

Fostering future-ready female TVETpreneur talent framework

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Abstract: The Malaysian government's heightened focus on Technical and Vocational Education and Training (TVET) reflects a strategic move towards economic and social development, particularly in addressing youth unemployment. Recognizing the potential of TVET to contribute to these goals, there is a specific emphasis on enhancing the marketability of women in the workforce from the current 62 percent to an ambitious 95 percent. However, a notable gender gap persists in entrepreneurial pursuits within the TVET sector in Malaysia, with female representation lagging. To bridge this gap, this study aims to construct a comprehensive framework that nurtures future-ready female TVETpreneur talent. This initiative aligns with the Malaysian Higher Education Blueprint, 2021–2025, i.e., fostering a diverse and innovative workforce. An extensive literature survey was conducted to identify the factors influencing female TVET students' entrepreneurial intention. The literature revealed that social psychological and organizational approaches are commonly used to explore and analyze the relationship between the influence of female TVET students' talents and behavior, their exposure to entrepreneurship, mentorship and support programs, role models in TVET, curriculum design, and access to resources. A comprehensive theoretical framework was developed based on these findings, which offers significant insights related to enhancing TVET opportunities for women and advancing Malaysia's economic and social development goals in a sustainable way.

Keywords: TVET; female TVETpreneurs; entrepreneurial intention; innovative workforce; entrepreneurship; higher education; sustainable development goals (SDGs)

1. Introduction

As per the Vocational Education Transformation Plan and the Twelfth Malaysia Plan (12MP) 2021–2025, Malaysia has set a target to become a fully industrialized developed country. To realize this vision, the government needs to focus on creating a highly skilled and competent workforce. As such, the plan emphasizes the importance of producing more TVET (Technical and Vocational Education and Training) graduates who are equipped with relevant skills and knowledge to meet the demands of the rapidly changing job market. These graduates are expected to play a crucial role in the development of various sectors such as manufacturing, engineering, and technology. By creating a more future-resilient workforce, Malaysia can enhance its economic growth and ensure that its people are well-equipped to face the challenges of the 21st century.

TVET needs to shift its focus toward fostering entrepreneurship for two crucial reasons. Firstly, the alarming 11.7 percent youth unemployment rate in 2022 (Statista, 2023), exacerbated by a mismatch between university courses and industry demand, leaves graduates struggling to secure suitable jobs. This especially happened to female

youth whereby their unemployment rate was about 13.39 percent higher than the male youth unemployment rate (World Bank, 2023a). The increasing ratio over the specified period indicates a growing disparity between the unemployment rates of young females and males in Malaysia. Secondly, Malaysia's heavy reliance on foreign labor creates a two-tier labor market, keeping wages low and making certain job categories socially undesirable for local youth. 64.0 percent of graduates with Diploma Level 4 and 48.1 percent of Diploma Graduates Advanced Level 5 do not accept a salary equivalent to the basic salary guide issued by Ministry Human Resources (Sistem Kajian Pengesanan Graduan TVET (2019) and Buku Panduan Gaji Permulaan (2020) as cited in Ministry of Higher Education of Malaysia (2021)). To address this, promoting entrepreneurship through TVET is essential for reducing unemployment, as simply waiting for sectors dominated by foreign workers to become attractive to locals is not a viable solution (Ministry of Higher Education of Malaysia, 2023). It is also with the aim to achieve the New Industrial Master Plan (NIMP) 2030. which is formulated with the intent to transform the industry to greater heights, capitalizing on emerging global trends, and improving the salary range of the middle class.

Despite their technical expertise, TVET graduates may find it easier to launch businesses, with the potential for higher incomes. Interestingly, a significant percentage of self-employed TVET diploma holders earn above RM5000, emphasizing the income potential in entrepreneurship. Besides, these TVETpreneurs are more engaged in manufacturing and construction, highlighting the pivotal role of skill-based education in fostering entrepreneurship and generating job opportunities, particularly in industry-related sectors (Hamid, 2023). In short, TVET and entrepreneurship is a lifeline for future female TVETpreneurs.

Furthermore, according to the Strategic Plan for Graduate Employability (SPGE), 2021–2025 second strategy which is the extension of the student's career emphasizes Higher Education Institute Top Management KPI to ensure the employability rate of graduates achieve above 80 percent annually and produce entrepreneur graduates or the gig economy. However, the number of graduates in skill-related underemployment rose by 7.9 percent 2022 to 1.68 million, compared to 1.55 million in 2021 (Free Malaysia Today, 2023). Statistics also show that female's participation in the labor force in Malaysia is merely less than 50 percent over the last 30 years and was among the lowest among ASEAN countries (Alias et al., 2021). These reasons may be the driven force for the implementation of TVET entrepreneurship to help produce more female TVETpreneurs in achieving the strategic objectives of the National Entrepreneurship Policy 2030.

Despite women owning 20.6 percent of businesses and contributing significantly to Malaysia's GDP in 2021 (The Star, 2022), their participation in professional and technical fields is lower at 41.5 percent compared to 58.5 percent for men (Ajos, 2023). Addressing this imbalance requires efforts to promote women's participation in technical fields and recognize and support their success in entrepreneurship. There is also a notable absence of a holistic framework specifically designed for cultivating future-ready female TVETpreneurs, particularly in developing countries like Malaysia. The current literature lacks comprehensive frameworks that address both technical and entrepreneurial skill development tailored to the unique needs of TVET students especially female TVET students. Limited attention has been given to entrepreneurial

intention among TVET students (Buli and Yesuf, 2015), and there is an underrepresentation of female TVET students compared to males (World Bank, 2023a). Even prior research has discovered that females' perception on entrepreneurial intention is different compared to males (Nikou et al., 2019). According to World Bank data, several countries have substantial TVET enrollment rates: 40% in South Korea, 60% in Singapore, and over 70% in Germany. Female enrollment in TVET programs stands at 47% in Switzerland and 51% in Germany (Kithinji, 2023). Key drivers of success in the TVET systems of Germany, Switzerland and Singapore include strong government backing, collaboration between industry and education providers, and a focus on developing skills in high demand in the labor market. These factors have contributed to reducing unemployment rates, enhancing workforce productivity, and propelling economic growth in these countries.

This study's research findings have the potential to influence educational curricula and government policies for educational institutions, government agencies, and policymakers. Additionally, these findings can contribute to empowering women in TVETpreneurship, promoting a gender-inclusive and future-ready workforce, and aligning with global sustainable development goals (SDGs).

Given these achievements of TVET systems from high-income countries like Germany, Switzerland, and Singapore, it is crucial to investigate the entrepreneurial intention of female TVET students in the Malaysian context. The problem is no longer just a concern for young women but has become a societal issue in our country. It is linked to globalization, technological advancements, demographic changes, and climate change, all of which impact the demand for skills and the availability of economic opportunities (World Bank, 2023b). As a result, there is a pressing need to develop a framework for nurturing future-ready female TVETpreneur talent in Malaysia.

2. Theoretical framework and background

Entrepreneurial intention refers to an individual's planned effort to start a new business (Krueger et al., 2000). It reflects an individual's mindset to pursue entrepreneurship as a career path. However, it is found that the understanding of gender-related issues in entrepreneurial intention remains problematic (Miranda et al., 2017). There is ambiguity regarding the origins of gender differences in this context and the applicability of established theories like the Theory of Planned Behavior (TPB) and Social Learning Theory (SLT) to both men and women remains uncertain. Therefore, understanding the intention to be a TVETpreneur is crucial in entrepreneurship research and education, as it provides insights into the factors that drive female TVET students to embark on entrepreneurial ventures (Vracheva et al., 2019).

2.1. Theory of planned behavior

The Theory of Planned Behavior (TPB), proposed by Ajzen (1991), is a psychological theory that provides insight into the intentions behind individual behaviors, and it is widely utilized in entrepreneurial and entrepreneurship studies (Ayanwale et al., 2023; Buli and Yesuf, 2015; Mensah and Khan, 2023). According

to Ajzen (2005), individuals tend to place more emphasis on their intentions when they perceive a higher likelihood of success. This theory suggests that by learning and adopting different behaviors that can influence attitudes, individuals can significantly impact their entrepreneurial intentions (Ferreira et al., 2017). Under TPB, an individual's talent and behavior play a crucial role in shaping their attitude toward entrepreneurial activities. This is especially true when individuals possess confidence in their skills and abilities, they are more likely to develop a cheerful outlook toward entrepreneurship and in turn, increase their entrepreneurial intention. Furthermore, exposure to entrepreneurship will lead to individuals becoming more aware of the positive attitude society holds toward entrepreneurial ventures, as such they will have a higher intention to pursue a similar path. In addition, mentorship and support are pivotal in bolstering students' confidence in their entrepreneurial capabilities. Effective mentorship can help students overcome barriers to entrepreneurship by offering guidance, resources, and encouragement, thus strengthening their confidence in their entrepreneurial potential. This is also aligned with the role model's component. Within TVET settings, role models shape students' perceptions of socially acceptable entrepreneurial behavior. Besides, in TPB, a well-crafted curriculum that presents entrepreneurship as an attractive career option can shape positive attitudes among students, influencing their inclination toward entrepreneurial activities. Additionally, access to resources, such as financial support and networks, also directly impacts students' perceived control and intention to engage in entrepreneurship.

2.2. Social learning theory

Social Learning Theory (SLT) is widely used to explain how human behavior is influenced (Mehrabian and Russell, 1974). It suggests that individuals can acquire new behaviors, attitudes, and emotional reactions by observing, modeling, and imitating others. It is the external environment and cognitive factors that will affect human learning and behavior. In other words, the reciprocal determinism occurred that caused the combination of cognition, environment, and personal qualities all mutually influence each other. Vicarious experience, verbal persuasion, and physiological states are the three ways we learn and interact. By having this observation and cognitive process, individuals can develop an idea of how new behaviors are conducted (Bandura, 1977).

SLT complements this by suggesting that exposure to entrepreneurship, particularly through observation, serves as a form of observational learning. From the perspective of SLT, students who observe successful behaviors in themselves or others are likely to develop higher self-efficacy. Hence, exposure to entrepreneurship, mentorship, role models to students, curriculum design and access to resources serve as powerful agents of observational learning and positive reinforcement. By observing the successful behaviors of these elements, students are more inclined to imitate these behaviors, which in turn boosts their confidence and commitment to pursuing entrepreneurial activities.

In Malaysia, female entrepreneurs have emerged as significant contributors to the country's economic growth in recent decades (Teoh and Chong, 2014). To support the development of entrepreneurial skills among female TVET students in Malaysia, it is

essential for them to adopt superior business practices and engage in continuous learning to succeed in the global market. As a result, implementing the Social Learning Theory framework in this study has the potential to enable female TVET students to learn and understand through observation, imitation, and modeling, which can encourage their desired behavior and facilitate their social change, leading to success as entrepreneurs in the TVET sector.

3. Conceptual framework development

Table 1 illustrates the significance of educational institutions in shaping the entrepreneurial intentions of their students, as indicated by numerous studies. In a comprehensive review conducted by Maheshwari et al. (2022), a total of 254 influential studies from 2005 to June 2022 were analyzed. The findings revealed seven primary factors—cognitive, personality, environment, social, educational, contextual, and demographic—that directly impact students’ entrepreneurial intentions. In the most cited papers, personality, environmental, and social factors are not considered independently but are examined in combination with other factors. However, such combined factors are not extensively utilized. Moreover, social (e.g., prior experiences, role models), educational (e.g., entrepreneurial course, curriculum), contextual (e.g., perception of support and barriers, desire for satisfaction), and environmental factors (e.g., access to capital, sustainability orientation) are rarely employed individually to gauge students’ entrepreneurial intention. It is pivotal to assess the influence of social factors, as well as contextual and environmental factors in understanding the forces that drive individuals toward entrepreneurship. By considering these integrated factors, a more comprehensive understanding of the factors affecting students’ entrepreneurial intention can be obtained.

Table 1. Summary of previous studies on entrepreneurial intention among students.

Authors	Country	Predictor(s)
Roslan et al. (2020)	Malaysia	<ul style="list-style-type: none"> Higher Learning Environment • Entrepreneurship education • Entrepreneurship activities • Teaching and learning methods • Role model
Rusu et al. (2022)	Romania	<ul style="list-style-type: none"> • Easy access to financial resources • Business knowledge • Entrepreneurial education
Rahim et al. (2020)	Malaysia	<ul style="list-style-type: none"> • Motivation • Support and assistance • Entrepreneurship and creativity course • Entrepreneurial activities • Role models • Financial support
Sisu et al. (2024)	Romania	<ul style="list-style-type: none"> • Business incubation program support • Beneficiary of non-reimbursable grants • Facilitation of networking events • University-based innovation labs • Mentoring services • Perceived quality of entrepreneurship courses

Table 1. (Continued).

Authors	Country	Predictor(s)
Purwanti et al. (2024)	Indonesia	<ul style="list-style-type: none"> • Curriculum • Entrepreneurial mindset • Entrepreneurship education
Abu Bakar et al. (2024)	Malaysia	<ul style="list-style-type: none"> • Appropriate behaviors • Course delivery
Simba and Kising'u (2024)	Kenya	Competency-based learning (1) Problem-based learning <ul style="list-style-type: none"> • Collaborative learning • Constructive learning • Self-directed learning (2) Project-based learning <ul style="list-style-type: none"> • Activity-based learning • Scenario-based learning • Challenge-based learning
Amofah et al. (2024)	Ghana	<ul style="list-style-type: none"> • Attitude • Perceived behavioral control • Subjective norm • Prior entrepreneurial exposure/role models • Study program
Vu et al. (2024)	Vietnam	Perceived university support <ul style="list-style-type: none"> • Educational support • Business development support • Concept development support Personal innovativeness Attitude toward entrepreneurship Subjective norm

In Asia, indicators such as social support resources, role models, campus activities, self-efficacy, individual behavior, and the design of both regular and extra-curricular university/college programs play a significant role in shaping entrepreneurial intentions (Rahim et al., 2020; Saeed et al., 2015; Vu et al., 2024; Wahid et al., 2017). Additionally, this study has identified six factors (individual's talent and behavior, entrepreneurial exposure, mentorship and support, role models in TVET, curriculum design, and access to resources) that influence the entrepreneurial intention of female TVET students. **Figure 1** illustrates the framework of the study.

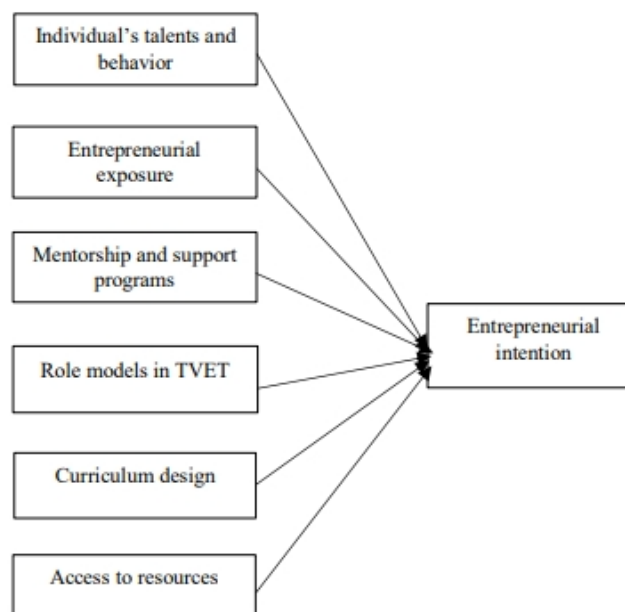


Figure 1. Conceptual framework.

3.1. Individual's talents and behavior and entrepreneurial intention

Various skills and talents, such as technical skills, business management skills, and personal entrepreneurial skills, determination, perseverance, self-belief and creativity (Komarnicka, 2020; Pennetta et al., 2024), are required to become a successful entrepreneur. It has been found that self-motivation positively and significantly affects the entrepreneurial intention of students. A propensity to take risks and innovativeness also enhance entrepreneurial intention among young graduates to launch start-ups (Shahzad et al., 2021). Individuals with high personal innovativeness tend to exhibit entrepreneurial behavior towards entrepreneurship (Vu et al., 2024). Gurel et al. (2010) indicates that innovativeness and risk-taking propensity play a significant role as a predictor for entrepreneurial intentions of tourism students in the UK and Turkey, while tolerance of ambiguity and locus of control do not relate to the intentions towards entrepreneurship. The study of Mustafa et al. (2016) found that entrepreneurial intentions are positively impacted by an initiative-taking personality and the perceived university support of Malaysian students. Among the two drivers, initiative-taking personalities have a stronger influence on intentions towards self-employment than from the perceived concept of student development support from students. In summary, talents and behavior play a crucial role in understanding an individual's entrepreneurial intention. To confirm the effects of individual's talents and behavior on entrepreneurial intention of female TVET students, the following hypothesis is proposed:

H1: There is a significant relationship between individual's talents and behavioral and the entrepreneurial intention of female TVET students.

3.2. Entrepreneurial exposure and entrepreneurial intention

Having parents, role models, or previous job experience in entrepreneurship are examples of prior entrepreneurial exposure (Peterman and Kennedy, 2003). Kimathi et al. (2020) also identified that entrepreneurial exposure is positively related to the

TVET graduates' entrepreneurial intention. This is especially true when they have the interaction and exposure to guest speakers and practicing entrepreneurs in the teaching of entrepreneurship as well as networks with local and/or international entrepreneurs. This is in line with the study by Malebana and Mothibi (2023) that revealed prior start-up experience, as well as guidance and knowledge from successful entrepreneurs, are likely to shape entrepreneurial intentions and behavior among secondary school learners in South Africa. This is also consistent with Hockerts's (2017) and Tuan et al. (2019) findings that individual's prior experience with social organizations tends to have higher social entrepreneurial intentions towards entrepreneurship. According to Zapkau et al. (2015), an individual's entrepreneurial goals may be either positively or negatively affected by previous entrepreneurial experiences, which can be perceived as either beneficial or detrimental. However, Cardella et al. (2020) argue that having a positive entrepreneurial parental role model while growing up may reduce the negative impact of previous exposure to entrepreneurship on a person's subsequent actions. Hence, whether it is a factor influencing the entrepreneurial intention of female TVET students is to be confirmed through the following proposition:

H2: There is a significant relationship between entrepreneurial exposure and the entrepreneurial intention of female TVET students.

3.3. Mentorship and support programs and entrepreneurial intention

Mentoring involves the guidance of an experienced individual to help novice entrepreneurs overcome challenges (Sullivan, 2000). Females highly value their ability to develop relationships (Teoh and Chong, 2007). This can be achieved through mentorship and support programs, which play a key role in shaping and supporting women in their entrepreneurial career development. Mentoring helps mentees, such as students, to focus on personal growth and gain an understanding of how to succeed as an entrepreneur by developing entrepreneurial maturity (Hossain et al., 2023; Nabi et al., 2019). In the context of undergraduate entrepreneurship, the influence of mentorship (i.e., professional experts) (Padi et al., 2022) and support programs becomes particularly strong when provided to TVET female students, helping them gain confidence in their entrepreneurial endeavors (Shymko and Khoury, 2023). A mentor, either a professional or experienced entrepreneur, can also enhance entrepreneurial intentions by persuading mentees that they can manage unpleasant emotions, just as the mentor has done, thereby enhancing the perceived desirability and feasibility of entrepreneurship (St-Jean et al., 2018). Mentorship plays a crucial role in helping students cultivate a cheerful outlook toward entrepreneurship, boost self-efficacy, and foster a sense of empowerment—all of which align with the constructs of the TPB. As a result, mentoring services not only provide practical skills but also contribute to shaping the psychological factors that are instrumental in predicting entrepreneurial intentions (Lim et al., 2021). In short, mentoring not only facilitates the development of specific knowledge, but also encourages students to act in looking for and seizing business opportunities, thereby increasing entrepreneurial intention (Dilshodovich, 2023; Nabi et al., 2019; Sisu et al., 2024). The following hypothesis is formulated:

H3: There is a significant relationship between mentorship and support programs and the entrepreneurial intention of female TVET students.

3.4. Role models in TVET and entrepreneurial intention

The presence of role models significantly influences the entrepreneurial intention of young people, particularly those studying in TVET institutions (Roslan et al., 2020). Role models serve as a source of inspiration and motivation, impacting an individual's decision to pursue entrepreneurship (Najmudin et al., 2024). Zhang et al. (2014) discovered that female students exhibit lower entrepreneurial intention compared to male students. Consequently, it is essential for them to have female role models who can inspire and encourage them towards entrepreneurship as the study by Greene et al. (2013) suggests that the success of idols, with respect to their specific genders, significantly facilitates individuals in identifying with their own gender. Having successful business role models, especially in the TVET field, can lead to higher and more positive entrepreneurial intentions among students (Barnir et al., 2011; Musa et al., 2018). Therefore, it is evident that role models play a positive role in shaping entrepreneurial intentions (Najmudin et al., 2024). Moreover, exposure to role models, including professors and successful entrepreneurs associated with the university, can also influence students' entrepreneurial intentions (Heuer and Kolvereid, 2014; Rosique-Blasco et al., 2016). These role models can provide valuable training, share expertise, and offer advice to cultivate the entrepreneurial potential of students (Rofa and Ngah, 2024). Hence, the following hypothesis thus ensues:

H4: There is a significant relationship between role models in TVET and the entrepreneurial intention of female TVET students.

3.5. Curriculum design and entrepreneurial intention

According to Halik Bassah (2022), TVET in Malaysia has facing several issues and challenges and yet to be solved until today. One of them is the curriculum design issues. Curriculum design for entrepreneurship entails various teaching models aimed at integrating entrepreneurship into education to enhance students' entrepreneurial knowledge, skills, attitudes, behaviors, and competencies (Lackéus and Sävetun, 2018). Curriculum integration can influence the entrepreneurial intention of an individual (Ferrandiz et al., 2018; Israr and Saleem, 2018). The research conducted by Purwanti et al. (2024) provides evidence that implementing an entrepreneurship curriculum positively influences the entrepreneurial aspirations of vocational students in Banyuwangi, Indonesia. The study indicates that this curriculum not only boosts students' enthusiasm for entrepreneurship but also encourages them to actively explore and pursue entrepreneurial opportunities. Effective curriculum design which concerns the mindset and affects attitudes, beliefs, and values will be the honing of entrepreneurship intentions (Iwu et al., 2021). In order to support and encourage entrepreneurial spirit, it is crucial to carefully consider the relevance and sufficiency of the entrepreneurial curriculum, as emphasized by Deale (2016). This means ensuring that the material and learning experiences provided to aspiring entrepreneurs are both applicable to real-world situations and comprehensive enough to equip them with the necessary knowledge and skills for success. Having entrepreneurial education

and future-ready skill development industrial training/internship, online and physical learning classroom, cooperative programs, and business plan competitions, which are integrated into the TVET undergraduate curriculum, could make universities and polytechnics students feel more confident in their ability to learn and undertake vocational-entrepreneurship-related tasks. This improve their soft skills and future TVETpreneurs to be, particularly females, by upskilling them with a completely different TVET entrepreneurial mentality without undue reliance on an over-burdened government to create jobs for them (Gavigan, 2021). It also prepares them to have entrepreneurial mindset and the ability to identify opportunities by creating new ventures. Therefore, the following hypothesis is put forth:

H5: There is a significant relationship between curriculum design and the entrepreneurial intention of female TVET students.

3.6. Access to resources and entrepreneurial intention

The availability of resources in the educational environment, such as funding, labs, and tools, supports entrepreneurial activities among TVET students. Information and financing, especially seed funding for new enterprises, are critical resources for increasing entrepreneurial intention among female TVET students. A study by Rusu et al. (2022) reveals that the entrepreneurial intentions of female students are influenced by access to bank loans and personal savings. This finding is also supported by the studies of Alzamel et al. (2019) and Cheng and Liao (2017), where resource accessibility has a significant positive impact on the entrepreneurial intentions of female students. Besides, the university offers various types of support including financial aid for business development and endorsement of start-ups, educational support such as training, simulation, and case studies, as well as concept development support aimed at promoting awareness of entrepreneurship as a viable career option and motivating students to engage in new business activities. These supports are designed to help students overcome financial barriers and foster a cheerful outlook towards entrepreneurship (Vu et al., 2024). Thus, the hypothesis is developed as follows:

H6: There is a significant relationship between access to resources and the entrepreneurial intention of female TVET students.

4. Methods

This study will involve a mixed-methods approach, combining quantitative surveys and qualitative interviews for an in-depth examination of curriculum integration, role models in TVET, entrepreneurial exposure, mentorship, and support programs, access to resources and individual talents, and behavioral in shaping the entrepreneurial intention of female TVET students in Malaysia.

In the initial phase, a focus group study will be conducted. Multi-stakeholder participants such as policymakers and industry representatives from various industries and government agencies like the Malaysian Investment Development Authority (MIDA) and TalentCorp will be selected as respondents using a purposive sampling method. 30 multi-stakeholder participants from the state of Selangor will be invited to comment on the current and future industry trends to ensure that the developed

framework addresses real-world challenges and prepares female TVET students for successful careers as TVETpreneurs. This study will be selecting participants for the focus group in Selangor because as one of the most economically important states in Malaysia, Selangor is likely to have a significant impact on TVETpreneurship. Engaging stakeholders from this region can offer insights into economic trends and opportunities.

During a focus group session, two moderators are needed: one to ask questions and the other to handle technology and take notes for three-day sessions. At least 6 but no more than 10 in each group for this session. Informed consent will be conducted, including signed release forms for audio or video recording. The focus groups will last from 45 to 90 mins. After the session, debrief and highlights, issues, or immediate conclusions will be presented to all the participants. The findings from the focus group discussions will also inform the development of a structured questionnaire for broader data collection using NVivo. This study stands as a pioneering initiative in Malaysia, uniquely considering the perspectives of various stakeholders in the cultivation of future-ready female TVETpreneur talent.

In the second stage, a survey instrument will be distributed to the selected 50 respondents from education, other industries, and government agencies, along with a cover letter explaining the purpose of the pilot test and requesting their honest feedback. During this phase, researchers will closely monitor the participants' responses and gather qualitative feedback through interviews or focus group discussions. The feedback gathered will be analyzed to identify any ambiguities, confusing language, or potential bias in the survey questions. Adjustments will be made to refine the instrument accordingly. This iterative process ensures that the survey is clear, unbiased, and effectively captures the information needed for the study.

Once the survey has been tested through the pilot test, it will be given to the main sample of 400 final-year female TVET students at Malaysian Technical University Network (MTUN). There are the Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Teknikal Malaysia Melaka (UTeM), Universiti Malaysia Pahang (UMP) and Universiti Malaysia Perlis (UniMAP). The larger sample size will allow for a more comprehensive analysis of the research questions and provide statistical power for generalizing the findings. The survey administration process will be organized efficiently, with clear instructions provided to participants. During the main survey, researchers will use rigorous data collection and analysis techniques to derive meaningful insights. Respondents will have a 10-minute time frame, and tokens will be provided for motivation. Comparing the results between the pilot test and the main survey will further validate the reliability and validity of the survey instrument, ensuring that the study's findings accurately reflect the perspectives and experiences of the target population. The research will contribute valuable insights to the development of a framework for cultivating future-ready female TVETpreneur talent. It will have practical implications for both educational institutions and the industry.

Survey data will undergo analysis using SPSS and SmartPLS, incorporating sophisticated techniques like descriptive and inferential statistics, normality tests, exploratory and confirmatory factor analysis, reliability analysis, correlation analysis, and structural equation modeling to test the research framework formulated for the study.

This study will also employ a longitudinal design to assess the long-term impact of interventions such as mentorship programs and curriculum changes on the entrepreneurial intentions of female TVET students. A cohort of female students enrolled in various technical and vocational disciplines will be selected and followed over time, from the onset of their education through to their early careers. The interventions will include structured mentorship programs, pairing students with experienced entrepreneurs, and targeted curriculum changes aimed at enhancing entrepreneurial competencies through practical skills and innovation. Data will be collected at multiple stages—baseline, mid-term, and long-term follow-up—using a combination of surveys, interviews, and assessments of entrepreneurial intentions. The analysis will focus on identifying trends and correlations between the interventions and changes in the participants' entrepreneurial mindsets, confidence, and engagement in entrepreneurial activities. The outcomes of this study will provide insights into the immediate and sustained effects of these interventions, informing strategies to better support female entrepreneurship in technical and vocational fields.

5. Conclusions and implications

In conclusion, this study has contributed to both theoretical and practical aspects of factors affecting the entrepreneurial intention of female TVET students. The theoretical implications of this study will significantly contribute to understanding entrepreneurial intentions of female TVET students by integrating the TPB and SLT. It will show how various factors such as individual's talents and behavior, entrepreneurial exposure, mentorship and support programs, role models, curriculum design, and access to resources interact to shape entrepreneurial intentions. The focus on female TVET students will highlight the role of gender and educational environment in entrepreneurial intentions. Overall, the study will provide new insights into entrepreneurial intentions in diverse educational and demographic contexts.

In the practical perspectives, the study can suggest integrating tailored entrepreneurship education into TVET curricula which is specifically based on the needs and talents of female students. The lecturers should incorporate more simulation, online education, and case studies which aligned with the SLT principles to improve self-efficacy and entrepreneurial skills among students. Additionally, mentorship programs connecting female TVET students with successful entrepreneurs either locally or internationally can be recommended by the educational institutions. The institutions can partner with local entrepreneurs to increase entrepreneurial exposure through internships, workshops, and networking events which in turn positively influence students' entrepreneurial intentions. Besides, it is also important to provide equitable access to resources and creating gender-specific support systems. Policy interventions should promote entrepreneurship education and support services for female students within the TVET system. In sum, the study provides a framework for increasing female participation in entrepreneurship, leading to greater economic diversity and innovation. Continuous monitoring and evaluation of educational interventions are important for supporting the entrepreneurial aspirations of female students over time. Additionally, the current generation of women entering entrepreneurship will lead to a larger number of women entrepreneurs in the next

generation (Teoh and Chong, 2008), especially after the outbreak of COVID-19. Future studies should explore the variables outlined in the conceptual framework. Besides, further research is needed to compare gender and region differences.

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