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Methodology for Investigating Competency Index of Technical Vocational Education and Training (TVET) Instructors for 4.0 Industrial Revolution

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A B S T R A C T S

The purpose of this study is to construct several methods for evaluating the competency index of Technical Vocational Education and Training (TVET) instructors toward IR4.0. Research methodology is important so that the research conducted has the most appropriate and effective method in answering research problems. Therefore, the research method that is designed involves the interview protocols, the research design, research subject or sample, research procedure, data collection procedure, and data analysis procedure.

A R T I C L E   I N F O

1. INTRODUCTION

Research methodology is a procedure or technique for special use to identify, select, process, and analyze information about something topic or problem. Methodology on research allows people to evaluate by critical validity and reliability of studies as a whole. Part methodology research will answer two questions: (i) how data is collected or generated, and (ii) how method to be analyzed. Methodology research is the word referring to " how " to be practical in every part of doing research. More specifically, research methodology is about how the researcher does systematic designing studies for ensuring valid results and the results could reliable when discussing target research (Kamila & Sakti, 2022).

Research methodology decides: (1) what data should be collected as well as what data to ignore (Reiter, 2011), and (2) from who to collect it or it is often called design taking samples in research. There is a vocabulary important in method research, how collecting it is called the "method data collection ", and with method what analyze it normally called with "data analysis ". The methodology must justify the choice of experimental design and the most suitable technique for meaning and target research. The methodology must give valid results that could reliable for other researchers. A good research methodology will give logical findings scientifically.

In other words, research methodology is concerned close with field research, this is another way to complete project research. Methodology study scientific more character technical writing as well as this scientific research methodology started from question common follow _ with draft special, where hypothesis general narrowed down for highlight aspect certain from topics that. Besides, it is also developed design study for observing and analyzing aspects and focuses carefully. The end of the research methodology is to develop and generalize following the practical and realistic world.

The important aspects of knowing what purpose and function of research methodology relate to the way how to identify, choose, process, and analyze information. Then, this research methodology naturally operates many functions. Available functions in the research methodology are :

(i)   Identify activity study in true meaning.
(ii)   Determine and define the actual concept.
(iii) State method like what will be required for investigation more further, more. Moreover, how progress can be measured.
(iv)   Offers a platform for demonstrating how we could communicate activity study in true meaning.

The research methodology has several types and is distinguished based on its focus (Alpi & Evans, 2019). The type of research methodology are:

(i)   Qualitative Research Methodology. Study qualitative refers to focused research on the collection and data analysis (written or verbal) and textual data.
(ii)   Quantitative Research Methodology. Type study quantitative this counted enough general used when meaning and destination study character exploratory. For example, the qualitative methodology can be used to understand the perception Public about something events that occurred or nominating a candidate self as a leader. For example, methodology quantitative could use to measure the connection between two variables like type personality and the possibility based on hypothesis.
(iii) Mixed Research Methodology. This method tries to combine the best from methodology qualitative and quantitative.

The research methodology will explain what the researcher did and how the researcher conducted it. This allows the reader to evaluate the reliability and validity of the research. This must include:

(i) Type of research will be done.

(ii) How to collect data.

(iii) How to analyze data.

(iv) Tool or ingredient whatever use in research.

(v) Reason for choosing the method.

In short, when doing a research methodology, several factors must be considered:

(i) Explain Approach Methodological. We get started by introducing the approach in the whole research. Mainly, we can start with a problem study or question what will be investigated. As an example, when we aim to describe characteristics something systematically and explore the unfinished topic of research. Or, we could focus on what to use to build a connection between cause and effect, and what kind of data is the researcher need to reach the destination.

(ii) Explain Method Data Collection. After the researcher introduced the approach in the whole research, we must give details complete about the data collection.

(iii) Explain Method Analysis. Next, we must show how the researcher proceeds and analyze data by explaining the method of analysis. In applying this step, the researcher must avoid explaining too lots of details and our no can start presenting or discuss results in anything on this step.

(iv) Evaluation and Justification Choice Methodological. The final step in the research is to write a research methodology that is with evaluation and justification the choice methodology. The methodology must explain the reason for the selection of the method, especially if the researcher did not take the most standard approach for the intended topic. The researcher must discuss why other methods do not suitable for destination research and show how the approach could give contribution knowledge or understand new ideas.

Research methodology or methodology study adopted for check theory certain and the app along with series standard academic certain. Thus, the purpose of this study is to construct several methods for evaluating the competency index of Technical Vocational Education and Training (TVET) instructors toward IR4.0.

TVET is a learning strategy developed by taking into account the right targets, clear goals, clear competencies, and performance indicators, as well as a measurable transformation of the achievement of TVET's mission and vision in the 21st Century (Indarta *et al*., 2021; Salleh & Sulaiman, 2020). The TVET learning strategy was developed by taking into account the carrying capacity of available resources in the field.

Good TVET learning is learning that has an impact on students' self and future in social, economic, artistic, cultural, technological, and natural environment life. The 21st Century TVET learning requires increasing impact rather than output (Majumdar, 2011). An important impact of TVET learning is the formation of a person's professional identity or expertise. The formation of a person's vocational or work capacity needed by the world of work and society is the goal of TVET. The TVET learning strategy is designed to increase the real impact on students. TVET is a certified education for work-standard skills, respect for competence, development of careers, and prosperity. The objectives of the TVET learning strategy are as follows:

(i) Understand the competency requirements of the world of work.

(ii) Doing routine work.

(iii)   Mastering daily work procedures.
(iv)   Implement work safety standards.
(v)   Increase productivity.
(vi)   Able to work in a collaborative team.
(vii)   Digital literacy and symbols at work.
(viii) Pay attention to quality and efficiency.
(ix)   Apply ethical standards, work morality.
(x)   Understanding national change.
(xi)   Have an entrepreneurial spirit.

One of the important issues in TVET is TVET instructor. Teacher training is an important social task in all countries since future social orientation is conveyed through job competence. To create a symbiosis of technology and work-oriented training in the "Teacher Training for Technical Education and Vocational Education and Training" system and to support the development of a multi-dimensional learning process, teachers must have qualifications to be able to channel didactic concepts and concepts. The concept of the future of the industry is oriented towards humans and technology, both in terms of mastery of industry and learning theories. Transnational standards for teacher training are the solution to this need. All the partner countries mentioned have interests worth considering for development in the context of planning and implementing the concepts mentioned above. Another very pragmatic and important opinion is that European partners as a knowledge society with a high-quality orientation are willing to support and that partners in Asia want to close the gap between industrial and service societies in 2020. However, both targets require good teacher training for the system of Technical Education and Vocational Education as well as training and strengthening of related research. Reforms to the vocational education system are being implemented with the help of international advisors who usually pay little attention to maintaining the structures of teacher training and TVET research except by involving their respective local academic communities.

Therefore, research methodology on the evaluation of TVET instructors is important so that the research conducted has the most appropriate and effective method in answering research problems. Therefore, the research method that is designed involves the interview protocols, the research design, research subject or sample, research procedure, data collection procedure, and data analysis procedure.

2. METHODS

This study is a literature review. We collect data from news and international articles published in journals. Detailed information on the way how to collect data is explained elsewhere (Azizah *et al*., 2021).

3. RESULTS AND DISCUSSION

In the era of increasingly dynamic global competition, it is undeniable that the existence of superior human resources with talent is important to improve organizational capabilities. Understanding the demands of competence in every job is a must for every company leader to be fully involved in developing the potential to continue the interests of the business and/or organization, including TVET. Competence is understood as a collection of effective behaviors that determine a person's success in carrying out his role in the organization. Broadly speaking, competencies are divided into groups of behaviors that are technical (technical competencies) and non-technical (soft competencies). Soft competencies can be

grouped into at least three major groups, namely value-driven competencies, leadership/managerial competencies, and specific soft competencies. Each competency group has its role in shaping employee attitudes and work skills. Understanding competence completely means understanding several important components of competence, namely Name (or title), Definition (or understanding), Behavioral Indicators, and what is no less important is Competency Level. There are many opinions related to understanding Competency Levels, including "Does competencies need to be developed into several different levels?" and "Is the Competency Level the same as the Competency Assessment criteria?". The answer is that each competency consists of several levels. The difference lies in the level criteria and the number of levels that appear for each competency group. For example, for Technical Competencies, it is necessary to do a leveling that describes the level of expertise. In general, the levels are divided into five, starting from the beginner level to the advanced level (expert). The Leadership Competency Leveling is different because it generally follows the demands of leadership at the level of positions in the organization.

Competency Level is different from Competency Rating Criteria. The Competency Level refers to the behavioral demands expected at the position, while the Competency Assessment Criteria are a reference for the assessor in determining the value to be given based on the individual's ability to display the expected behavioral demands. The Competency Assessment Criteria are a further process after the company has analyzed the Competency Levels required for the position.

Thus, in general, the description of Competency Levels is expected to complete a complete understanding of competence and apply it as a basis for integrated human development to optimally produce company talents.

3.1. Research design

The selected research design will serve as a guide for the researcher in achieving the research's goals and answering the research questions through a series of detailed procedures. Research design is the detailed planning of data collection and analysis procedures that include decision-making activities based on aspects such as research objectives, research strategy, research location, type of research, unit of analysis, design sampling as well as methods of data collection, measurement, and analysis. This research uses interviews that are divided into two stages as shown in **Figure 1**.

3.1.1. Stage 1

This stage aims to construct structured questions for the interview instrument. The construction of the question will be based on previous research materials related to the competency of TVET instructors in Malaysia that have been conducted by previous researchers. Furthermore, the process of refining the items of the interview instrument will be done by two individuals who are experts in the field of education. They suggest that the selection of qualitative study participants should be at least one and there is no maximum limit for the number. They assert that if the required data has met the requirements of the study, only one participant is sufficient.
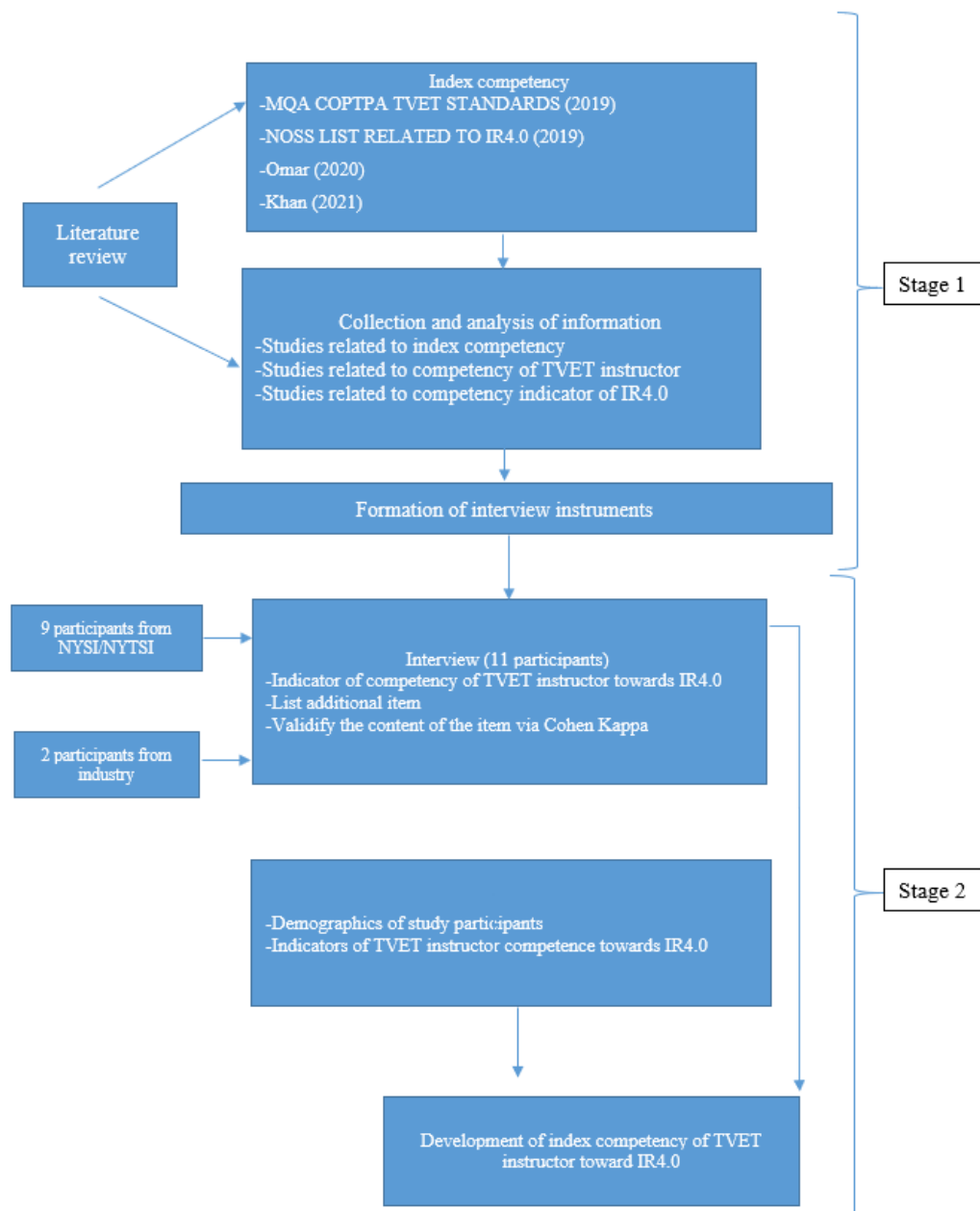
Figure 1. Research design.

3.1.2. Stage 2

A two-round interview will be carried out in stage 2. In the first round, the interview will be conducted to identify the importance of developing a competency index of TVET instructors towards IR4.0. In addition, it aims to reach a high consensus among the expert panel that has been formed by the researcher to list the items of the competency index of the TVET instructor. The second-round interview is to ensure the saturation point of information gathered from participants would develop the index of competencies, at the end of the study.

Furthermore, the findings of the research at this stage will be used to construct questionnaire instrument items to conduct a survey study on TVET instructors. This aims to verify the Competency Index of TVET instructors based on the research data. The three rounds of Delphi studies are briefly discussed as follows:

(i)   First-round interview. In the first round of the Delphi study, the researcher will meet and interview each participant of the expert panel that has been formed to collect qualitative data on the development of the competency index of TVET instructors towards IR4.0. The researcher will also discuss the importance and elements of competency required among TVET instructors in facing the era of IR4.0 based on interview protocol. The method conducted in the first round is to explore and understand the phenomenon of a study in more depth by diving into what will be interpreted by the expert panel members through their conversations, expressions of feelings, and views.

(ii) Second-round interview – Cohen Kappa Process. In the second round, the researcher will meet again with each participant of an expert panel to determine the Julat Antara Kuartil (JAK) that relates to the consensus of each panel expert, before the items/indicators of each variable [knowledge, skills, and attitude] is developed/agreed. Before the JAK comes to a consensus by the end of this round. Each participant in the expert panel will be allowed to examine each item to get an explanation of the terms that are poorly understood.

(iii) Third-round. The purpose of the third round is to bridge the gap of opinion among the participants of the expert panel on the questionnaires that were analyzed in the second round. In this round, all items of the questionnaire should reach the highest level of agreement among experts. Thus, the round session for the Delphi study will cease and the questionnaire items are adopted for the survey study.

3.1.3. Stage 3

Stage 3 involves survey activities to verify the competency index of TVET instructors towards IR4.0. Questionnaire instruments are developed through a Delphi study with the expert panels that will be used. Questionnaire instruments are suitable for obtaining information about a phenomenon in general from a large population size or to study a large sample of quantities to represent the population. The findings of the research will receive the following benefits: (1) improve the accuracy of sample statistical estimates for estimating population parameters, and (2) reduce sampling errors.

3.1.4. Method of data collection

Data collection would be executed by interviewing expert panels from experienced TVET lecturers, syllabus makers, and expert industry associates with IR4.0. This will be the basic source of data collection i.e. qualitative data on the competency index of TVET instructors towards IR4.0. A questionnaire will be designed to collect quantitative data related to the research question.

Developing mixed methods research could employ a mixed method of data collection, meaning that the analysis would also be mixed using any of the available common methods, questionnaire, survey, interview, observation, experiment, bibliometric, and usability testing. A popular instrument in qualitative and quantitative research methods is the questionnaire. A well-designed questionnaire is the basis of successful research. Since the research wishes to collect exploratory information on a phenomenon, the study articulates two methods of data collection and envisage different method of analysis for each level.

3.1.5. The interview protocols

Interview protocol can be viewed as a guide for the interview: what to say at the beginning of the interview to introduce yourself and the topic of the interview, how to collect participant consent, interview questions, and what to say when ending the interview. A structured

interview is a systematic approach to interviewing where the researcher can ask the same predetermined questions to all candidates in the same order.

During a structured interview, the predetermined questions the researcher asks are all correlated to important job competencies derived from a previous research study. The questions can be either behavioral or situational. This process has shown greater reliability and validity than the unstructured interview. Structured interviews also ensure that researchers can reduce discrimination issues since all candidates are treated fairly and given the same opportunities to showcase their abilities.

There are four types of interview Structured Interview, Semi-structured interview, In-depth interview, and focused group discussion. This study will adopt a Structured interview with the senior lecturer of TVET education, an experienced lecturer that expert in IR4.0, a syllabus maker, and a representative from the IR4.0 industry. The purpose of choosing this type of interview is to help collect complete information with deep understanding.

3.1.6. Questionaire

The questionnaire is a data collection instrument that consists of a series of questions and prompts respondents to respond to the research question in a logical flow. A well-design questionnaire is tailored to meet the research objective "What is the Competency Index of TVET instructors toward IR4.0?". **Figure 2** shows the process of data collection for the questionnaire.

A questionnaire can be deployed using an open-ended format or closed-ended format. A questionnaire with an open-ended format is questions without a predetermined set of responses. A closed-ended format questionnaire is a design that takes the form of a multiple-choice question. A questionnaire allows the collection of data that are both subjective and objective in a large sample of the study population. To obtain statically significant results, a closed-ended questionnaire will be used to evaluate the Competency Index of TVET instructors for IR4.0.

In this study, the questionnaire designed will be based on the findings from Research Objective 1 that is; after determining the levels of knowledge, skills, and attitude among TVET instructors in the Public Skills Training Institution for the 4th Industrial Revolution gathered from the Delphi Stage 1-3. The items/indicators in the questionnaire will be listed about the levels of knowledge, skill, and attitude among TVET instructors. This questionnaire will be validated by the panel experts from the field of TVET, and the reliability of the questionnaire will be considered from the Cronbach Alpha values after the Pilot Study is administered.

3.1.7. The Development of the TVET Competency Index for IR4.0

In this study, competency is made up of the following three elements: knowledge, skills, and attitude. The Competency Index for IR4.0 is developed based on the findings from Research Questions 1 and 2. At this stage, a framework structure that identifies the competency by categories and defines the behaviors that are associated with it is established. It will be developed via:
(i) Grouping and categorizing competencies, by reading through the three elements and grouping them into categories.
(ii) Creating definitions to describe competencies associated with each of the three elements surfaced.
(iii) Validating and revising the competencies.
(iv) Selecting competencies that are most effective and align with the objective of the research.

(v) Establishing the metrics that will be used to determine whether the competencies are effective.
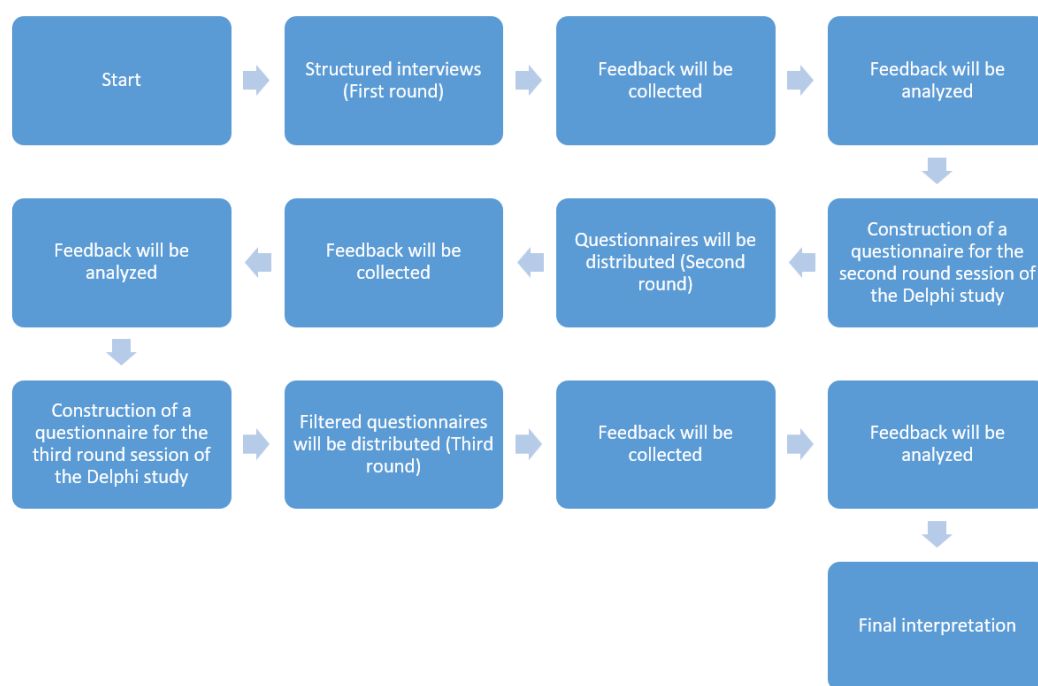
Figure 2. Process of data collection of question.

3.1.8. Pilot study

A mixed-method is complex thus, an efficient process in modern-day research. It is a complex task to collect and analyze both quantitative and qualitative data within the same study. To make the process easy and free of error., a pilot study will be conducted before the main study to ascertain the feasibility and validity of the research method. The objective of the pilot surveys is also to test the strength of the research method. The pilot study will help to identify and solve the confusing points if any.

3.2. Population and study area

The study area of this research is an institution under ILKBS, and the target study area is National Youth Skills Institute (NYSI) and National Youth TECHNOLOGY Skills Institute (NYTSI). The interview will be conducted through an online meeting because of the pandemic COVID-19. The researcher chooses NYSI and NYTSI due to the TVET education system that relates to IR4.0.

3.3. Sample Size

The sample size will be discussed in more detail in this section.

3.3.1. The participants in the research

The main feature of the selection of study participants is to coincide with the study ethics which is based on the principle of willingness or willingness of participants to engage in this study. In line with the views, which approved it by setting the main requirement is the participants agreed personally and were interested in involving themselves in a study.

The researcher should consider the following aspects: (1) determination of the field of study, (2) determining the quantity of data to be collected and analyzed, (3) interpretation

and inference related to the information studied, and (4) the time, expense and energy required to solve a phenomenon in a study. Thus, the participants of this study will be selected based on the title and research questions that have been set by the researcher when planning to carry out the study by taking into account the above views.

The main focus of the study is to develop an index of competencies of TVET instructors based on their pedagogical approach in the IR4.0, the fluid and organic curriculum that relates to innovation among these groups is considered crucial as part of the contribution to developing the main objective of the research. This study is dominantly focused on TVET instructors to ensure the findings will extremely design an accurate index of competencies for IR4.0 among TVET instructors in the Public Skills Institutions

3.3.1.1. Delphi study

Delphi is a method of structuring characteristics of the group communication process to make it more efficient between individuals or whole groups while solving complex problems. Expert panels will be asked to identify, clarify, refine, and finally reach an agreement on specific issues through a series of rounds of questionnaires. The advantage of this research method is that the expert panel does not have to meet face to face. Thus, an expert can express his or her views without being influenced by other experts. The selected experts are kept secret from the knowledge of other experts.

We can choose to conduct the Delphi study after considering some views such as previous researchers who used this method. This research uses the Delphi study method to identify, analyze, and explain the importance and formation of the Competency Index of TVET instructors towards IR4.0. Next, this study also identifies, refines, and obtains agreement on the items for the Competency Index of TVET instructors towards IR4.0 through a series of questionnaires. Therefore, the selection of Delphi study participants is based on their level of expertise in the field of TVET. The selection of study participants especially in the Delphi study should be made carefully because errors in selection will affect in results or findings to the contrary, the sample size of Delphi study participants

Several previous researchers have put forward several opinions in determining the sample size or the number of expert panels through Delphi studies. A formed panel of experts with 7 to 100 members is well suited to obtain a robust study.

Next, they suggested that the appropriate number of expert panels be 5 to 10 people only so that the study conducted achieves the set objectives. Next, they suggested that the expert panel should consist of an unvarying group, such as experts from the same disciplinary group, and need the involvement of experts between 10 to 20 people only.

A sample is a segment of the population that is selected for investigation. This study will report interviews with senior lecturers of NYSI and NYTSI, senior lecturers of the Universiti Teknologi Malaysia (UTM) electrical and electronics department, and experts from the technology industry. A total of ten interviews will be conducted for a qualitative study

3.3.1.2. Sample criteria of Delphi study participants

The Delphi study is used because it is designed to optimize the input to be obtained from the individuals involved in the expert panel group formed. The most important thing to pay attention to in the use of the Delphi study is the selection of experts.

The following criteria as a guide for selecting a person to be an expert panel. Among them are good self-appearance and respect by professionals, the number of papers that have been produced and presented to the public at the national or international level, publications that have been on the market, and the number of studies that have been conducted. Based on

this view, in the Delphi study, which is purposive sampling, the researcher considers the criteria and the criteria that have been discussed earlier.

Based on the two definitions of the meaning of 'expert' above, the researcher determines the selection of experts for the study to be conducted based on three criteria namely; (1) Must obtain at least Bachelor's Degree, (2) Know the curriculum and implementation of technical and vocational subjects whether at the university level, teacher education institutes or schools, and (3) Those directly involved in the implementation of TVET, especially in the Ministry of Youth and Sports of the Ministry of Education Malaysia.

The selection of individuals as expert panels is dependent on the objectives constructed as Delphi research questions. The important thing in expert selection is the quality of the expert panel members and not the quantity. The panel of experts selected should be based on their willingness and ability to express their opinions on the topic to be discussed and have in-depth experience on the matter.

3.3.1.3. Survey study

The survey study to be conducted is to obtain the quantitative data to verify the Competency Index of TVET instructors towards IR4.0. Therefore, this section will discuss the following aspects of conducting a survey study:

(i)   The location of the survey study. The location of study will be conducted in peninsular malaysia and sabah. The following table shows the location and number of institut kemahiran tinggi belia (nytsi) that offer electrical and electronic programs where this study is conducted based on the location of the participants.

(ii) The survey study population. Determining the study population is the most important step that needs to be done in the early stages of the research sample selection process. The study population consisted of the target population. In this research, the target population of the survey study selects those who are serving in the nysi and nytsi in peninsular malaysia. The survey population is 147 tvet instructors from the electrical and electronic departments in nysi and nytsi. **Table 1** shows the number of populations of tvet instructors of nysi and nytsi. The sample size representative of tvet instructors is 108. It is determined based on krejcie and morgan's sample size calculation which same as using krejcie and morgan's sample size determination table. The sample size determination **Table 2** is derivative of the sample size calculation which is expressed as below equation (1).

$$S=x^2 \, np \, (1 - p) \pm d^2 \, (n - 1) + x^2 \, p \, (1 - p) \qquad (1)$$

Where s is the required sample size, x^2 is the table value of chi-square for 1 degree of freedom at the desired confidence level (0.05 = 3.841), n is the population size, and p is the population proportion (assumed to be 0.50) since this would provide the maximum sample size, and d is the degree of accuracy expressed as a proportion (0.05). Krejcie and morgan's sample size calculation was based on p = 0.05 where the probability of committing a type i error is less than 5 % or $p <0.05$.

3.4. Sampling technique

Two groups of sampling techniques have been identified in this study which is probability and purposive sampling technique. Probability sampling is useful in a relatively large number of units. Probability sampling is common in a quantitative study. The purposive sampling technique is primarily used in a qualitative study by selecting a few individuals, or groups of individuals or institutions to drive a research study's question. In this study, the sampling

selected is among TVET instructors from ILKBS who have more than 5 years of experience teaching in the field of electrical and electronic areas.   Other sampling techniques are convenience sampling and mixed methods sampling, which involves using probability sampling to increase external validity and purposive sampling strategies to increase transferability. The interview process will be based on the purposive sampling technique.

Table 1. The population of TVET instructors of NYSI and NYTSI

No	Ilkbs	Department	No. Tvet Instructor
1	NYTSI SEPANG	Electronic Technology Department	9
2	NYTSI BUKIT MERTAJAM	Electrical Technology Department	22
		Electronic Technology Department	13
3	NYTSI DUSUN TUA	Electrical Technology Department	23
		Electronic Technology Department	3
4	NYTSI ALOR GAJAH	Electrical Technology Department	16
5	NYSI JITRA	Electrical Technology Department	7
6	NYSI KINARUT	Electrical Technology Department	20
7	NYSI WAKAF TAPAI	Electrical Technology Department	6
8	NYSI NAKA	Electrical Technology Department	19
9	NYSI SERI ISKANDAR	Electrical Technology Department	4
		Electronic Technology Department	5

Table 2. Determining sample size from a given population.

N	S
75	63
80	66
85	70
90	73
95	76
100	80
110	86
120	92
130	97
140	103
150	**108**
160	113

The sampling method used in the survey study is the probability sampling method which is random sampling. A probability sampling defines as one in which every unit in the population has an equal chance of being selected in a sample that can be accurately determined. A sample chosen randomly is meant to be an unbiased representation of the total population. The sample population of the survey study will be focused on TVET instructors at the Electrical and Electronic Department from NYSI and NYTSI.

3.5. Method of data analysis

Since this research entails collecting data from two different sources, the qualitative method can be analyzed using the content analysis technique. This may involve the use of qualitative software such as NVivo. This enables the researcher to identify key elements of

the Competency Index of TVET instructors towards IR4.0. NVivo content analysis has powered analytics procedure to interpret topics and surface insight from respondents.

While qualitative data will be collected through a questionnaire that will be administered through email or in person. Feedback will be collected using Qualtrics experience Management survey software, the software will be used to collect quantitative data and the data will be saved in a format that can be directly imported into the SPSS software package for easy analysis. **Table 3** shows a summary of the study to further explained the research question and the data collection of the study.

3.6. Content validity and reliability

In this research, the initiatives taken will be subject to expert review for the validity and reliability of the research and the research instrument. This process will help to reduce the errors and biases in the research and help to provide transparency through careful review of the research procedures and focus areas.

Table 3. Table for determining sample size from a given population.

No.	Research Questions	Participants	Data Collection Techniques	Data Analysis Techniques
1.	What are the levels of knowledge, skills, and attitude among TVET instructors in the Public Skills Training Institution for the 4th Industrial Revolution?	TVET instructors	Semi-structured Interview	Thematic
2.	What are the types of training required among TVET instructors in the Public Skills Training Institution for the 4th Industrial Revolution?	TVET Instructors	Semi-structured Interview	Thematic
3.	How does the TVET index of competencies among TVET instructors in the Public Skills Training Institution for the 4th Industrial Revolution is developed?	TVET Instructors	Semi-structured Interview	Thematic

3.6. Example for the Question during Interview Protocol

The questions for the interview protocol for this study are in the following:
(i)   Do you know what is Competency Index?
(ii)   Competency can be defined by three elements, which are knowledge, skills, and attitudes, do you agree?
(iii) What do you describe as knowledge competency for a TVET instructor?
(iv)   What do you describe as skills competency for a TVET instructor?
(v)   How do you describe the attitudes and competencies of the TVET instructor?
(vi)   Do you know about Industrial Revolution 4.0 and can you explain a little bit the relationship between IR4.0 and the current education syllabus?
(vii) In your opinion, what type of knowledge competency that TVET instructor should have to adapt to IR4.0?
(viii) In your opinion, what type of skills competency that TVET instructor should have to adapt to IR4.0?
(ix)   In your opinion, what type of attitude competency that TVET instructor should have to adapt to IR4.0?

(x)   The competency Index is a set of measures (items) that includes knowledge competency, skills competency, and attitude competency. In your opinion, what are the most critical items that must include in the Competency Index to develop a Competency Index for TVET instructors towards IR4.0?

(xi)   Finally, what type of training can improve the competency of TVET.

4. CONCLUSION

The research design and methodology used for this study are presented in this paper as well as details on the research method and how the data will be collected. The questionnaire development and construction for the expert panel evaluation of the competency index have been discussed in this paper and how the feedback and data collected from the survey study will be analyzed.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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