

Article

# A Delphi study to build consensus on strategies for adult vocational training of higher education institutes in Guangxi Zhuang Autonomous Region China

Guangpei Wei, Ampapan Tuntinakhongul\*

King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand

\* **Corresponding author:** Ampapan Tuntinakhongul, [ampapan.tu@kmitl.ac.th](mailto:ampapan.tu@kmitl.ac.th)

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**Abstract:** Adult vocational training of higher education institutes has great potential to help workforce coping with uncertainties of the fast-changing Labor market in the era of Industrial Revolution 4.0. However, the lack of clarity regarding strategies for effectively establishing adult vocational training in higher education institutes may hinder progress. The aim of this study was to develop agreed strategies of adult vocational training for higher education institutes in Guangxi Zhuang Autonomous Region, China. The 3-round Delphi method used semi-structured interviews and questionnaires to explore and reach an agreement on the future direction of the strategies. The semi-structured interview was used in the first round to explore the ideas in relation to such strategies. The questionnaires were used in the second and the third rounds to explore further and reach the consensus on expert opinions defined at interquartile range (IQR)  $\leq 1$ . Besides that, Analytic Hierarchy Process (AHP) methods were used to calculate the weights of each consented statements. Through Delphi method, the comprehensive strategies have been articulated with the highlights of 1 vision, 6 goals and 40 actionable strategies. Furthermore, the experts commonly highlighted that the vision of future adult vocational training shall prioritize cultivating skilled professionals with industrial needs, offering everyone accessible opportunities for career development. Besides that, the result also showed that reskilling and upskilling and extending the learners' interpersonal networks have been ranked as the two most important goals for future adult vocational training in higher education institutes.

**Keywords:** vision; goals; actionable strategies; adult vocational training; higher education institutes; Delphi method; AHP method

## 1. Introduction

As the world undergoes digitization and automation in the era of industry 4.0, global work patterns are changing (Li, 2022). Millions of people will need to update and enhance their skills, and some will change occupations (Mindell, 2023). Di (2023) estimated that 44% of workers' skills will be disrupted, six out of ten workers will require training before 2027, but only half adults are seen to have access to adequate vocational training opportunities. It is obvious that reskilling, upskilling, and adult vocational training are urgent tasks to transform the workforce into lifelong learners and help them coping with uncertainties of the fast-changing Labor market (Mahboubi, 2021). Those Urgent tasks are also consistent with Sustainable Development Goals (SDGs), particularly SDG 4, which emphasizes quality education and lifelong learning opportunities for all (Chankseliani and McCowan, 2021). To address this challenge, mobilizing higher education institutions (HEIs) is the key due

to higher education institutes are of the existing excellent teaching force and teaching equipment (Burns, 2020; Rawas, 2024)). There are a lot of countries are currently exploring the way to combine adult vocational training with higher education institutes. In America, Stanford University's "Open Loop University" model breaks the constraints of traditional universities, forming a mixed student campus with a wide age range—encompassing teenagers, working professionals, retired individuals (Cheng, 2016). In New Zealand, Industry training organizations (ITOs) are part of New Zealand's tertiary education sector, along with universities, polytechnics and recognized by Government and usually receive funding from both Government and industry for the people who are learning a trade or skill on-the-job (Williams, 2022). In Japan, Brush Up Programs for Professions (BP) offered by universities are designed to expand opportunities for working adults to upgrade skills necessary for their occupations through practical programs certified by the Minister of Education, Culture, Sports, Science and Technology (Jubatova, 2021). In Singapore, Skill future Career Transition Programme (SCTP) is a national workforce initiated by Skills Future Singapore (SSG) under the Ministry of Education and based at higher education institutes such as National University of Singapore, Nanyang Technological University and Singapore Management University to support mid-career individuals with acquiring industry-relevant skills to improve their employability, allowing more to pivot to new sectors or job roles (Chia, 2022). But China as the hub of manufacturing of the world has not yet used the force of higher education institutes to establish similar aforesaid program for their workforces.

China is modernizing and digitizing its industries, and rebalancing its economic structure by transitioning to high value-added innovative industries (Telese, 2023). Guangxi Zhuang Autonomous Region as a developing province of China, is striving to seize these opportunities to advance the transformation and upgrading of its economic structure, promoting the shift of traditional industries towards high-end and intelligent development. However, some employees are unable to keep pace with these changes, many of workers are in danger of being replaced by the machines (Stefanov, 2024). Meanwhile, training sufficient skilled workforces are the foundation for Guangxi Zhuang Autonomous Region to seize industrial upgrading opportunities. Thereby, this study aims to develop adult vocational training strategies for the higher education institutes in Guangxi Zhuang Autonomous Region China, to maximumly utilize the forces of higher education institutes to build up a transition bridge for its workforces to reskill and upskill. Thereby, Guangxi Zhuang Autonomous Region is able to smoothly complete its industrial upgrading, meanwhile, ensuring their workforce also be able to survive in the unstable future labor market.

## **2. Materials and methods**

### **2.1. Delphi method**

The Delphi method is a scientific approach that utilizes an iterative process for surveying and gathering judgments and opinions based on anonymous expert panelists' experiences, knowledge, and presumptions on a specific topic (Lilja et al., 2011). It provides different opportunities to researchers than survey research, the essential components of the Delphi technique include the communication process, a

group of experts, and essential feedback (Adler and Ziglio, 1996; Stitt-Gohdes and Crews, 2004). Meanwhile, this technique also finds applied whenever decisions, strategies, or concepts need to be informed by expert judgment particularly useful in situations where the insights and judgments of experts and practitioners are required, but logistical constraints such as time, distance, or other factors make it impractical for the panel to be gathered in a single physical location (Yousuf, 2007). Delphi has been viewed as a method for structuring a group communication process, this structure permits the process to be an effective way to allow a group of individuals to deal with a complex problem through four aspects: some feedback of individual contributions of information and knowledge; some assessment of the group judgment or view; some opportunity for individuals to revise views; and some degree of anonymity for the individual responses (Turoff and Linstone, 2002). Anonymity is a fundamental aspect of the Delphi method, fostering an environment where panelists can offer their perspectives without fear of judgment or repercussions, empowering expert panelists with freedom to express their opinions without concerns about social pressures or repercussions regardless of their official position or status, thereby promoting independence and overcome limitations inherent in face-to-face expert groups. Delphi method also has been used in various research field; the researcher of this study reviewed related works in terms of research methodology about Delphi study of developing strategies with Delphi method to better guide the researcher to complete this Delphi research. The Delphi technique has proven to be a reliable measurement instrument in developing new strategies and setting the direction of future-orientated research. The technique seeks the opinion of a group of experts to assess the extent of agreement and to resolve disagreement on an issue. It has been used to establish consensus across a range of subject areas, with several in the field of education (McKenzie et al., 2024; Sharpe et al., 2020; Sim et al., 2021; Wang et al., 2023).

## **2.2. Study design**

In Round 1, a semi-structured interview was used to explore ideas of strategies for adult vocational training for higher education institutes. As results, “As constructing learning society pioneer that cultivates skilled professionals with industrial needs, offering everyone accessible opportunities for career development” has been identified as vision of the adult vocational training of higher education institutes. To fulfill the vision, there were six goals and certain actionable strategies under each goal have also been identified. There were four actionable strategies for Goal 1: to offer an accessible vocational training to learners; two actionable strategies for Goal 2: to provide comprehensive counseling for learners; three actionable strategies for Goal 3: to customize training schedule for learners; fourteen actionable strategies for Goal 4: to reskill and upskill learners; three actionable strategies for Goal 5: to extend interpersonal network of learners; Six actionable strategies for Goal 6: to qualify learners with social approval. In conclusion, the preliminary strategies consisted of 1 vision statement, 6 goals and 32 actionable strategies have been formed through literature review and semi-structured interview with content analysis in round 1.

In Round 2, the preliminary strategies consisted of 1 vision statement, 6 goals

and 32 actionable strategies as the results of round 1 would be delivered in the form of questionnaire to the same group of participants. Participants were asked to independently rate a total of 39 statements, across three domains, using a 5-point Likert scale respectively are: “Strongly undesirable”, “Undesirable”, “Neutral”, “Desirable” and “Strongly desirable” (Giannarou et al., 2014; Hohmann et al., 2018). Besides that, A free-text response was available to participants within each of the survey domains, providing the opportunity for participants to elaborate or explain responses meanwhile contribute additional alternative statements if there are any further ideas.

In Round 3, Participants were asked to reconsider their responses in light of the group’s responses for a final time, each participant received an individualized survey, comprising the same statements as round 2. Further, the new statements derived from the free-texted responses of round 2 would also be added as new statements in round 3. Furthermore, there was no option for free-text responses in round 3. All surveys of round 2 and round 3 were administered using Questionnaire Star, and survey links were distributed via Chinese social media—WeChat or Email to participants.

### **2.3. Delphi participants**

The size of a Delphi panel has ranged from a low of 3 to a high of 80 members (Wright et al., 1996). The specific number of panelists should be dictated by the characteristics of the study such as the number of available experts, the desired geographic representation, and the capability of the facilitator (Hallowell and Gambatese, 2010). Thereby, the consensus expert group of this study is composed of experts in the field of adult vocational training based at higher education institutes. this consensus selected experts who are familiar with the latest research developments in the field and have adult vocational training practice experience to ensure the expert opinions are meaningful and guiding. Besides that, the invited experts were from different regions and higher education institutes to participate in the formulation of the consensus, incorporating their practical experiences to ensure the representativeness of the experts.

Coefficient of sense (Cs) is to reflect the participants’ degree of familiarity toward Delphi survey content, it represents the level of familiarity that experts have with the surveyed items (Hsu and Sandford, 2007). Thereby, the participants would be asked to rate the familiarity toward survey content during the round 2 and round 3 survey by the question: “how familiar you are with survey contents?” with five-point, respectively 1 (unfamiliar) to 5 (very familiar), with assigned values respectively 0, 0.2, 0.5, 0.8, and 1. Besides that the coefficient of adjudication (Ca) is the basis for expert judgment on the evaluation content, conventionally categorized into four types: theoretical knowledge, working experiences, understanding of peers and industry, and individual intuition (Hsu and Sandford, 2007). During two round Delphi survey, the participants also were asked to answer the judgement sources and impacts towards the survey contents. The impact levels are classified as high, medium, and low, with corresponding assigned values. The coefficient of reliability (Cr) was used to assess the degree of the experts’ authority in relation to their technical ability to evaluate the indicators as determined by two factors, the coefficient of adjudication (Ca) and

coefficient of sense (Cs). Normally, Cr which is bigger than 0.7 would be consider as acceptable, which means that the participants' opinion is reliable. Cr is calculated as followed formula:  $Cr = (Ca + Cs)/2$  (Hsu and Sandford, 2007).

#### **2.4. Data analysis**

Since this paper mainly discussed the questionnaire-based Delphi survey, it is necessary to check the reliability of two set of questionnaires used in these Delphi surveys to ensure the quality of questionnaires. The Cronbach's  $\alpha$  coefficient of questionnaires used in round 2 and round 3 were respectively 0.965 and 0.842, both are higher than 0.7, meaning that both questionnaires were of good reliability (Lavrakas, 2008). The experts were asked to rate the significant level of the proposed statements using a 5-point Likert scale ("Strongly undesirable", "Undesirable", "Neutral", "Desirable", and "Strongly desirable"), the values 1 to 5 have been assigned respectively from strongly undesirable to strongly desirable. Means were calculated to reflect the experts' understanding of desirableness towards the surveyed items, hence, mean value was analyzed to check the degree of desirableness towards group consensus of each round. Besides that, the median was also analyzed to check the degree of significance, any proposed statement that receiving median less than 3.00 are considered as insignificant, the proposed statements receiving a group median more than or equal to 3.00 are included in the final list because the experts consentaneously consider them at least as a moderate significant level factor (Ott and Longnecker, 2016). Furthermore, interquartile range (IQR) the Interquartile Range, is the measure of dispersion for the median, and consists of the middle 50% of the observations (Von Der Gracht, 2012). Thus, to determine whether consensus has been achieved using this measure, a maximum threshold of IQR is established if the middle 50% of observations range by less than the threshold, consensus is considered to have been achieved (Sooksil and Benjaoran, 2017). IQR is a measure of statistical dispersion, being equal to the difference between the mean score of the upper and lower quartiles, and thus consists of the middle 50% of the observations (Sekaran and Bougie, 2016). An IQR of less than 1 indicates that more than 50% of all responses fall within 1 point on the scale (De Vet et al., 2005).

At the last round of Delphi survey, the researcher used the Analytic Hierarchy Process (AHP) for weight calculation, consistency testing is essential due to consistency testing is used to evaluate the consistency of the judgment matrix, assessing its internal logical coherence and stability (Saaty, 2008). Consistency ratio (CR) is a crucial metric in this process, as it evaluates the consistency of the judgment matrix by calculating the ratio of the Consistency Index (CI) to the Random Index (RI). A smaller CR indicates better consistency of the judgment matrix. Generally, if the CR is less than 0.1, the judgment matrix meets the consistency test criteria. If the CR exceeds 0.1, it indicates inconsistency, and adjustments to the judgment matrix should be made before conducting further analysis (Saaty, 1990).

### 3. Research results

#### 3.1. Result of participants

##### 3.1.1. Demographic characteristics of participants

25 experts invited to participate in this Delphi study, The questionnaire response rate indicates the level of interest and concern the experts have for this study. 17 participants completed the round 1 (68% response rate), as to the round 2 and round 3, both the response rate was 100% (17 participants). the demographic characteristics of those 17 participants in term of gender distribution, the percentage of female participants were slightly higher than the male participants. The participants’ mean age was around 44.9 years old. Most participants from the higher education institutes located at Nanning city, which is the capital city of Guangxi Zhuang Autonomous Region, as the rest of participants were from 7 cities of Guangxi Zhuang Autonomous Region. most participants were either the director of certain adult training program/center or the vice dean of continuing education college, having doctoral degree and had been working in field of adult vocational training/education for  $\geq 3$  years.

##### 3.1.2. The reliability of participants

Besides that, the Coefficient of sense (Cs), the coefficient of adjudication (Ca) and the coefficient of reliability (Cr) of participants has been analyzed. Two rounds of Cr are respectively, 0.85 and 0.86, both are higher than 0.7, which means that the participants of this study have an acceptable authority towards the surveyed content.

#### 3.2. Result of strategies

Since, the proposed strategies consisted of vision, goals and actionable strategies, thereby, the following section has been divided by three parts they are respectively: result of vision results of goals and results of actionable strategies.

##### 3.2.1. Result of vision

For the statement of vision as showed in following **Table 1**, in the second round of the Delphi process, mean is 4.24, which is higher than 4.0, considered as “very desirable” level, median is 4.00 which is higher than 3.00, which considered as significant, and IQR is 1.00, hence,  $IQR \leq 1$  met consensus. In the round 3, mean is 4.59, which is higher than 4.0, considered as desirable level, median is 5.00 which is higher than 3.00, which considered as significant, and IQR is 1.00, hence,  $IQR \leq 1$  met consensus. In conclusion, the statement of vision met consensus in both round 2 and 3.

**Table 1.** Delphi-vision section.

Theme	Subtheme	Round 2			Round 3		
		Mean	Median	IQR	Mean	Median	IQR
Vision	As constructing learning society pioneer that cultivates skilled professionals with industrial needs, offering everyone accessible opportunities for career development.	4.24	4.00	1.00	4.59	5.00	1.00

**3.2.2. Result of goals**

For the statement of goals as showed in following **Table 2**, there are six goals in this session, in the second round of the Delphi process, six means were ranged from 4.00 to 4.59, which are all equal or higher than 4.0, considered as “very desirable” level, median were ranged from 4.00 to 5.00, which are all higher than 3.00, and considered as significant, and IQRs were ranged from 0.50 to 1.00, hence, all IQRs  $\leq 1$  met consensus. in the third round of the Delphi process, six means were ranged from 4.35 to 4.94, which are all equal or higher than 4.0, considered as “very desirable” level, medians were ranged from 4.00 to 5.00, which are all higher than 3.00, and considered as significant, and IQRs were ranged from 0.50 to 1.00 hence, all IQRs  $\leq 1$  met consensus. In conclusion, the statement of goals met consensus in both round 2 and 3.

AHP was implemented to find the relative weights of those 6 goals towards the aforesaid vision. It helped evaluate the degree to which each goal affecting the proposed vision and identify the major contributing goals. Six goals have the similar weights, but “Goal 4: to reskill and upskill learners” weighted 17.836%, ranked the first among six goals, while “Goal 3: to customize training schedule for learners” weighed 15.693%, ranked the last among six goals. Furthermore, CR of Delphi goals session is 0.00, which is smaller than 0.1, meaning that in this study, the judgment matrix satisfies the consistency test, indicating that the calculated weights are consistent.

**Table 2.** Delphi-goals session.

Theme	Subtheme	Round 2			Round 3			AHP	
		Mean	Median	IQR	Mean	Median	IQR	Weighted	CR
Goals	Goal 1: to offer an accessible vocational training to learners.	4.18	4.00	1.00	4.53	5.00	1.00	16.345%	0.00
	Goal 2: to provide comprehensive counseling for learners.	4.18	4.00	1.00	4.53	5.00	1.00	16.347%	
	Goal 3: to customize training schedule for learners.	4.00	4.00	0.50	4.35	4.00	1.00	15.693%	
	Goal 4: to reskill and upskill learners.	4.59	5.00	1.00	4.94	5.00	0.00	17.836%	
	Goal 5: to extend interpersonal network of learners.	4.29	4.00	1.00	4.71	5.00	0.50	16.999%	
	Goal 6: to qualify learners with social approval.	4.59	5.00	1.00	4.65	5.00	1.00	16.781%	

**3.2.3. Result of actionable strategies**

For the statement of actionable strategies as showed in following **Table 3**, there are 40 actionable strategies under six goals, there are 5, 2, 4, 18, 4 and 7 actionable strategies respectively for goal 1, goal 2, goal 3, goal 4, goal 5 and goal 6. In the second round of the Delphi process, means were ranged from 3.71 to 4.59, three means of actionable strategies are less than 4.00 but higher than 3.00, therefore those three actionable strategies were considered as “desirable” level, as to the rest of 37 actional strategies are higher than 4.00, considered as “very desirable” level. Medians were ranged from 4.00 to 5.00, which are all higher than 3.00, and considered as significant. IQRs were ranged from 2.00 to 0.50, there are two actionable strategies’ IQRs were higher than 1.00, which stated that those two actional strategies have not yet met

consensus in the round 2 as showed in the bold front in the following **Table 3**, as to the rest of 38 actionable strategies' IQRs were ranged from  $0.5-1.00 \leq 1$  and have met consensus. Besides that, there eight new statements were identified in round 2 as showed in the bold front at following table 3. In the third round of the Delphi process, all means were ranged from 3.71 to 5.00, there are four actionable strategies' means are less than 4.00 but higher than 3.00, therefore those three actionable strategies were considered as "desirable" level, as to the rest of 36 actional strategies are higher than 4.00, considered as "very desirable" level. Medians were ranged from 3.00 to 5.00, which are all higher than or equal to 3.00, and considered as significant, and IQRs were ranged from 0.00 to 1.00 hence, all IQRs  $\leq 1$  met consensus. In conclusion, 40 statement of actionable strategies have all met consensus in round 3.

AHP in actional strategies session was implemented to find the relative weights of those actionable strategies towards the six goals. It helped evaluate the degree to which each actionable strategies affecting the proposed goals and identify the major contributing actionable strategies. There are five actionable strategies identified for goal 1, five actional strategies of goal 1 have the similar weights, but "Providing experimental courses for potential learners" weighted 22.449%, ranked the first among five actionable strategies, while "Offering various of tuition payment options to reduce the financial pressure of adult learners" weighed 18.350%, ranked the last among five actionable strategies of goal 1. Furthermore, CR of Delphi actionable strategies session of Goal 1 is 0.00, which is smaller than 0.1, meaning that in this study, the judgment matrix satisfies the consistency test, indicating that the calculated weights are consistent. There are only two actionable strategies identified for goal 2, two actional strategies of goal 1 have the similar weights, but "Establishing career guidance system" weighted 51.908%, ranked the first among five actionable strategies, while "Establishing psychological guidance office" weighed 48.902%, ranked the last among two actionable strategies of goal 2. Furthermore, CR of Delphi actionable strategies session of Goal 2 is Null, in this case, the data pertains to a second-order matrix (where the Random Index, RI value, is 0, making it impossible to calculate the CR value). However, despite this limitation, all second-order data pass the consistency test, confirming that the calculated weights are consistent. There are four actionable strategies identified for goal 3, four actional strategies of goal 3 have the similar weights, but "Establishing flexible project-based course selection system" weighted 26.777%, ranked the first among four actionable strategies, while "Blended learning model" weighed 23.556%, ranked the last among four actionable strategies of goal 3. Furthermore, CR of Delphi actionable strategies session of Goal 3 is 0.00, which is smaller than 0.1, meaning that the judgment matrix satisfies the consistency test, indicating that the calculated weights are consistent. There are eighteen actionable strategies identified for goal 4, eighteen actional strategies of goal 4 have the similar weights, but "Establishing teaching forces featured with industrial working experiences" weighted 6.119%, ranked the first among eighteen actionable strategies, while "Utilizing mentorship cultivated model" weighed 4.617%, ranked the last among eighteen actionable strategies of goal 4. Furthermore, CR of Delphi actionable strategies session of Goal 4 is 0.00, which is smaller than 0.1, meaning that the judgment matrix satisfies the consistency test, indicating that the calculated weights are consistent. There are only four actionable strategies identified for goal 5, four



actional strategies of goal 5 have the similar weights, but “Organizing regular job fairs” weighted 26.483%, ranked the first among five actionable strategies, while “Organizing seminar trip to cooperates” weighed 23.358%, ranked the last among four actionable strategies of goal 5. Furthermore, CR of Delphi actionable strategies session of Goal 5 is  $-0.00$ , which is smaller than 0.1, meaning that the judgment matrix satisfies the consistency test, indicating that the calculated weights are consistent. There are seven actionable strategies identified for goal 6, seven actional strategies of goal 6 have the similar weights, but “Establishing university strength-based training program” and “Building a good relationship between community, corporates, and governments” weighted the same as 15.434%, ranked the first among seven actionable strategies, while “Create interuniversity credit bank” weighed 11.880%, ranked the last among seven actionable strategies of goal 6. Furthermore, CR of Delphi actionable strategies session of Goal 6 is 0.00, which is smaller than 0.1, meaning that in this study, the judgment matrix satisfies the consistency test, indicating that the calculated weights are consistent.

**Table 3.** Delphi-actionable strategies section.

Theme	Subtheme	Round 2			Round 3			AHP	
		Mean	Median	IQR	Mean	Median	IQR	Weighted	CR
Goal 1	Establishing New media department to increase adult learner’s accessibility of training information.	4.41	4.00	1.00	4.59	5.00	1.00	21.377%	0.00
	Creating low barriers for entrance to accept different age, education background and working experiences of adult learners.	4.24	4.00	1.00	4.00	4.00	0.00	18.633%	
	Offering various of tuition payment options to reduce the financial pressure of adult leaners	3.71	4.00	1.00	3.94	4.00	0.00	18.350%	
	Adopted self-paced education to increase	4.00	4.00	0.50	4.12	4.00	1.00	19.192%	
	Providing experimental courses for potential learners	/	/	/	4.82	5.00	0.00	22.449%	
Goal 2	Establishing career guidance system	4.41	4.00	1.00	4.76	5.00	0.00	51.908%	Null
	Establishing psychological guidance office	4.29	4.00	1.00	4.41	5.00	1.00	48.092%	
Goal 3	Establishing flexible project-based course selection system	4.53	5.00	1.00	4.82	5.00	0.00	26.777%	
	Blended learning model	4.29	4.00	1.00	4.24	4.00	1.00	23.556%	
	Establishing self-studying learning platform to satisfy remote learning needs of adult learners	4.47	5.00	1.00	4.35	4.00	1.00	24.167%	
	Utilizing “daytime for elder people, nighttime for young people night school model	/	/	/	4.59	5.00	1.00	25.500%	
Goal 4	Developing vocational certificate-based training courses	4.41	4.00	1.00	4.41	4.00	1.00	5.671%	0.00
	Developing training courses towards certain corporate	4.53	5.00	1.00	4.12	4.00	0.00	5.298%	
	Establishing teaching forces featured with industrial working experiences	4.53	5.00	1.00	4.82	5.00	0.00	6.199%	
	Creating the channel for teachers to participate into industrial works	4.59	5.00	1.00	4.35	4.00	1.00	5.594%	
	Establishing industrial data base to understand updated skill needs	4.47	4.00	1.00	4.47	4.00	1.00	5.748%	
	Establishing the motivation mechanism based on completed training adult learners’ feedback	4.41	4.00	1.00	4.35	4.00	1.00	5.594%	

**Table 3. (Continued).**

Theme	Subtheme	Round 2		Round 3			AHP		CR
		Mean	Median	IQR	Mean	Median	IQR	Weighted	
Goal 4	Organizing leadership training for program administrative leaders to improve the administrative quality	4.35	4.00	1.00	4.53	5.00	1.00	5.826%	0.00
	Utilizing mentorship cultivated model	4.00	4.00	1.00	3.59	3.00	1.00	4.617%	
	Utilizing practice-based learning model	4.35	4.00	1.00	4.29	4.00	1.00	5.517%	
	Applying role play teaching method in class	4.00	4.00	2.00	3.71	4.00	1.00	4.771%	
	Applying case study-based teaching method in class	4.41	4.00	1.00	4.35	4.00	1.00	5.594%	
	Applying group discussion-based teaching method in class	4.24	4.00	1.00	4.00	4.00	0.00	5.144%	
	Applying workshop-based teaching method in class	4.24	4.00	1.00	4.59	5.00	1.00	5.903%	
	Internship	4.18	4.00	1.00	4.12	4.00	0.50	5.298%	
	Organizing regular trainings of adult learning methods for teachers	/	/	/	4.53	5.00	1.00	5.826%	
	Interaction based teaching method	/	/	/	4.71	5.00	1.00	6.057%	
Live broadcasting teaching method	/	/	/	4.47	5.00	1.00	5.748%		
Combining Skill with English	/	/	/	4.35	4.00	1.00	5.594%		
Goal 5	Organizing fellowship and alumni activities	4.29	4.00	1.00	4.71	5.00	1.00	24.947%	-0.00
	Organizing regular job fairs	4.24	4.00	1.00	5.00	5.00	0.00	26.483%	
	Organizing seminar trip to cooperates	4.35	4.00	1.00	4.41	4.00	1.00	23.358%	
	Organizing fellowship activities between corporates and adult learners	/	/	/	4.76	5.00	0.50	25.212%	
Goal 6	Create interuniversity credit bank	3.82	4.00	1.50	3.71	4.00	1.00	11.880%	0.00
	Involving the industrial experts to evaluate learners' learning outcomes	3.94	4.00	0.50	4.35	4.00	1.00	13.929%	
	Organizing follow-up survey (leaners and employers)	4.29	4.00	1.00	4.47	4.00	1.00	14.313%	
	Organizing national/ provincial level skill competition	4.53	5.00	1.00	4.71	5.00	1.00	15.082%	
	Adopting national vocational skill standard as evaluation benchmark	4.53	5.00	1.00	4.35	4.00	1.00	13.929%	
	Establishing university strength-based training program	4.35	4.00	1.00	4.82	5.00	0.00	15.434%	
	Building a good relationship between community, corporates, and governments	/	/	/	4.82	5.00	0.00	15.434%	

\* The bold font statements are the new statements derived from round 2.

\* "/" means No data.

## 4. Discussion

### 4.1. Discussion of the results

The results of this study have defined the vision that "As constructing learning society pioneer that cultivates skilled professionals with industrial needs, offering everyone accessible opportunities for career development". These research findings are consistent with the strategic goals and requirements of China: Building a lifelong learning society for all citizens (Xi, 2022). Burn (2020) highlighted that it is needed to match the adult vocational training with industrial needs, Di (2023) estimated that

44% of workers' skills will be disrupted, six out of ten workers will require training before 2027, but only half adults are seen to have access to adequate vocational training opportunities, the proposed vision is expected to be able to offer sufficient vocational training opportunities to the workforces.

Pasnicu (2023) mentioned that the Fourth Industrial Revolution's impact on economies, jobs, and skills, accelerated by the rapid rate of change, substantial digitalization is driving significant changes in job roles and the skills needed for workforce. This is reflected the importance of "Goal 4: to reskill and upskill learners" due to some senior workers, whose skills were valued when they entered the workforce, are now facing challenges due to the evolving skill requirements (Bongomin et al., 2020). It is needed to mention that most of adults go back to school for career-related reasons, whether the society recognizes what they trained in the training program are very important, thereby, Goal 6: to qualify learners with social approval is vital to meet the expectation of adult learners. And "Goal 2: to provide comprehensive counseling for learners" such as establishing career guidance system to guide adult learner is critical to both adult learners and the success of adult vocational training in higher education institutes due to adult learners need to have clear career plan prior to determine what they will learn. Furthermore, as an adult, vocational training are no longer just simple reskilling and upskilling training but also crucial spaces to explore their own interpersonal relationship that are benefited in various aspects such as personal development, emotional health, career success, and social engagement, which is also mentioned by "Goal 5: to extend interpersonal network of learners", such as fellowship and alumni activities and fellowship activities between corporates and adult learners have been identified in the research findings as actionable strategies. Besides that, Fambely (2020) highlighted that adult learners often enter the adult training program while juggling family and work responsibilities, which compete with their studies in terms of time and financial resources. Ryu and Fan (2023) also stated that learning often comes with pressure, most of adult learner's self-finance their learning, and Some of adult learners used to have failed learning experiences during the period of their youth learning, which may affect the confidence toward completion of learned training programs, thereby, it is necessary to offer financial aids as the research findings showed in actional strategies "Offering various of tuition payment options to reduce the financial pressure of adult learners" , would help the adult learners to transit through their difficult to realize "offering everyone accessible opportunities for career development" stated in the vision, meanwhile, as stated in actional strategies session, Establishing psychological guidance office would be helpful for adult learners to learn under a health mental status. Merriam and Baumgartner (2020) highlighted that adult learners prefer setting their own pace, utilizing their preferred learning style, and having flexible learning schedules adaptable to their individual time constraints, lacking flexible scheduling may make it more challenging for adult learners to balance their multiple work and family responsibilities they hold outside of school, Hence it is also critical that to implement "Goal 3: to customize training schedule for learners" with establishing flexible project-based course selection system and self-studying learning platform to satisfy remote learning needs of adult learners. Apart from the feasibility of time, as the suitable teaching method towards adult learners also being important, Knox (1977) proposed

that adults engage in purposeful, systematic, and sustained learning activities to enhance their skills relevant to their life stage, in term of proposed actionable strategies, the teaching methods of adult learners have been identified such as practice-based learning model and workshop-based teaching method have been suggested to use to teach adult learners, those methods are also aligned with Rowan-Kenyon et al (2023) stated that, the learning purpose of adult gradually shifts from acquiring knowledge to prepare for future work to learning for the direct application of knowledge and engage in learning aimed at addressing specific issues in social life, driven by a strong desire to solve practical problems through learning. it is worthy to mention that there are several teaching methods have been proposed in the research findings, as the lecturers of adult vocational trainings are encouraged to attend the trainings to master on using those teaching methods to improve the effectiveness of teaching in class.

#### **4.2. Limitation and future research**

Firstly, even though the developed adult vocational strategies of this study have researched the consensus of participated experts, but this Delphi study was only focused on Guangxi Zhuang Autonomous Region. Before implementing the developed adult vocational strategies of this study, the policymakers and administrators of higher education institutes could not have the mindset of one size fit all, but needing to consider their own provinces' characteristics, provincial policies, and situation of local higher education institutes, For example, there are some higher education institutes particularly public one having a very strict financial management system, with that it is very difficult to implement the actional strategies "offering various of tuition payment options to reduce the financial pressure of adult learners". Besides that, different provinces or regions have economic cooperation zone which involving with different countries, thereby, the prioritized foreign language for labor market might be different, for actionable strategies: "combining skill with English", different countries might need to combine skills with other languages suited to their economic cooperation zone. Hence, it is highly suggested that prior surveys towards local policies, local economy and implemented higher education institutes are needed before the implementation of the developed adult vocational strategies. Secondly, the results have showed lot of teaching methods that are suitable to teach adult learners, but each class of adult learners might have diverse learning needs and preferences of different student groups, hence it is highly recommended that teachers should actively interact and communicate with their students to find out the suitable teaching method for them, but not rather than relying on a single approach for all classes. Thirdly, the results have found 40 actionable strategies, it is almost impossible for administrator of higher education institutes to implement all proposed actional strategies due to the limited resources, thereby, the weights of each actional strategies are recommended for administrator to take as a reference and select the most effective strategies for implementation. Fourthly, the proposed adult vocational strategies in this study have researched the consensus of participated experts, but it is still lacked experimental evidence, thereby, a small experimental study on the proposed adult vocational strategies is worthy of conducting before large-scale implementation. The last but not

least, this study did not involve the survey towards adult people, hence, it is recommended that the administrators to conduct relevant survey towards the perspectives of adult people to have more systemic evidences to support the proposed strategies.

## 5. Conclusion

A three-rounds of Delphi study involving 17 experts has been conducted through this study to develop a censused adult vocational training strategies for the higher education institutes in Guangxi Zhuang Autonomous Region China. Besides that, AHP method has been used to find weights of each goal and actionable strategies. As the results, adult vocational strategies with one vision, six goals and forty actionable strategies have been developed for higher education institutes in Guangxi Zhuang Autonomous Region China. The policy makers could take the proposed adult vocational strategies as a reference to promote a lifelong education with the force of higher education institutes, accelerating in realization of a learning society in China, and cultivating sufficient skilled workforces for the region to obtain advantages in front of industrial upgrading opportunities. The administrators of higher education institutes could be guided by the developed adult vocational training strategies to establish or improve their own adult vocational training program. Furthermore, the weights of each goal and actionable strategies helped the administrators to identify what goal and actionable strategies shall be first considered under the consideration of limited resources and cost-effectiveness. As to the adult people, the result of this study elucidated that we are living in an era of fast development of technologies, it is needed for us to be lifelong learner, break through our limitations, enhance our abilities, keep pace with the times, and better cope with various changes, with the proposed adult vocational strategies, more adult vocational training programs are expected to be available for us.

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