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Environment and Benchmarking: Industry 4.0 Sustainable Work Readiness Framework

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Abstract.

This paper presents a sustainable work readiness framework for engineering students, incorporating core skills, personal skills, and self-efficacy as mediating variables. The study aims to investigate the impact of core skills and personal skills on engineering students' work readiness, as well as the mediating influence of self-efficacy on this relationship. The researchers designed and tested a work readiness framework with three focal points: skills, personal skills, and self-efficacy, and their influence on engineering students' work readiness. The findings indicate that core skills, personal skills, and self-efficacy positively and significantly influence engineering students' work readiness. Self-efficacy can be explained by the core skills and personal skills variables at 87.8%, while the work readiness variable can be explained by core skills, personal skills, and self-efficacy at 85.4%. This study contributes to the existing literature by proposing a sustainable work readiness framework and measurement instrument that link core skills, personal skills, and self-efficacy as mediating variables influencing work readiness. The results are beneficial not only to Universiti Teknologi PETRONAS, Malaysia, as they directly reflect the work readiness of UTP's final-year undergraduate engineering students but also to individuals, universities, teaching staff, organizations, human resource specialists, and public administrators. They can use these findings to enhance the development of individual work readiness skills and increase the work readiness of students in their respective universities. The novelty of this study lies in proposing a sustainable work readiness framework tailored to equip engineering students with the skills required and acquired in Industry 4.0.

Keywords: student, engineering, PLS-SEM, skills, self-efficacy, sustainable, work readiness

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1. Introduction

Nowadays, the nature of work and employability has changed with the coming of the 4^{th} industrial revolution. Realizing this, governments have initiated and run programs to equip students with the changes in the current job market. However, the outcome of these programs was less than fruitful as it is estimated that around 300 thousand engineering graduates have become unemployed. The condition worsened due to the impact of Covid-19, and the Unemployment Rate increased by 5.6% (Herbert et al., 2020a, Sato et al., 2021). Hence there is a knowledge gap in addressing work readiness among engineering graduates and the current framework is not sustainable. Therefore, this paper aims to address that knowledge gap by introducing a sustainable work readiness framework based on our research findings.

The work readiness of the graduates produced is also a yardstick to the success of the Engineering programs enrolled by the students. This study seeks to identify the gaps and improve the elements of work readiness that should be emphasized in Engineering programs as well as elements of work readiness. This study also aims to address the knowledge gap on work readiness skills required by the Fourth Industrial Revolution. The advancement of technology in the current industry and shifts required in the IR4.0 has affected certain professions. The lack of IR4.0 skills among graduates of Higher Education Institutions is a main concern as it is a factor leading to unemployment (Chigbu & Nekhwevha, 2022; Reedy et al., 2020; Stahn et al., 2022).

In response to the IR4.0, an education revolution is taking place in attempt to improve the curriculum structure in Higher Education Institutions. The 21st-century education landscape has changed to education 4.0, which focuses on innovation-based education. As a source of skills and information to a workforce, the educational sector will need to reconfigure how students are trained to ensure that graduates can adapt to future employment prospects. In addition, institutions of higher learning should consider altering the curriculum model to focus on acquiring the required skills and competencies in accordance with the IR4.0 (Ellahi et al., 2019). For example, equipping graduates with complementary training can effectively bridge the gap between academic education and IR4.0 requirements. Furthermore, the criteria are intended to encourage the systematic pursuit of improvement in the quality of engineering education that addresses the needs of its constituents in a dynamic and competitive market.

Work Readiness of Engineering Graduates in Malaysia is described as a combination of comprehension skills, a personal attitude, or a quality that allows graduates to potentially achieve the desired career. Based on this definition, graduate work readiness

is determined by graduates' capability to employ their university-acquired skills to secure their preferred career. One of the issues with graduate work readiness in Malaysia is a lack of self-efficacy. Another factor is the graduates' inability to communicate in English, which becomes one of the barriers to employment. This is a significant barrier for firms seeking to hire engineering graduates. (Chai et al., 2017; Yusoff et al., 2012). Another issue affecting engineering graduates' employment in Malaysia is a lack of core and interpersonal skills. According to Esa et al. (2014), industries looking for graduates expect them to have basic skills in their field. Many companies will consider core competencies and personal skills when deciding whether or not to hire engineering graduates (Zaharim et al., 2012).

Due to the nature of the workplace in IR4.0, which has changed considerably and is distinct from that of the traditional workplace, graduates are expected to have up-to-date skills to match the current industry needs. Furthermore, previous research has revealed that due to a lack of exposure to industrial training, Malaysian graduates experience skills gaps for IR4.0 (Guzmán et al., 2020; Teo et al., 2021). Core Skills and Personal Skills of Engineering Graduates in Malaysia requires an update to keep up with the ever-changing landscape. Industries are not only concerned with technical skills (core skills) but also with soft skills as this allows their employees to adapt to all types of tasks and at the same time acquiring "multi-skills". The elements that need to be available for a graduate such as core skills and personal skills are particularly important aspects of work readiness of engineering graduates (Marouani & Nilsson, 2016; Nordin et al., 2013). his has become an important national agenda and it is the responsibility of higher education institutions to develop a competitive workforce to cater to the demands of the job market. A recent study in Malaysia(Adnan et al., 2014; Marouani & Nilsson, 2016; Rahman et al., 2011) identified that the core skills, personal skills, and self-efficacy have a positive correlation to work readiness, which is consistent with prior studies.

2. Research Hypothesis

To fulfil the demands of the industry revolution 4.0, the work readiness of engineering graduates must also be updated. The skills that will be investigated in this study include core skills and personal skills with self-efficacy as a mediating variable. The following sections will elaborate on the skills mentioned.

2.1. Core Skills

Core skills refer to understanding and competence in a specific activity, especially something involving methods, processes, procedures, and techniques (Aviso et al., 2021a) In addition to specific knowledge and analytic ability in the use of tools and techniques in certain disciplines such as civil engineering, engineering electrical, electronic, or information systems, core skills also include specialised information and the ability to apply it analytically (Herbert et al., 2020a). Skills to successfully accomplish a task requiring specialised knowledge or abilities and proficiency are regarded as skills.

To ensure the core skills are relevant to current developments in work readiness, the approach in education needs to be hands-on. The appropriate curriculum should be designed to increase the productivity of workers in the future. One of the appropriate ways is to enrich their self-efficacy and expose students to the knowledge of technology and the skills associated with it. Analytical skills will spearhead the global stage as well as being the choice of industries (Alaloul et al., 2020; Che Ibrahim et al., 2022). In addition, the core skills can increase self-efficacy, and have a positive relationship on work readiness. Chigbu & Nekhwevha (2022) used an experimental study between-subjects factorial design with 335 students to determine whether core skills and self-efficacy influence the perceived employability of final year students. According to his research, core skills and self-efficacy are the keys to increasing graduates' employability. Chiang et al. (2022) reported very similar findings, arguing that core skills and self-efficacy can contribute a higher rate of job suitability and work readiness skills for Malaysian graduates. Consequently, we posit the following hypotheses:

H1: Core skills will positively affect the work readiness of engineering students

H4: Core skills will positively affect the self-efficacy of engineering students

2.2. Personal Skills

Personal skills are the interpersonal abilities of a person who can effectively communicate with a team and fulfil his or her function as a team member. Self-efficacy, on the other hand, relates to the ability to solve a real or simulated problem in an efficient manner (Aviso et al., 2021). It suggests that personal skills and self-efficacy are the two essential skills for work readiness that make a job prospect competent in any situation. The research conducted by Che Ibrahim et al. (2022) confirmed that these two skills are necessary for a graduate to obtain a desired job in Malaysia. Work readiness among engineering graduates can significantly enhance the likelihood of employment. Ariffin

and Ahmad (2021) corroborated such findings that a student's self-efficacy regarding work readiness can enhance their employment status. Therefore, we posit that:

H2: Personal skills will positively affect the work readiness of engineering students

H5: Personal skills will be positively affecting the self-efficacy of engineering students

2.3. Self-Efficacy

Self-efficacy according to Choe (2022) self-efficacy is a person's self-confidence in their abilities to organize and carry out a series of actions necessary to produce something and high self-efficacy will foster confidence in his ability to carry out tasks. Self-efficacy can drive a person's performance in a variety of areas including entrepreneurial interests. Therefore, a person starting a business requires self-confidence in his or her ability so that his or her business can be successful (Mendoza et al., 2022; Zhu et al., 2021). Capron Puozzo & Audrin (2021) also identified that work readiness has a positive relationship with core skills and self-efficacy. The finding is also congruent with (Brennan, 2022; Fort & Puget, 2022; Sharma & Kumra, 2022). Therefore, we posit that:

H3: There is a positive influence of self-efficacy on the work readiness of engineering students

H6: Self-efficacy mediates the relationship between core skills and the work readiness of engineering students

H7: Self-efficacy mediates the relationship between personal skills and the work readiness of engineering students

2.4. Work Readiness

Work Readiness is a set of comprehensive skills, a personal attitude, or a quality that can facilitate graduates in obtaining their desired job.

Work readiness is a skill associated with a set of accomplishments, one of which is understanding and personal attitude, or a trait that enables graduates to potentially get the desired job. (Chigbu & Nekhwevha, 2022). According to Herbert et al. (2020), Graduate work readiness refers to the skills, knowledge, attitudes, and commercial awareness that allow graduates to contribute effectively once employed. On the basis of these definitions, it is conceivable to assert that a graduate's work preparedness is contingent upon their ability to use the skills acquired at the university in their desired career.

Work readiness was operationalized as the extent to which students/graduates are prepared 1) to find a job (Herbert et al., 2020a; Stahn et al., 2022); 2) to find work in their field (Heijkants et al., 2022); and 3) to make progress in the workplace (Creed et al., 2022b; Joosen et al., 2022). This study provides a model for student work readiness that analyses the influence of core skills, personal skills, and self-efficacy on student work readiness, as well as the interconnections between various skill categories, as shown in Figure 1. Research model framework.

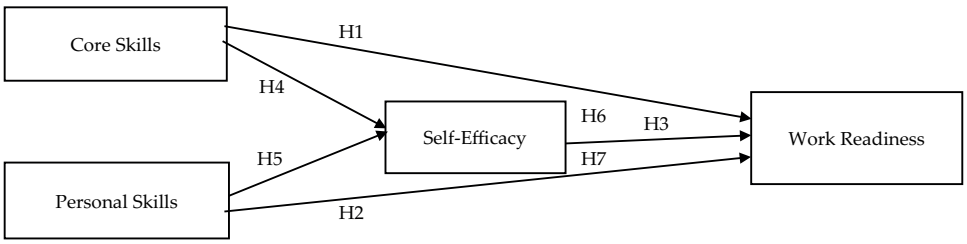

Figure 1: Research Model Framework.

3. Methodology

3.1. Sample

The proposed research model was tested with final year undergraduate engineering students in Universiti Teknologi PETRONAS, Malaysia. Final year engineering students were chosen as the sampled population because these students were in the final stages of their engineering degree, and they were expected to contribute their knowledge to relevant industries. In the QS World University Rankings by Subject, engineering programmes at Universiti Teknologi PETRONAS in Malaysia are ranked among the best in the world. One of these programmes is ranked in the World's Top 22. (Bernama, 2022). Through purposive sampling, we received the data from 274 final year engineering students. According to the Krejcie and Morgan Sampling Method, the sample size is adequate (Shariatzadeh & Bijani, 2022).

3.2. Method

This study uses a quantitative approach because it is an appropriate way and significant to the aim of the study, which is to examine the impact of core skills and personal skills with self-efficacy as mediating variable to work readiness of engineering

students. The researcher designed the research instrument and incorporated pertinent literature review. The questionnaire comprised four components of work readiness, totaling 53 items, out of which two constructs focused on core skills and personal skills with self-efficacy as a mediating variable and one construct on work readiness.

The aim of this study is to investigate the proposed conceptual model, which claims that engineering students' work readiness is dependent on their perceptions of their core skills, personal skills, and self-efficacy. For several reasons, the partial least square structural equation modelling (PLS-SEM) technique was deemed suitable for this application. First, PLS-SEM often relies on the development of models that reflect causal relationships between variables through links (Perzylo et al., 2019), in our case the relationship between core skills, personal skills, self-efficacy, and work readiness. Second, the proposed model is exploratory, and PLS-SEM is a viable method for doing exploratory research and developing theories (Hair et al., 2021; Sarstedt et al., 2022). Third, PLS-SEM includes a measurement model as well as a structural model, allowing for the evaluation of both the research instrument and the conceptual model (Dash & Paul, 2021). Fourth, this method allows researchers to work effectively with a wide range of sample sizes (Hair et al., 2021), and our sample size of 274 allowed us to assess the structural model with minimal bias. Fifth, the method solves extremely complex models with multiple constructs and indicators (Ringle et al., 2018). In our study, there were four components and 53 initial indicators. Sixth, the PLS method allows for the inclusion of both reflective (reflective measurement) and composite (formative measurement) factors in the SEM (Hayajneh et al., 2022), whereas the CB SEM method is only applicable to formative measurements (Hayajneh et al., 2022; Dash and Paul, 2002) Our study employs reflective measures that are common in behavioral studies (Cortellazzo et al., 2020; Sukhov et al., 2022).

Taking into consideration the strength of PLS-SEM, as well as the exploratory nature of this study and the complexity of the model. Similarly, despite the small number of work readiness studies that use structural equation modelling, the use of this technique is deemed appropriate (Hair et al., 2021; Wang, 2022).

We utilised the SmartPLS-SEM 3.0 statistical programme (Hair et al., 2021) to assess the core skills, personal skills, and self-efficacy variables as work readiness predictors. SmartPLS was utilised for both the measurement model assessments and the structural model analysis. According to (Hair et al., 2021), testing the model requires at least 50 items in the sample. The actual sample size of 274 respondents was sufficient

to estimate the four-construct model using the PLS method with a margin of error of 0.05.

3.3. Measures

The structural model is theory-based, with two independent variables, one mediating variable, and one dependent variable derived from the four constructs. All multi-item variables were operationalized by adapting previous research on work readiness and incorporated into the questionnaire. Using participant-collected data, we analysed the conceptual model (shown in Figure 1) and the assumed relationships (defined by H1-H7) between the four construct variables.

Similar to those proposed by Dash & Paul, the questionnaire's design incorporated in advance procedural safeguards against method bias (2021) The questions were kept simple, specific, concise, and free of complicated syntax, and the proximal separation of measurements was accomplished by separating the items of one construct and mixing them with the items of the other constructs. Using a four-point Likert scale with clear labels for each point, ranging from 1 (total disagreement) to 4 (total agreement), a balance between positively and negatively worded questions was found. This will accomplish the research's objectives, elicit specific responses, and, through thorough analysis, provide answers to the issues discussed and problem statements presented. Finally, the questionnaire was pre-tested with thirty people, and a total of 53 items for the four constructs were found to be valid. The literature suggests that the acceptable threshold for factor loadings be 0.50 (Hayajneh et al., 2022; Hair et al., 2021). In our study, we used a factor loading criterion of 0.50 to confirm the exploratory model and its components' high validity, and the final model contained 53 items that did not overlap.

4. Data Analysis and Results

4.1. Measurement Model Evaluation

Analysis of the measurement model evaluation, also known as an outer model, is performed to ensure that the measurements used are feasible as valid and reliable measurements (Hair et al., 2021). The Outer Model is a measurement model made up of indicators and pathways that link them to their corresponding factors. The following indicators can be used to analyse the outer model:

4.2. Validity Test

Convergent Validity was used for testing validity. Testing for Convergent Validity can be conducted by examining the loading factor values of each indicator. An indicator is considered valid if its value is larger than 0.70, and if it has a value between 0.5 and 0.70, it is considered mediate and may still be deemed valid (Hair et al., 2021). According to this criterion, if a loading factor is less than 0.5, it will be removed from the model. From the convergent PLS validity test results indicates that the outer loadings results of all indicators have a value of > 0.5 so it is concluded that all indicators can be declared valid (Hair et al., 2021).

4.3. Discriminant Validity

The discriminant validity value can be seen from the Average Variance Extracted (AVE) value. A variable is considered to have a good degree of validity if it has an AVE value of ≥ 0.50 (Hair et al., 2021).

TABLE 1: Average Variance Extracted (AVE) Test Results.

Variable	Average Variance Extracted (AVE)
Core Skills	0.505
Personal Skills	0.501
Self-Efficacy	0.580
Work Readiness	0.535

From Table 2. Average Variance Extracted (AVE) Test Results showed the average variance extracted (AVE) value of each variable is above 0.50 so it can be concluded that all variables in this study are valid.

4.4. Reliability Test

The final step in the evaluation of the outer model is to conduct a model reliability test to ensure there are no measurement-related concerns. Indicators of Composite Reliability and Cronbach's Alpha are utilised to conduct reliability tests. The Composite Reliability and Cronbach's Alpha tests are used to assess the reliability of research instruments. A Composite Reliability or Cronbach's Alpha of 0.70 (Dash & Paul, 2021; Hair et al., 2021) for all latent variable values shows that the construct is of high quality or that the questionnaire used in this study was reliable or consistent.

Table 2: Composite Reliability and Cronbach's Alpha Test Results.

Variable	Cronbach's Alpha	Composite Reliability	Information
Core Skills	0.938	0.945	Reliable
Personal Skills	0.928	0.937	Reliable
Self-Efficacy	0.927	0.938	Reliable
Work Readiness	0.903	0.920	Reliable

According to the results of the composite reliability and Cronbach's alpha tests in Table 3, all latent variables have composite reliability values and Cronbach's alpha values of 0.70. As a result, it is possible to conclude that the questionnaire used as a research tool was reliable or consistent.

4.5. Structural Model Evaluation

After the estimated model satisfies the Outer Model criteria, the structural model (Inner Model) is evaluated. The development of concept-based models and theories to investigate the relationship between exogenous and endogenous variables expressed in conceptual projections constitutes inner model testing. Evaluation of this model is carried out using R-Square, Goodness of Fit Test, and Hypothesis Test (Hair et al., 2021; Mustofa et al., 2022). The following are the proposed final structural model framework.

The findings indicate that core competencies and personal skills have a positive and statistically significant influence on work readiness (p 0.001), therefore confirming H1 and H2. As shown in Figure 2 Structural Equation Model, the data supported all hypotheses, indicating that self-efficacy has a positive and significant influence on work readiness (H3), that core skills have a positive and significant influence on self-efficacy (H4), and that personal skills have a positive and significant influence on self-efficacy (H5). Self-Efficacy as a mediating variable can mediate the positive and significant influence of core skills on work readiness (H6) and the positive and significant influence of personal skills on work readiness (H7).

4.6. Coefficient of Determination

The Coefficient of Determination or R-square value is a value that will indicate how much influence the independent variables used in and out of this study exert on dependent variables (Basco et al., 2021; Hair et al., 2021).

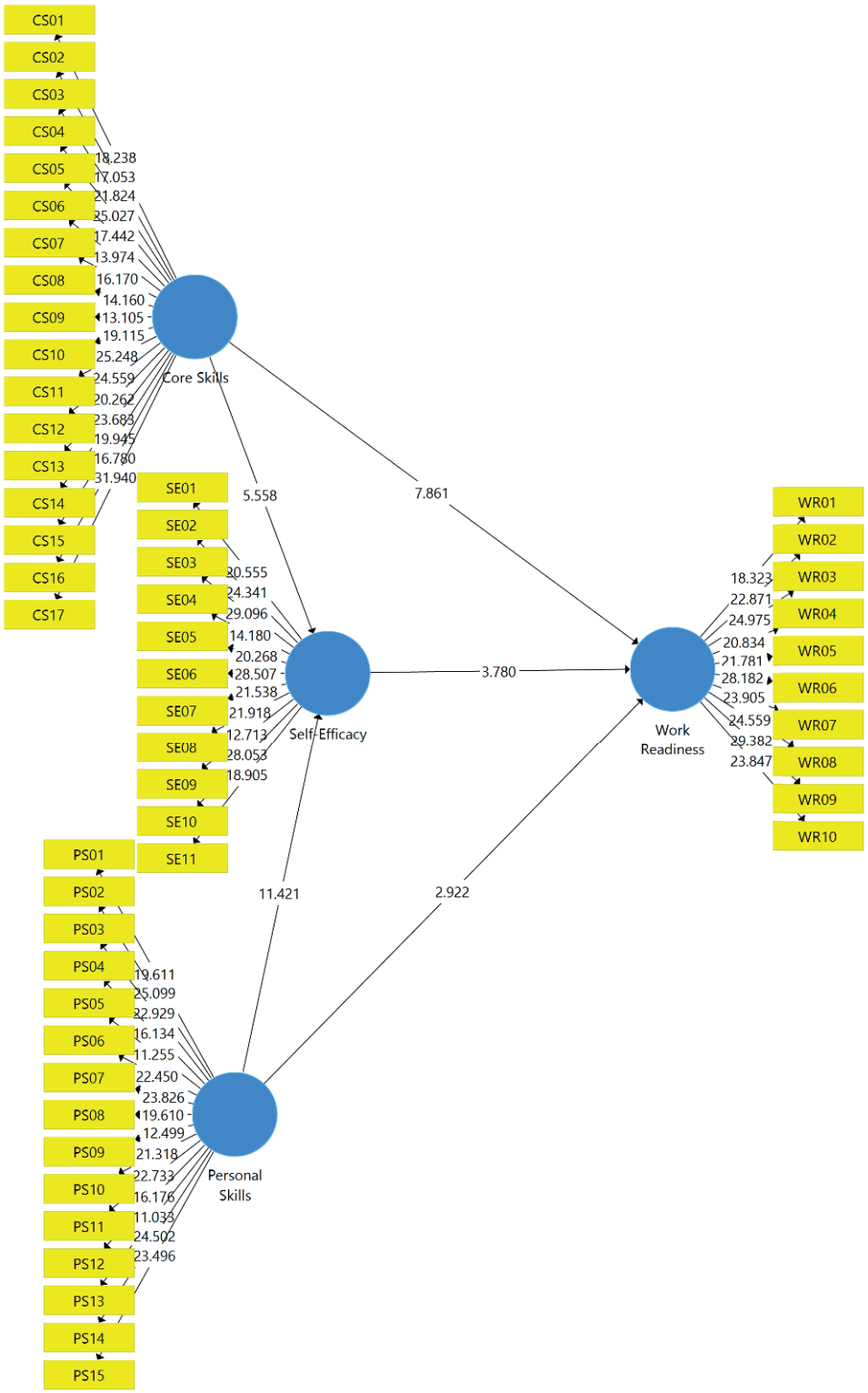

Figure 2: Structural Equation Modeling.

The result of the r-square test for the Self-Efficacy variable was 0.878, or 87.8 %. This indicates that 87.8 percent of Self-Efficacy can be explained by the Core Skills and

Table 3: Coefficient of Determination Results.

Variable	R Square
Core Skills and Personal Skills > Self-Efficacy	0.878
Core Skills, Personal Skills, and Self-Efficacy Work > Work Readiness	0.854

Personal Skills variables, while 12.2 percent of Self-Efficacy is explained by variables outside this research model. The results of the r-square test for the Work Readiness variable indicated a value of 0.854, or 85.4%, indicating that 85.4% of the Work Readiness variable can be explained by the Core Skills, Personal Skills, and Self-Efficacy variables, while 14.6% can be explained by variables outside this research model.

4.7. Goodness of fit Test (Q-Square)

The good of fit rating is as from the value of Q-square. The higher the Q-Square value, the better the model or the more fit the data (Sarstedt et al., 2022; Sukhov et al., 2022). The Q-square value is categorised as small = 0.1, medium = 0.25, and large = 0.38. (Sarwono & Umi, 2015). The following are the results of the Q-Square calculation:

Table 4: Q-Square Value Test Result (Q^2).

Variable	Q-Square
Self-Efficacy	0.444
Work Readiness	0.395

The results of the calculation of Q-square for both dependent variables (self-efficacy and work readiness) are > 0.38 (0.444 and 0.395 respectively), hence it can be concluded that this study has a large model because the GoF value is greater than 0.38.

5. Discussion and Contribution

Bootstrapping procedures can be used to generate hypothesis tests. Examining the coefficient value of the parameter and the value of the significance of t-statistical in the algorithm bootstrapping report can expose the hypothesis's significance (Hair et al., 2021; Sukhov et al., 2022). The significant or non-significant values can be determined by comparing the t-table with the t-statistic at alpha 0.05 (%) = 1.96. Alternatively, the significant or non-significant values can be examined by viewing the p-value < 0.05 with a degree of confidence of 95% (Hair et al., 2021).

5.1. Direct Influence Test

The direct influence test can be seen in the results of the Path Coefficients value, along with the results of the direct influence test.

Table 5: Path Coefficient of Direct Influence.

Hypothesis		Original Sample	T-Statistics	P-Values	Information
Core Skills -> Work Readiness	H1	0.298	5.558	0.000	Positive and significant
Personal Skills -> Work Readiness	H2	0.216	2.922	0.004	Positive and significant
Self-Efficacy -> Work Readiness	H3	0.296	3.780	0.000	Positive and significant
Core Skills -> Self-Efficacy	H4	0.298	5.558	0.000	Positive and significant
Personal Skills -> Self-Efficacy	H5	0.634	11.421	0.000	Positive and significant

Based on table 6 above, the t-statistical value of the influence of Core Skills on Work Readiness is greater than t-table value of 1.967 (T-Statistics = 5.558) which is with a large influence of 0.298 and the P-value < 0.05 of 0.000. Hence it can be concluded that the direct influence of Core Skills on Work Readiness is positive and significant and hypothesis H1 is accepted. The finding is congruent with previous studies (Aviso et al., 2021a; Beaumont et al., 2016; Rodrigues et al., 2019) that showed core skills have a positive and significant influence on work readiness.

The t-statistical value of the influence of Personal Skills on Work Readiness is greater than t-table value of 1.967 (T-Statistics = 2.922) with a large influence of 0.216 and the P-value < 0.05 of 0.004. Hence it can be concluded that the direct influence of Personal Skills on Work Readiness is positive and significant and Hypothesis H2 is accepted. The finding is supported by several studies (Chigbu & Nekhwevha, 2022; Delva et al., 2021; Hensel et al., 2021) that showed personal skills have a positive and significant influence on work readiness.

The t-statistical value of the influence of Self-Efficacy on Work Readiness is greater than t-table value of 1.967 (T-Statistics =3.780) with a large influence of 0.296 and the P-value < 0.05 of 0.000. Thus, it can be concluded that the direct influence of Self-Efficacy on Work Readiness is positive and significant. This supports our Hypothesis H3 and the finding is supported by other studies (Creed et al., 2022a; Misra & Khurana, 2017; Moldovan, 2020) that self-efficacy has a positive and significant influence on the work readiness.

The t-statistical value of the influence of Core Skills and Self-Efficacy is greater than t-table value of 1.967 (T-Statistics =5.558) with a large influence of 0.298 and the P-value < 0.05 of 0.05 of 0.000. Tt can be concluded that the direct influence of Core Skills and Self-Efficacy is positive and significant, and this supports our Hypothesis H4. The finding is supported by studies (Buntat et al., 2013; Sato et al., 2021; Soares & Mosquera, 2021) that indicate core skills have a positive and significant influence on the self-efficacy.

The t-statistical value of personal skills' influence on self-efficacy is greater than t-table value of 1.967 (T-Statistics = 11.421) with a large influence of 0.634 and p-value > 0.05 of 0.000. It can be concluded that the direct influence of Personal Skills on Self-Efficacy is positive and significant and the Hypothesis H5 is accepted. This finding is also supported by previous studies (Arora & Mittal, 2020; Bala & Singh, 2021; Creed et al., 2022b) that personal skills have a positive and significant influence on the self-efficacy (H5).

5.2. Indirect Influence Test

Indirect influence test is shown in the results of the specific indirect effect value in bootstrapping analysis (Hair et al., 2021; Mustofa et al., 2022), along with the results of indirect influence tests:

Table 6: Path Coefficient of Indirect Influence.

Hypothesis		Original Sample	T-Statistics	P- Values	Information
Core Skills -> Self-Efficacy -> Work Readiness	H6	0.088	3.115	0.002	Positive and significant
Personal Skills -> Self-Efficacy -> Work Readiness	H7	0.188	3.601	0.000	Positive and significant

Based on table 6 above, the t-statistical value of the influence of Core Skills on Work Readiness mediated by Self-Efficacy is greater than t-table of 1.967 (T-Statistics = 3.115) with a large influence of 0.088 and P-value < 0.05 of 0.002. This shows that self-efficacy can mediate the influence of Core Skills on Work Readiness positively and significantly. This also supports our Hypothesis H6 and this finding is supported by several studies (Mendoza et al., 2022; Pakaya et al., 2021; Zhu et al., 2021) that Self-Efficacy as mediating variable can mediate the influence of Core Skills on Work Readiness positive and significantly (H6)

The t-statistical value of the influence of Personal Skills on Work Readiness mediated by Self-Efficacy is greater than t-table of 1.967 (T-Statistics = 3.601) with a large influence

of 0.188 and the P-value < 0.05 of 0.05 of 0.000. This indicates that Self-Efficacy can mediate the influence of Personal Skills on Work Readiness positively and significantly. Our hypothesis H7 is also accepted. The findings of this analysis are supported by other studies (Capron Puozzo & Audrin, 2021; Kader, 2022; Rodrigues et al., 2019; Udayar et al., 2018) where Self-Efficacy can mediate the influence of Personal Skills on Work Readiness positive and significantly (H7).

6. Conclusions

The aim of this paper is to present a model of work readiness of engineering students that incorporates core skills, personal skills, and self-efficacy as mediating variables. The study's objectives are twofold: to identify the impact of core skills and personal skills on work readiness of the engineering students, and to identify the mediating impact of self-efficacy on the relationship between core skills, personal skills, and work readiness of the engineering students. The findings demonstrated that core skills, personal skills, and self-efficacy have a positive and significant influence on engineering students' work readiness. While the results of the Work Readiness variable can be explained by 85.4 % of Core Skills, Personal Skills, and Self-Efficacy. The study added to the existing literature by proposing a new model and measurement instrument that links core skills, personal skills, and self-efficacy as mediating variables that influence work readiness.

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