related skills, maturity, health and safety habits, and job commitment [16]. Thus, students with employability skills will have high self-esteem, good problem-solving skills, and the ability to form good working relationships with co-workers, making them better prepared to work in a new environment. These considerations underline the following hypotheses:

- H4 Employability skills have a positive effect on career adaptability.
- H5 Employability skills have a positive effect on work readiness.
- H6 Career adaptability has a positive effect on work readiness.
- H7 Employability skills mediate the effect of career exploration on work readiness.
- H8 Career adaptability mediates the effect of career exploration on work readiness.

Role of Teacher Support in the Relationship between Career Exploration, Career Adaptability and Employability Skills with Work Readiness

Most students explore careers on campus. When exploring careers students need guidance from teachers [4]. Career exploration with instructors can help students learn vital work-related knowledge for the future, thus improving their job preparedness. These considerations underline the following hypothesis:

- H9 Perceived teacher support strengthens the influence of career exploration on work readiness.

Students develop career adaptability while studying at university, especially while working in groups and during fieldwork in organisations. Teachers help students adapt in schools and in companies. The more thoroughly teachers guide students throughout the learning period, including work practices at companies, the simpler it is for students to improve their job readiness after graduation and adjust to their new work environment. These factors formed the basis for the following hypothesis:

- H10 Perceived teacher support strengthens the influence of career adaptability on work readiness.

Students need employability skills to be more job-ready. Tertiary students develop employability skills with instructor guidance. High-employability students are job-ready, but the instructor must support the process. Thus, teacher's help in developing employability skills is crucial to students' future job preparation. These factors formed the basis for the following hypothesis:

H11 Perceived teacher support can strengthen the effect of employability skills on work readiness.

METHODOLOGY

The population in this study were all students of the Faculty of Engineering at the University of Surabaya, Indonesia, for the 2021/2022 academic year, totalling 758 students. Using the Slovin formula at a significance level of 5%, the minimum number of subjects in this study was calculated as 258 respondents (Equation 1).

$$n = \frac{N}{1+(e^2.N)} = \frac{758}{1+(e^2.758)} = 258 \quad (1)$$

The research questionnaire consists of two parts. The first part contains questions related to the demographics of the respondents, such as gender, age and year of the respondent's graduation, while the second part contains questions related to the respondents' perceptions of the research variables. The employability skill variable instrument has 13 measurement indicators: 1) adaptation skills; 2) co-operation skills; 3) skills for work use of equipment and technology; 4) critical thinking skills; 5) team management skills; 6) information literacy skills (searching for and using information; 7) communication skills; 8) oral expression skills; 9) collaboration skills; 10) problem-solving skills; 11) presentation skills; 12) ICT use skills; and 13) negotiation skills [17].

There are three indicators - exploration process, reaction to exploration and beliefs - measured by the instrument. The career adaptability tool measures concern, control, curiosity and confidence. Interest, favourable regard, expectancy and accessibility assess perceived teacher support [18].

Work readiness is measured by responsibility, communication, adaptability and self-reflection [19]. This quantitative study used questionnaires. The questionnaire is based on prior research and tailored to UNESA students. All instruments utilise the Likert scale, with 1 - strongly disagree, 2 - strongly agree, 3 - neutral, 4 - agree, and 5 - strongly agree.

Before the questionnaire was used, expert judgment was conducted with four experts. The results of the approved questionnaire were then tested on 30 students. The results of filling out the questionnaire were then tested using the corrected item-total correlation validity test, and a reliability test was carried out using the Cronbach's alpha reliability test. The results of the validity and reliability tests show that all instruments are valid and can be used as research instruments. The data collection resulted in a response rate of 95%, which means that this survey is in the *good* survey category, and there was no need to add samples again.

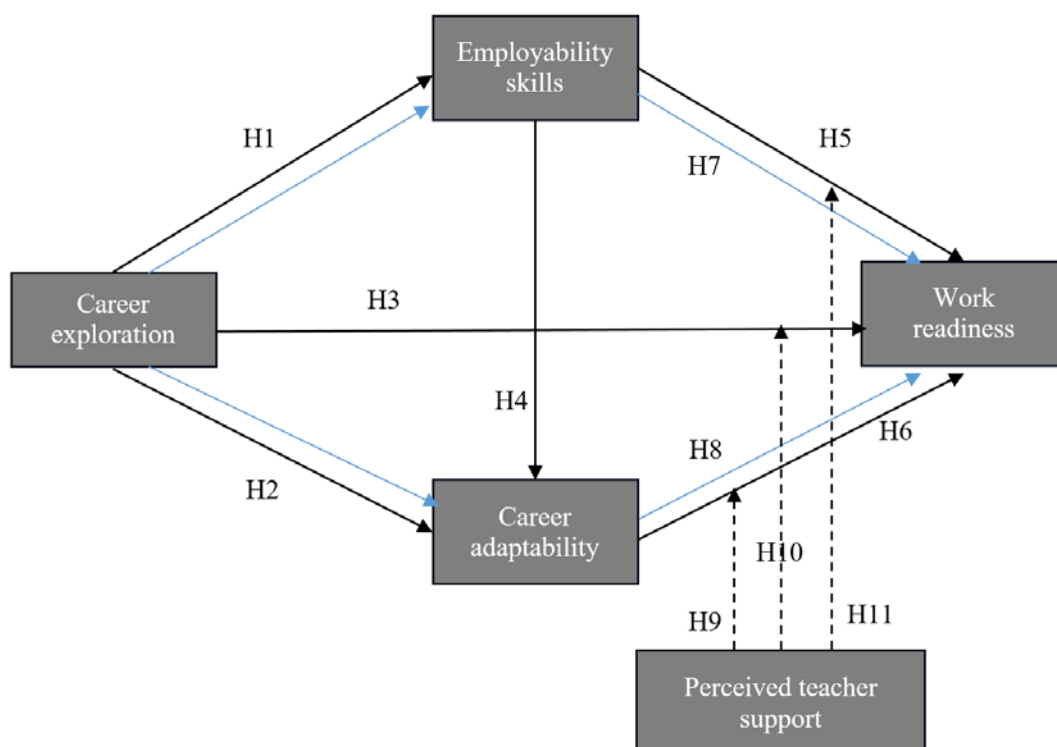


Figure 1: Research design model.

The research data were analysed using SPSS and SmartPLS programs. SPSS is used to test the validity and reliability of the instrument at the beginning of the instrument's trial phase, to analyse the characteristics of the respondents, and to calculate the average score of the respondents' answers to see the respondents' perceptions of the research variables. SmartPLS is used for PLS-SEM analysis which has been used for testing the 11 research hypotheses. The research design model can be seen in Figure 1.

RESULTS AND DISCUSSION

Demographics

This research involved 258 respondents who were all students of the Faculty of Engineering at the University of Surabaya (UNESA), Indonesia, in the 2021/2022 academic year. The majority of the respondents were male students (84%), and in regard to the whole sample, there were 81 students majoring in electrical engineering, 45 in informatics engineering, 71 in mechanical engineering and 61 in civil engineering.

Descriptive Statistics

When analysing the respondents' answers regarding each variable it can be seen that the answers are rated as high within the scale as shown in Table 1. The average score of the answers regarding each variable tends to be high, with only a few indicators with an average low value, which means that these aspects need to be improved in the future.

Employability skills (ES) indicators that still need improvement are: ES3, ES8 and ES9; the career adaptability (CA) indicator that still need improvement is CA1; career exploration (CE) indicators that need improvement are: CE1 and CE3; perceived teacher support (PTS) indicators that need improvement are: PTS3, PTS4; and the work readiness (WR) indicator that needs improvement is WR3.

Table 1: Descriptive statistics.

Item	Mean	Median	Minimum	Maximum	Standard deviation	Skewness
CA1	3.330	3.000	1.000	5.000	1.144	-0.378
CA2	4.633	4.000	1.000	5.000	1.169	-0.637
CA3	4.533	4.000	1.000	5.000	1.284	-0.500
CA4	4.473	4.000	1.000	5.000	1.315	-0.415
CE1	3.546	4.000	1.000	5.000	1.290	-0.548
CE2	4.694	4.000	1.000	5.000	1.091	-0.616
CE3	3.505	4.000	1.000	5.000	1.209	-0.341
ES1	4.367	4.000	1.000	5.000	1.140	-0.617
ES10	4.433	4.000	1.000	5.000	1.023	-0.756
ES11	4.400	3.000	1.000	5.000	0.917	-0.354
ES12	4.339	4.000	1.000	5.000	1.051	-0.588
ES13	4.500	4.000	1.000	5.000	1.118	-0.645
ES2	4.302	3.000	1.000	5.000	1.079	-0.207
ES3	3.200	3.000	1.000	5.000	1.077	-0.725
ES4	4.367	4.000	1.000	5.000	1.048	-0.775
ES5	4.336	4.000	1.000	5.000	1.054	-0.586
ES6	4.306	4.000	1.000	5.000	1.105	-0.663
ES7	4.367	4.000	1.000	5.000	0.948	-0.789
ES8	3.333	4.000	1.000	5.000	0.943	-0.947
ES9	3.367	4.000	1.000	5.000	0.929	-0.620
PTS1	4.667	4.000	1.000	5.000	1.247	-0.796
PTS2	4.749	4.000	1.000	5.000	1.358	-0.551
PTS3	3.525	4.000	1.000	5.000	1.333	-0.642
PTS4	3.900	4.000	2.000	5.000	1.248	-0.635
WR1	4.062	3.000	1.000	5.000	1.241	0.190
WR2	4.015	3.000	1.000	5.000	1.367	-0.126
WR3	3.036	3.000	1.000	5.000	1.261	-0.103
WR4	3.104	3.000	1.000	5.000	1.229	0.280

CE - career exploration; CA - career adaptability; ES - employability skill; WR - work readiness; PTS - perceived teacher support

Reliability and Validity Tests

The results of the validity test shown in Table 2 show that all items are valid, as indicated by the value of R count > R table (n = 30), and that all are reliable as indicated by the Cronbach's alpha > 0.7. The employability instrument has a Cronbach's alpha value of 0.976, the career adaptability instrument has a Cronbach's alpha of 0.939, career exploration has a Cronbach's alpha of 0.935, work readiness has a Cronbach's alpha of 0.959, and the perception of teacher support has a Cronbach's alpha of 0.968.

Table 2: Item reliability and validity: corrected item-total correlation and Cronbach's alpha.

Item	R	R table	Validity	Cronbach's alpha	Reliability
ES1	0.883	0.361	Valid	0.976	Reliable
ES2	0.819	0.361	Valid		
ES3	0.887	0.361	Valid		
ES4	0.890	0.361	Valid		
ES5	0.856	0.361	Valid		
ES6	0.890	0.361	Valid		
ES7	0.836	0.361	Valid		
ES8	0.852	0.361	Valid		
ES9	0.820	0.361	Valid		
ES10	0.871	0.361	Valid		
ES11	0.831	0.361	Valid		
ES12	0.878	0.361	Valid		
ES13	0.886	0.361	Valid	0.939	Reliable
CA1	0.878	0.361	Valid		
CA2	0.836	0.361	Valid		
CA3	0.888	0.361	Valid		
CA4	0.830	0.361	Valid	0.935	Reliable
CE1	0.845	0.361	Valid		
CE2	0.842	0.361	Valid		
CE3	0.924	0.361	Valid	0.959	Reliable
WR1	0.907	0.361	Valid		
WR2	0.895	0.361	Valid		
WR3	0.900	0.361	Valid		
WR4	0.904	0.361	Valid	0.968	Reliable
PTS1	0.895	0.361	Valid		
PTS2	0.914	0.361	Valid		
PTS3	0.937	0.361	Valid		
PTS4	0.938	0.361	Valid		

CE - career exploration; CA - career adaptability; ES - employability skills; WR - work readiness; PTS - perceived teacher support

Test of Hypotheses

The stages in the PLS-SEM analysis included the outer model testing stage and the inner model testing stage. In the outer model testing phase, construct validity and reliability were tested, whereas in the inner model, the research hypotheses were tested. The PLS outer model testing yielded convergent validity, discriminant validity and composite reliability. Convergent validity testing evaluated each indicator-latent concept connection. An indication is legitimate if its loading factor is > 0.7 and each construct has an average > 0.5.

The outer model in Figure 2 shows that all indicators in the PLS model are legitimate construct measures since they already have a loading factor > 0.7 and each construct has an average > 0.5. Discriminant validity ensures that each latent variable model notion is unique. The indicator meets discriminant validity requirements, if the heterotrait-monotrait ratio of correlations (HTMT) between constructs is below 0.9. Each construct meets discriminant validity since the HTMT value between constructs is below 0.9. All indicators and constructs passed the discriminant validity test, HTMT, between constructs < 0.9. Composite dependability evaluates a variable's absolute dependability, whereas the Cronbach's alpha value assesses its lower bound. In construct reliability measurement, Cronbach's alpha and composite reliability must be > 0.7. The construct reliability test shows that all constructs in the PLS-SEM model are trustworthy, since their Cronbach's alpha and composite reliability values are more significant than 0.7.

Testing the inner model involves assessing the structural model's quality of fit, path coefficient, relevance of exogenous factors' partial influence on endogenous variables, and coefficient of determination. The study hypothesis has to be tested using these results. R square, Q square, and standardised root mean square residual (SRMR) model values indicate the PLS-SEM model's fitness. The R square value shows how well the model predicts endogenous variables.

The R square value is 0-1 and classified as strong, moderate or weak. According to Chin, the R square value > 0.67 indicates the PLS model is robust, 0.33 - 0.67 suggests moderate and 0.19 - 0.33 indicates a weak model [20]. The model's Q square value shows predictive usefulness. Q square values range from 0.02 to 0.15, 0.15 to 0.35, and > 0.35. The SRMR model relates to the ability of the sample to explain the population. SRMR values are grouped into two categories: perfect fit models if SRMR < 0.08; the model is fit if the SRMR is between 0.08 - 0.10; and the model is not fit if the SRMR is > 0.10.

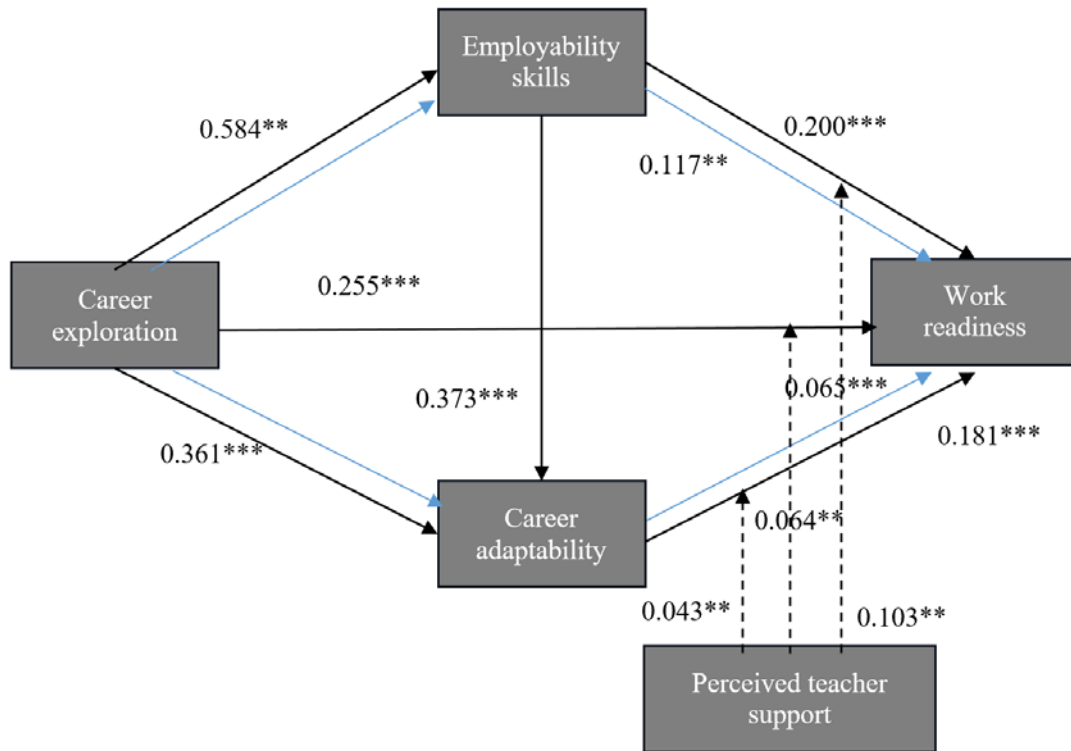


Figure 2: Estimation results of the PLS model.

The results show that the estimated PLS-SEM model fits within the analysed data because it has strength in the moderate category (firm enough) and considerable predictive relevance, and the model's SRMR value is in the fit criteria. Therefore, this model can be considered feasible to test the research hypotheses. The estimation results of the PLS model can be seen in Figure 2 and the test results of the hypotheses can be seen in Table 3.

Table 3: Test results of the hypotheses.

Hypothesis	Correlation	Result	Supported by significance
1	CE → ES	0.584***	Yes
2	CE → CA	0.361***	Yes
3	CE → WR	0.255***	Yes
4	ES → CA	0.373***	Yes
5	ES → WR	0.200***	Yes
6	CA → WR	0.181***	Yes
7	CE → ES → WR	0.117***	Yes
8	CE → CA → WR	0.065***	Yes
9	PTS*CE → WR	0.043**	Yes
10	PTS*CA → WR	0.064**	Yes
11	PTS*ES → WR	0.103***	Yes

One-tailed test; results: path coefficient with *p*-value star; star of *p*-value:
 *) sig. level 10%; **) sig. level 5%; ***) sig. level 1%
 CE - career exploration; CA - career adaptability; ES - employability skills;
 WR - work readiness; PTS - perceived teacher support

The PLS-SEM analysis shows the direct effect between variables from the p -value and the t -statistics. At a significant level of 5%, exogenous variables are declared to have a significant effect on ending if the p -value is <0.05 or the t -statistics > 1.65 (one-tailed) and the t -statistics > 1.96 (two-tailed). The direction of influence (positive effect/negative effect) is assessed from the sign accompanying the path coefficient.

The results of the analysis in Figure 2 and Table 3 show that there is a significant influence of career exploration on employability skills ($\rho = 0.584$; p -value = 0.000), work readiness ($\rho = 0.255$; p -value = 0.000) and career adaptation ($\rho = 0.361$; p -value = 0.000). This means that the better the career exploration carried out by students, the better their employability skills, career adaptability and job readiness.

Employability skills ($\rho = 0.200$; p -value = 0.000) and career availability ($\rho = 0.181$; p -value = 0.000) positively and significantly affect work readiness. This means that the higher the employability skills and career adaptability of students, the more supported the job readiness of students will be in the future. Without appropriate employability skills and career adaptability students will not be work-ready in the future. Employability skills and career adaptability in the analysed SEM model mediate career exploration's influence on work readiness. The analysis results show that the indirect effect of career exploration on work readiness through employability skills is significant, with a p -value of 0.000 and a positive path coefficient of 0.177. This means that employability skills can significantly mediate the effect of career exploration on work readiness.

A well-carried out career exploration will form high student employability skills, which will increase student work readiness in the future. The results of the indirect influence test of career exploration on work readiness through career show a p -value of 0.000 and a positive path coefficient of 0.065. This means that career adaptability can significantly mediate the indirect effect of career exploration on work readiness. This means that the better students carry out their career exploration, the higher the career adaptability of the students, which in turn can support their work readiness.

Perceived teacher support in this study acts as a moderating variable. The results of the moderating effect test of perceived teacher support on the influence of career exploration on work readiness are significant, with a p -value of 0.040 and a positive path coefficient of 0.043. This means that perceived teacher support can strengthen the influence of career exploration on work readiness. Students who carry out career exploration with the support of lecturers will have better job readiness than students who carry out career exploration without the support of lecturers.

The results of the subsequent moderation test on the effect of career adaptability on work readiness show a p -value of 0.010 with a positive path coefficient of 0.064. This means that perceived teacher support can strengthen the influence of career adaptability on work readiness. Students who have high adaptability and get a lot of lecturer support will have better work readiness than those who do not, even though these students may have high career adaptability.

The results of the subsequent moderation test on the effect of employability skills on work readiness show a p -value of 0.001 with a positive path coefficient of 0.103. This means that perceived teacher support can strengthen the effect of employability skills on work readiness. Students who have high employability skills and get a lot of lecturer support will have better work readiness than those who do not, even though these students have high employability skills.

CONCLUSIONS

In conclusions, the following remarks can be drawn:

- 1) Career exploration improves employability, career flexibility and job preparedness. The better students' career exploration, the higher their employability skills, career adaptability and work readiness;
- 2) Employability skills and career adaptability can mediate the effect of career exploration on work readiness, increasing students' job readiness in the future;
- 3) Perceived teacher support refers to teachers who control the teaching and learning process, and must support students when they begin career exploration and during learning when they develop their employability skills and career adaptability.

In this globalised world, the industry will only hire work-ready graduates. Thus, higher education must focus on improving work readiness of their graduates. This study discovered three primary elements that impact student job readiness. Higher education institutions should focus on these three areas to increase student work preparation for future employment after graduation. Personal, contextual (external) and educational variables that impact student work preparedness could be included for further investigation in this study. Personal elements include psychology, interests, abilities and motivation. External variables include support, knowledge and relationships with significant persons, like parents, friends and instructors. Educational factors relate to learning, information and field experience.

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