Reliability Analysis of IR4.0 Skills and Technical Skills on Career Adaptability among Home Science Students.

Aina Afifah Azali, Zahidah Ab Latif

Jabatan Hospitaliti dan Sains Konsumer, Fakulti Teknikal dan Vokasional, Tanjung Malim, 35900, Malaysia

DOI: https://doi.org/10.47772/IJRISS.2026.10100354

Received: 04 January 2026; Accepted: 10 January 2026; Published: 06 February 2026

ABSTRACT

This study examines a research project titled Reliability Analysis of IR4.0 Skills and Technical Skills on Career Adaptability among Malaysian Home Economic Students. The main focus of the study is to evaluate the reliability of a questionnaire instrument developed to measure three main constructs: IR4.0 skills, technical skills, and career adaptability. The instrument consists of four main sections: Section A (demographic information), Section B (IR4.0 skills), Section C (technical skills), and Section D (career adaptability skills). To ensure both content validity and face validity of the instrument, a review was conducted by three experts, two in the field of fashion design and one language expert. Improvements were made to sentence structure, terminology selection, and item relevance based on their feedback to ensure alignment with the constructs being measured. A pilot study was then conducted involving 33 Form 4 and Form 5 students from the Home Science stream at SMK Dato Haji Kamaruddin, who were also involved in clothing construction lessons. The findings revealed that the overall Cronbach's Alpha value for the items was 0.987, indicating a very high level of reliability. According to Tavakol and Dennick (2011), a high Cronbach's Alpha value reflects strong internal consistency in measuring the same construct. They also noted that this value is influenced by the number of items and the sample size; a higher number of items directly related to the construct increases the likelihood of obtaining a stable Alpha value. Therefore, the instrument is considered valid and reliable for use in the main study. This research is expected to contribute to the enhancement of the TVET curriculum to be more aligned with current industry demands and the challenges of the Fourth Industrial Revolution.

Keywords: Ir4.0 Skills, Technical Skill, Career Adaptability

INTRODUCTION

This study was conducted to examine educational approaches that focus on the development of technical and practical skills to meet workforce demands in increasingly complex and high-technology industries. In line with the advancement of the Fourth Industrial Revolution (IR4.0), Technical and Vocational Education and Training (TVET) plays a crucial role in producing a workforce that is not only technically skilled but also capable of adapting to rapid technological changes.

The Fourth Industrial Revolution has transformed the global workforce landscape by introducing advanced technologies that require high-level skills. The government projects that approximately 1.5 million new jobs will be created; however, 60% of these positions require skilled workers. Despite this demand, only 31% of professional-level employment has been achieved compared to the targeted 35% (Economic Planning Unit, 2021). According to Makhbul and Latif (2019), there remains a 4% shortfall in unfilled job opportunities, while the competency level of the Malaysian workforce has yet to keep pace with current technological advancements (Sabah Media, 2023).

Although there are more than 1,300 TVET institutions in Malaysia, the shortage of skilled workers persists due to a mismatch between the skills taught and industry requirements (Mohd Zuhdi Ibrahim et al., 2017). This situation negatively affects students' career adaptability and the overall employability of TVET graduates. Therefore, this study aims to address this gap by evaluating the reliability of instruments related to IR4.0 skills, technical skills, and career adaptability among Home Economics students.

The selection of Home Economics as the subject area is appropriate, as it encompasses technical skills such as garment construction, the application of technology in design, and the use of automation in production processes. These elements align with IR4.0 requirements, which emphasize creativity, critical thinking, and technological proficiency in developing a competitive workforce.

Research Objectives

I. To identify the level of career adaptability in relation to IR4.0 skills and technical skills among Home Economics students.

II. To determine the reliability level of IR4.0 skills and technical skills in relation to career adaptability among Home Economics students.

LITERATURE REVIEW

Validity and reliability are essential to ensure the accuracy of measurement. Several previous researchers have emphasized that validity and reliability are crucial for determining whether a developed or adapted instrument aligns with the study concept and accurately measures the intended constructs (Kamarul Azmi, 2011; Guspatni et al., 2018). The development of the research instrument in this study is supported by the Career Adaptability Theory introduced by Savickas (2009, 2011), which provides a strong foundation for understanding individuals' ability to adapt to rapid changes in the world of work, particularly in the era of the Fourth Industrial Revolution (IR4.0).

This theory outlines four main dimensions (concern, control, curiosity, and confidence) which form the core constructs of career adaptability measured in this instrument. Each dimension was translated into questionnaire items reflecting students' ability to plan their future careers (concern), make decisions and act proactively (control), explore new opportunities in technology and creative industries (curiosity), and trust their own abilities to face career challenges (confidence). In the context of Home Economics students, the curiosity dimension serves as a catalyst for exploring technologies such as Artificial Intelligence (AI) and Virtual Reality (VR) in design processes, while the confidence dimension strengthens their ability to master technical skills such as CAD software and automation systems (Zianatul et al., 2025). This approach is further supported by narrative models and career counseling interventions that help students develop flexible and competitive career identities in technology-driven employment landscapes (Wang & Li, 2024). Thus, this theory not only provides a clear conceptual framework for constructing career adaptability but also strengthens the relationship between IR4.0 skills and technical skills measured in this study.

The questionnaire instrument developed in this study is grounded in findings from previous research that emphasize the importance of measuring career adaptability, IR4.0 skills, and technical skills among vocational students. Studies by Bai, Omar, and Mohd Puad (2025) indicate that career adaptability is a key element in enhancing employability and students' readiness for the labor market. Dimensions such as concern, control, curiosity, and confidence have a direct impact on students' ability to adapt to industrial changes (Maznizam et al., 2016). Furthermore, student personality traits such as openness and flexibility have been identified as contributors to high levels of career adaptability (Nizam & Sulaiman, 2020). Therefore, this construct was carefully designed to measure components aligned with current industry needs.

Regarding IR4.0 skills, studies have found that vocational students generally demonstrate a moderate level of mastery, particularly in critical thinking and adaptation to emerging technologies such as AI, IoT, automation, and cloud computing (Wan Ishak et al., 2020). Lecturer competency in delivering IR4.0-related content has also been identified as a determining factor in teaching effectiveness and student mastery (Suhaizal Hashim, 2024). Although exposure to technologies such as IoT and AI has been provided, practical skills still require further strengthening (Mahmud et al., 2022). Consequently, items in the IR4.0 skills section were developed based on core skill components reported as relevant and critical in the modern workplace.

In terms of technical skills, students are required to master various technologies and software such as AutoCAD, Adobe Illustrator, 3D printing, and digital fabrication to enhance their competitiveness (Ismawi & Mohd Ishar,

2022). Studies also show that the integration of modern technologies such as Artificial Emotional Intelligence can enhance students' technical and professional skills (Hanafi et al., 2023). Moreover, project-based learning approaches integrated with IR4.0 technologies have proven effective in developing comprehensive technical skills (Wan Hafiidzull et al., 2020). Therefore, the selection of items for the technical skills construct in this instrument was carried out holistically based on empirically supported indicators.

To ensure content validity, the instrument was reviewed by subject matter experts through an expert evaluation process, and to determine reliability, a pilot study was conducted. The Cronbach's Alpha values obtained indicated a high level of internal consistency, in line with the recommendations of Tavakol and Dennick (2011), who stated that instruments developed with an adequate and appropriate number of items tend to produce stable reliability values. Overall, the instrument is considered valid and reliable for use in the main study.

METHODOLOGY

This study employed a quantitative research design using a survey approach to examine the relationships between career adaptability skills, IR4.0 skills, and technical skills among students. A pilot study was conducted at SMK Dato Haji Kamaruddin, Hulu Selangor, involving 33 Form 4 and Form 5 students from the Home Science stream. The sample was selected using purposive sampling, based on the suitability of the subject group to the objectives of the study. The justification for the pilot sample size was guided by Browne (1995), who suggested that a sample size of approximately 30 respondents is sufficient to provide preliminary estimates of variance and research parameters prior to full-scale implementation. This view is supported by In (2017), who emphasized that pilot studies are essential for identifying initial issues in research design, questionnaire item clarity, and the feasibility of the instrument before it is used in the actual study. Based on these recommendations, the use of 33 respondents in this study was considered appropriate and sufficient for assessing the reliability and validity of the instrument.

The questionnaire was developed using the Google Form platform and distributed to respondents via WhatsApp. All research procedures complied with research ethics guidelines. Written permission was obtained from the school and the District Education Office (PPD), and written informed consent was also collected from the parents or guardians of the participating students.

The questionnaire was developed based on adaptations from previous studies and refined through expert input in the fields of fashion design and Technical and Vocational Education and Training (TVET). The content of the questionnaire was reviewed by three experts to ensure content validity and item suitability.

The questionnaire consisted of four main sections:

- Section A: Respondent demographics (gender, institution, location, academic achievement, technology experience, and career interests).
- Section B: IR4.0 skills (visual merchandising, computer graphics, and artificial intelligence).
- Section C: Technical skills (such as the use of workshop equipment, digital design software, and modern fabrication technologies).
- Section D: Career adaptability skills based on Savickas' 4C Model (2005), namely concern, control, curiosity, and confidence.

Each item was measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The data were analyzed using SPSS version 27.0 to evaluate the reliability of the instrument.

ANALYSIS

The reliability of the questionnaire instrument in this study was analyzed using the Cronbach's Alpha coefficient, a statistical technique commonly employed to assess the internal consistency of items measured using a Likert scale (Tavakol & Dennick, 2011). A pilot study was conducted involving 33 Form 4 and Form 5 students from the Home Science stream at SMK Dato Haji Kamaruddin, Hulu Selangor. The questionnaire was administered online via Google Forms. The purpose of the pilot study was to evaluate respondents' understanding of the

questions and to test the reliability of the items before they were used in the actual study. Data from the pilot study were analyzed using the Statistical Package for the Social Sciences (SPSS) version 27.0 to obtain the Cronbach's Alpha coefficient for each construct examined.

According to Nunnally and Bernstein (1994), a Cronbach's Alpha value exceeding 0.70 is considered acceptable for research in the fields of education and social sciences. The analysis results indicated that each main construct in the questionnaire—namely IR4.0 Skills, Technical Skills, and Career Adaptability—recorded Cronbach's Alpha values above 0.70. This finding demonstrates that the developed instrument is consistent and possesses a high level of reliability for use in the actual study.

Table 1: Distribution of Items by Section in the Questionnaire Instrument

Section	Variable	Number of Items
Section A	Demographic Information	8
Section B	IR4.0 Skills	9
Section C	Technical Skills	9
Section D	Career Adaptability Skills	19

DISCUSSION

The reliability analysis of the questionnaire instrument was conducted using the Cronbach's Alpha coefficient, a statistical technique commonly used to assess the internal consistency of items within a construct. According to the guidelines proposed by George and Mallery (2003), coefficient values of ≥ .90 are classified as *excellent*, .80–.89 as *good*, .70–.79 as *acceptable*, .60–.69 as *questionable*, and < .60 as *unacceptable*. The findings revealed that the overall Cronbach's Alpha value for the 37 items was 0.987, while the construct-level analysis yielded values of 0.941 for Section B (IR4.0 Skills), 0.926 for Section C (Technical Skills), and 0.954 for Section D (Career Adaptability). All values exceeded .90 and therefore fall within the *excellent* category.

These high alpha values indicate that the items within each construct exhibit strong internal relationships and consistently measure the same domain. This finding is consistent with previous studies that have reported high reliability coefficients in the development of instruments related to skills and technical education. For instance, Mohd Najib (2003), in developing an instrument to assess graduate employability in vocational education, reported Cronbach's Alpha values exceeding 0.90, reflecting a high level of item consistency.

In alignment with the context of this study in Home Science, research conducted by Arasinah Kamis, Ab. Rahim Bakar, and colleagues (2012) also developed a competency-based instrument in the field of fashion design and reported reliability values of 0.98 for respondents and 0.95 for items. That study employed the Rasch measurement model and demonstrated that item structures in skill-based domains such as fashion design are systematically developed based on clearly defined competency dimensions, thereby contributing to high reliability values. These findings further support the present study, indicating that instruments in technical and vocational education, including Home Science subjects, tend to yield high reliability coefficients when systematically constructed.

Nevertheless, extremely high alpha values (> 0.95) may raise concerns regarding potential item redundancy or excessive similarity, as highlighted by Tavakol and Dennick (2011). In this study, the alpha value of 0.987 is considered acceptable because the items were developed based on a strong theoretical framework and underwent a rigorous expert validation process. Moreover, within the context of Home Science—particularly in clothing construction modules—the skills taught are grounded in standardized procedures and repetitive yet critical practical skills, such as sewing techniques, machine operation, and design skills. Therefore, the similarity among items reflects the authentic competency structure required of students in this field.

Overall, the high Cronbach's Alpha values demonstrate that the questionnaire instrument is highly reliable and appropriate for use in the main study to measure IR4.0 Skills, Technical Skills, and Career Adaptability among Home Science students.

Table 2: Range of Cronbach's Alpha Coefficients

Cronbach's Alpha Range	Interpretation
0.90 or above	Excellent
0.80–0.89	Good
0.60–0.79	Moderate
0.40–0.59	Questionable
0.00–0.39	Unacceptable

Source: George, D., & Mallery, P. (2003). SPSS for Windows Step by Step: A Simple Guide and Reference (4th ed.). Allyn & Bacon.

The results of the reliability analysis conducted in the pilot study are presented as follows:

Table 3: Results of Item Reliability Analysis

Reliability Statistics	
Cronbach's Alpha	Number of Items
0.987	37

Table 4: Reliability Coefficients by Construct

No.	Construct	Number of Items	Reliability Coefficient
1	Section B (IR4.0 Skills)	9	0.941
2	Section C (Technical Skills)	9	0.926
3	Section D (Career Adaptability)	19	0.954

CONCLUSION

The study titled "Analysis of the Reliability of IR4.0 Skills and Technical Skills on Career Suitability among Home Science Students" focuses primarily on identifying the level of career suitability in relation to IR4.0 skills and technical skills, as well as assessing the reliability of the measurement of both constructs among Home Science students before being applied in the actual study.

Content validity and face validity processes were conducted with the involvement of two experts in the field of Fashion Design and one language expert. The suggestions and feedback provided helped improve the questionnaire items, particularly in terms of sentence structure, appropriate terminology usage, and the alignment of items with the constructs being measured.

The pilot study, which involved 33 respondents, showed an overall Cronbach's Alpha coefficient of 0.987, indicating a very high level of reliability. This demonstrates that the developed instrument is valid and reliable for use in the full study. With this high-quality instrument, the subsequent study can be conducted more systematically to identify the relationship between IR4.0 skills, technical skills, and career suitability among Home Science students.

Overall, this study plays an important role in enhancing the quality of vocational education by providing a deeper understanding of the influence of career suitability skills on the mastery of IR4.0 and technical skills. The significance of this study is also reflected in its contributions to educational institutions, meeting industry needs, improving graduate quality, enriching academic research, and supporting national education policies that emphasize the necessity of future-ready skills.

REFERENCES

1. Ahmad Sabri, S., Mohamad Nazan, H. F., & Jamlus Rafdi, N. (2022). Hubungan di antara kaedah pembelajaran koperatif dengan kemahiran bekerja secara berpasukan dalam kalangan pelajar KUIS. Journal of Management and Muamalah, 12(1), 94–106.
2. Bai, Z., Omar, M. K., & Mohd Puad, M. H. (2025). Employability skills and career adaptability among TVET students: What matters? Asian Journal of Vocational Education and Humanities, 6(1), 1–13. https://doi.org/10.53797/ajvah.v6i1.1.2025
3. Browne, R. H. (1995). On the use of a pilot sample for sample size determination. Statistics in Medicine, 14(17), 1933–1940. https://doi.org/10.1002/sim.4780141709
4. Che Wan Ibrahim, C. W. I. R., & Amir Mustafa, A. (2023, Januari 13). Pembelajaran sepanjang hayat melahirkan modal insan berkualiti. Dewan Masyarakat. https://dewanmasyarakat.jendeladbp.my/2023/01/13/11638/
5. Fadel, N. S. M., & Mohd Ishar, M. I. (2022). Kesedaran pelajar pendidikan TVET Universiti Teknologi Malaysia mengenai Revolusi Industri 4.0. Jurnal Pendidikan Teknikal dan Vokasional, 17(2), 123–140. https://sainshumanika.utm.my/index.php/sainshumanika/article/view/2014
6. George, D., & Mallery, P. (2003). SPSS for Windows Step by Step: A Simple Guide and Reference (4th ed.). Allyn & Bacon.
7. Guest, D. (1991, September 17). The hunt is on for the Renaissance man of computing. The Independent. https://wow.agiledata.io/wp-content/uploads/2022/10/David-Guest-1991-The-hunt-is-on-for-the-Renaissance-Man-of-computing.pdf
8. Guspatni, G., & Kurniawati, Y. (2018). Validity and reliability testing of an e-learning questionnaire for chemistry instruction. IOP Conference Series: Materials Science and Engineering, 335(1), Article 012102. https://doi.org/10.1088/1757-899X/335/1/012102
9. Hanafi, A. G., Ahmad, H. H., Mansor, M. F., & Mustafa, W. A. (2023). An integrated approach in empowering Technical and Vocational Education and Training (TVET) for Malaysian Asnaf in the IR4.0 era. Journal of Advanced Research in Applied Sciences and Engineering Technology, 30(2), 255–271. https://www.researchgate.net/publication/370523041
10. Heikkinen, E. (2018). The concept of T-shaped professionals and its application to knowledge workers [Doctoral dissertation, University of Oulu]. https://www.researchgate.net/publication/322506073_EXPLORING_STUDIO-BASED_HIGHER_EDUCATION_FOR_TSHAPED_KNOWLEDGE_WORKERS_CASE_LAB_STUDIO_MODEL
11. Ibrahim, M. Z., Ab Rahman, M. N., & Mohammad Yasin, R. (2017). Ketidaksepadanan kemahiran dan kolaborasi industri–institusi PLTV di Malaysia: Satu cadangan penyelesaian. Pusat Latihan Pengajar dan Kemahiran Lanjutan (CIAST) & Universiti Kebangsaan Malaysia. https://www.researchgate.net/publication/285965850_Determining_Factors_of_Students'_Satisfaction_with_Malaysian_Skills_Training_Institutes
12. In, J. (2017). Introduction of a pilot study. Korean Journal of Anesthesiology, 70(6), 601–605. https://doi.org/10.4097/kjae.2017.70.6.601
13. Ismail, N., & Mohamed Nor, S. N. (2024). Cabaran kepimpinan institusi TVET dalam kepimpinan 4.0 dan dunia VUCA: Sorotan literatur. Journal of TVET Transition Research (JTTR), 3(1). https://publisher.uthm.edu.my/ojs/index.php/jttr/issue/view/471
14. Ismawi, S. N. M., & Mohd Ishar, M. I. (2022). Elemen kebolehkerjaan pelajar lepasan diploma teknologi pembinaan kolej vokasional di Malaysia. Jurnal Pendidikan Teknikal Malaysia, 11, 89–95. http://eprints.utm.my/104771/
15. Kamarul Azmi Jasmi, Ab. Halim Tamuri, & Mohd Izham Mohd Hamzah. (2011). Penerapan matlamat pendidikan Islam oleh guru cemerlang Pendidikan Islam: Satu kajian kes di beberapa buah sekolah menengah di Malaysia. Jurnal Teknologi, 55(Sains Sosial), 37–53.
16. Kamaruzaman, F. M., Hamid, R., Mutalib, A. A., Rasul, M. S., Omar, M., Mohd Zaid, M. F. A., & Khairudin, K. N. (2022). Penerokaan spesifikasi kemahiran generik 4IR bagi graduan kejuruteraan awam berdasarkan perspektif daripada industri. Akademika, 92(IK1), 165–177. http://journalarticle.ukm.my/20811/1/59079-196299-1-PB.pdf

17. Mahmud, M. F., & Aripin, M. A. (2022). Tahap pelaksanaan elemen Revolusi Industri 4.0 dalam kalangan pensyarah teknologi pembinaan di kolej vokasional. http://eprints.utm.my/104775/
18. Makhbul, Z. K., & Latif, M. N. A. (2019). Mengurus modal insan dalam industri 4.0 ke arah kecemerlangan negara. e-Bangi: Journal of Social Sciences & Humanities, 16(6). http://journalarticle.ukm.my/19997/
19. Maznizam, M. A., Mohd Isa, K., & Mohd Noor, H. (2016). Hubungan kesediaan kerjaya dan kebolehsuaian kerjaya dalam kalangan pelajar vokasional. SkillsMalaysia Journal, 2(1), 27–33.
20. Mohd Rokeman, M. Z., Mohd Nor, M. F., & Mohd Saad, M. (2020). Cabaran dan strategi memperkasa penyampaian kurikulum TVET di Malaysia: Tinjauan di kolej vokasional. Jurnal Pendidikan Teknikal dan Vokasional, 22(2), 143–158. https://www.researchgate.net/publication/387861646_CABARAN_DAN_STRATEGI_MEMPERKASA_PENYAMPAIAN_KURIKULUM_TVET_DI_MALAYSIA_TINJAUAN_DI_KOLEJ_VOKASIONAL
21. Nizam, S. N., & Sulaiman, W. S. W. (2020). Pengaruh personaliti terhadap kebolehsuaian kerjaya dalam kalangan pemimpin mahasiswa. Jurnal Wacana Sains Sosial, 3(2), 23–32. https://spaj.ukm.my/jws/index.php/jws/article/view/299
22. Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory (3rd ed.). McGraw-Hill.
23. Razali, F., Anuar, A., & Hamzah, M. I. (2023). Keberkesanan program latihan industri dalam meningkatkan kebolehpasaran graduan TVET. Jurnal Pendidikan Teknikal dan Vokasional Malaysia, 15(1), 45–58.
24. Sabah Media. (2023, Ogos 12). Pembangunan modal insan negara wajar diteliti bagi melahirkan tenaga kerja berkemahiran tinggi. https://sabahmedia.com/2023/08/12/pembangunan-modal-insan-negara-wajar-diteliti-bagi-melahirkan-tenaga-kerja-berkemahiran-tinggi/
25. Saukkonen, J., & Kreus, P. (2022, August). T-shaped capabilities of the next generation: Prospecting for an improved model. In European Conference on Knowledge Management (Vol. 23(2), pp. 1032–1041). https://doi.org/10.34190/eckm.23.2.369
26. Savickas, M. L. (2011). Career counseling. American Psychological Association.
27. Savickas, M. L., Porfeli, E. J., Hilton, T. L., & Savickas, S. (2009). The student career construction inventory. Journal of Vocational Behavior, 74(3), 235–244. https://doi.org/10.1016/j.jvb.2009.01.002
28. Suhaizal, H., Mohamed Zahir, N. Z., Amiruddin, M. H., Ismail, M. E., & Nincarean, D. (2024). Students' soft skills and their readiness towards Industrial Revolution in Technical and Vocational Education and Training (TVET): A Malaysian sight. Online Journal for TVET Practitioners, 9(1), 37–51. https://doi.org/10.30880/ojtp.2024.09.01.004
29. Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International Journal of Medical Education, 2, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd
30. Unit Perancang Ekonomi. (2021). Rancangan Malaysia Kedua Belas (RMK12), 2021–2025: Malaysia makmur, inklusif, mampan. https://rmke12.ekonomi.gov.my/storage/fileupload/2021/10/2021102553_Slaid_Epu_Slu_Pasca_Rmke_12_Pahang.pdf
31. Wan Ishak, W. H., & Mat Yamin, F. (2020). Penguasaan semasa e-kemahiran dalam kalangan pelajar UUM: Cabaran dalam era IR4.0. Journal of Business Management and Accounting, 10(1), 29–45. https://doi.org/10.32890/jbma2020.10.1.2
32. Wan Rashid, W. H., Che Kob, C. G., & Abdullah, A. S. (2020). Modul pembelajaran berasaskan projek: Kesan terhadap pencapaian teori dalam projek tahun akhir 1 di kolej vokasional. Jurnal Pendidikan Teknikal dan Vokasional, 3(1), 83–92. https://doi.org/10.12928/joves.v3i1.1409
33. Wang, D., & Li, Y. (2024). Career construction theory: Tools, interventions, and future trends. Frontiers in Psychology, 15, Article 1381233. https://doi.org/10.3389/fpsyg.2024.1381233
34. Zahari, Z., & Omar, M. K. (2021). Pendekatan kebolehsuaian kerjaya dalam kalangan pelajar kolej vokasional di Selangor. Malaysian Journal of Social Sciences and Humanities, 6(1), 52–60. https://www.msocialsciences.com/index.php/mjssh/article/view/612
35. Zianatul Makwa, I., Ismara, K. I., Sudira, P., & Maryadi, T. H. T. (2025). Career adaptability for sustainable workforce development: A systematic review in vocational education. International Journal of Research and Innovation in Social Science, 9(3S). https://doi.org/10.47772/IJRISS.2025.903SEDU0231

36. Zulnaidia, K., & Abd Majid, M. Z. (2020). Readiness and understanding of technical vocational education and training (TVET) lecturers in the integration of Industrial Revolution 4.0. International Journal of Innovation, Creativity and Change, 10(10). https://www.ijicc.net/images/vol10iss10/101003_Zulnaidi_2020_E_R.pdf