Research Article

Digital Literacy in Modern Apprenticeship: University-Industry-Government Collaboration in the Confectionery Industry

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ARTICLE INFO	ABSTRACT
	Introduction: Digitalisation involves the ability of individuals to use digital devices effectively to find information, engage in critical thinking, and collaborate creatively. In the Confectionery sector, challenges include understanding digital literacy requirements, aligning university curricula with industry demands, and evaluating the impact of government initiatives on promoting digital literacy within this specific context. The Triple Helix Model, which emphasises collaboration between universities, industries, and the government, is used as the study's framework. **Objectives**: The primary objective of this study is to understand the perspectives of Confectionery business owners on the interaction between universities, industries, and the government in promoting digital literacy, as guided by the Triple Helix Model. **Methods**: A quantitative research methodology was employed, with questionnaires administered to 57 confectionery business merchants in Malaysia. **Results**: The study found a low but significant positive correlation between universities and industry (0.419), universities and government (0.304), and industry and government (0.488) regarding digital literacy based on the Triple Helix paradigm. These results indicate that while relationships among the three sectors exist, their impact on digital literacy is still limited. **Conclusions**: The study concludes that the Triple Helix Model fosters a supportive environment for digital literacy, contributing to improved operational efficiency, innovation, and growth in the Confectionery sector through customised programs, practical insights, and supportive government policies. Closer coordination among the university, industry, and government is needed to enhance digital literacy development. **Keywords:** Digital literacy, Modern apprenticeship, Confectionery sector.

1. INTRODUCTION

In the digital era, technology plays a very essential role in modern society, altering communication between individuals, organizations, and society in many activities. Technological advancements have significantly transformed our daily lives, enabling us to aspire to become digital citizens [1]. Digitalization can be regarded of as the ability of individuals to apply skills on digital devices so that they can search for information, analyse critically, and cooperate creatively with others. In addition, it also entails effective communication while paying attention to electronic security. Acceptance of a more autonomous technology can influence the intention to acquire AI-based smart devices [2].

Digital literacy is a must for every individual to survive in a digital society. Several countries have taken attempts to build a comprehensive framework [3]. The media and creative industries in Malaysia are increasing quickly in the application of digital technologies and 5G, the creation of creative content, and the development of creative human capital. Developing a digital marketing approach that meets the situation can enhance company sales through e-

commerce [4]. The small business sector plays a vital role in producing jobs, enhancing the quality of life, establishing a culture of entrepreneurship, creativity, innovation, and creating business prospects.

The digitalization process also disrupts traditional corporate operations, interactions, and customer acquisition of products and services [5]. Digitization is essential for business, and without transformation, future economic and environmental challenges cannot be addressed responsibly. Industry must demonstrate greater willingness to collaborate with educational institutions to attain various advantages. The national education system is crucial in fostering student interest in entrepreneurial endeavors [6]. The government has initiated many projects to enhance the competitiveness of the local workforce and generate graduates capable of adapting to technology and succeeding as entrepreneurs. The incorporation of digital technology in the confectionery business enhances operations, marketing, and industrial innovation.

As such, pedagogy plays a significant part in the triple helix model by providing a teaching strategy that is relevant, effective, and flexible to the needs of industry and society [7]. In the framework of the triple helix, which involves collaboration between universities, industry, and government, pedagogy guarantees that vocational education and training programs are tailored to job market demands as well as technological improvements. An innovative and student-centered pedagogical approach can increase technical and vocational abilities, preparing students to confront the difficulties of the world of work [8]. Through tight collaboration between academia, industry, and government agencies, effective pedagogy can stimulate innovation, speed technology transfer, and boost worker competitiveness, further contributing to sustainable economic development.

University and industry collaboration plays an important role in the advancement of the knowledge-based economy; however, some studies found that there is a negative relationship between the challenges and benefits of collaboration between the two parties [9]. The needs of the industry nowadays are more oriented to the ability and flexibility to manage the various tasks provided. [10] found that there is a limited positive effect where collaboration between universities and industry can harm scientific productivity. Knowledge transfer between universities and industry occurs through various means that are redefined into a channel and process where the content of knowledge in individuals or processes in organizations is the main component that drives the use of knowledge transfer mechanisms [11].

This study will use the theory of the triple helix model by [12] leysaying the picture of interaction and interconnectedness between three entities leads to innovation and progress which is important where involved in the innovation process which is between universities, industry and government. In the university is from the academic field. While in the industry from companies and firms. The Triple Helix trade-offs between the relative rigidity that may arise in an overpopulated institutional network and the relationship between excessive uncertainty in the network [13] to. The Triple Helix operates as a center of production, the government develops a new relationship of insight and invention, which serves as the principle of developing a knowledge-based economy. Adequate connection between test results and these assessments is hard due to the absence of a clear framework and reference point [14]. As reference, refer Fig. 1.
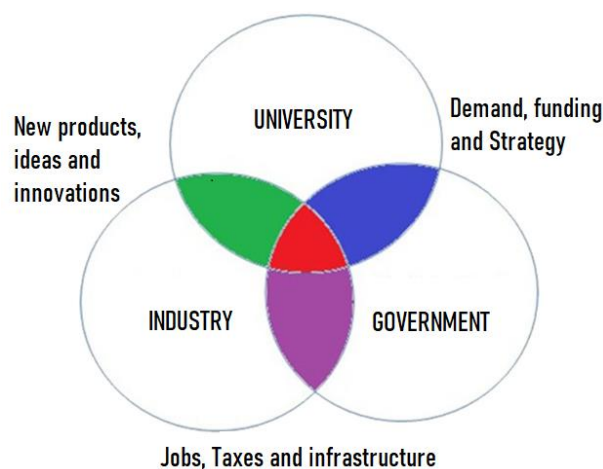
Fig. 1: Triple Helix Model [12]

In the concerns that have been discussed, these were the objectives of the study:

1. Identify the relationship between the role of the university and the industry regarding digital literacy in the confectionery business industry in Malaysia through the Triple Helix Model.

2. Identify the relationship between the role of the industry and the government regarding digital literacy in the confectionery business industry in Malaysia through the Triple Helix Model.

3. Identify the relationship between the role of the government and the university regarding digital literacy in the confectionery business industry in Malaysia through the Triple Helix Model.

2. METHODOLOGY

This study uses a quantitative survey method to collect data from confectionery establishments in Malaysia. According to [15], quantitative research studies are enquiries into social or human problems, based on testing theories that consist of variables measured by numbers and analyzed with statistical processes. In this quantitative research design, data is collected by questionnaires or structured interviews. This survey uses a questionnaire as a research instrument. The respondents, who consisted of merchants in the confectionery business industry, were given a questionnaire to complete. This questionnaire provides a series of variables that have been designed to test their perspective of the involvement of universities, industry, and government towards digital literacy based on the Triple Helix concept. The data acquired was evaluated using statistical processes to better the knowledge of the issues under research.

2.1 POPULATION AND SAMPLE

In this study, population and sample play an essential role. The research population comprised of confectionery business owners who opened confectionery shops in one of the major cities in Malaysia, with a total of 57 bakeries. Random proportional sampling is utilised in this survey to ensure that the study sample comprises a percentage that is comparable to the characteristics of the population [16]. This means that the study sample should reflect a certain percentage of the population, so that the study results can provide a more accurate picture of the perception of confectionery business owners towards digital literacy and the role of universities, industry, and government based on the Triple Helix model. A sample size of 57 from Malaysia is sufficient for purposive sampling as it is strategically selected based on specific criteria relevant to the study, ensuring that the participants possess the necessary characteristics and expertise to provide meaningful insights, rather than aiming for generalizability.

2.2 INSTRUMENT

In this study, the researcher employed the Triple Helix Model in a questionnaire to determine the role of universities in digital literacy in the setting of government, industry, and baking enterprises in Malaysia. Respondents are given a series of questionnaires, and the information they fill out will be utilised to determine the outcomes of the study. The study tool utilised is a structured questionnaire, which is an appropriate technique to obtain participation from the respondents. Reliability and validity tests assess a questionnaire's consistency and accuracy, ensuring that it produces stable results over time (reliability) and effectively measures what it intends to measure (validity). This questionnaire does not require personal information, including names, as the data is examined as a sample and not based on a single individual, guaranteeing that respondent anxiety is minimized. The questionnaire was sent personally to the responders. Table 1 displays the instrument that was built.

Table 1: Distribution of questionnaire items

Part	Construct	No. of Item
A	Demographics	6
B	Role of the University:	10
	• Consultation services	
	• Collaboration with industry experts	
	• Skill opportunities	
	• Provide a program	
C	Role of the Industry:	10
	• Consultation services	
	• Facilitate resource access	

	• Provide program courses	
	• Networking opportunity	
D	Role of the Government:	10
	• Provide sponsorship	
	• Promotion of Cooperation	
	• Development provides loans	
	• Provide consultation services	

2.3 DATA ANALYSIS

The data analysis of this study involves the interpretation of quantitative data obtained using the Statistical Package for the Social Sciences (SPSS) application. Descriptive statistics are produced to provide an overview of the distribution, dispersion, and central tendency of variables through means and standard deviations. Pearson correlation assesses the strength and direction of the linear relationship between two variables, ranging from -1 to 1. A score close to 1 implies a strong positive correlation, -1 indicates a strong negative correlation, and 0 shows no association. It assumes a linear relationship and is sensitive to outliers [17].

3. RESULT AND DISCUSSION

This research received responses by 57 confectionery merchants in Malaysia. The demographics for the perception of merchants who have responded the questionnaire reveal that a total of 43 female who have contributed to 75.4% of the sample while 24.6% were males, with a total of 14 sample who completed the questionnaire. The majority of 28 respondents aged 21 to 30 years and the least number of 2 individuals aged 18 to 20 years answered the questionnaire. Malaysia has a mix of races as a sample with a total of 20 individuals consisting of Malays, 15 Chinese, while 13 Ibans and other races, 9 entrepreneurs answered the questionnaire. A total of 29 single business bakeries, 17 sole proprietorships, 6 partnership bakery enterprises and only 5 additional merchants. Most of the business periods of 18 confectionery merchants have been operating for 2 to 4 years, 13 bakeries that have been functioning for more than 10 years are located in Malaysia.

Table 2 shows the coefficient value is 0.419, significance level or p= 0.001 between the perceptions of traders in the confectionery business industry regarding the role of university and industry in digital literacy based on the Triple Helix model. The correlation between universities and industry (0.419) suggests a weak but significant relationship, indicating limited collaboration in fostering digital literacy.

Table 2: Correlation Between The University and Industry Role

		University Role	Industry Role
University Role	Pearson Correlation	1	0.419
	Sig (2 tailed)		0.001
	N	57	57
Industry Role	Pearson Correlation	0.419	
	Sig (2 tailed)	0.001	
	N	57	57

The result suggests that the hypothesis is rejected since there is a substantial relationship between the role of the institution and the involvement of the industry. There is statistical evidence that reveals a substantial association between the role of the university and the role of the industry. Traders feel that the digital literacy courses and programs offered by the university can allow them to better understand the latest technology, increase operational efficiency, as well as extend the market through online platforms. They also demand continual collaboration and support from universities in the form of training, workshops, and studies that can have a good impact on their business success [18].

The low prevalence of university and industry collaboration can be ascribed to certain business features such as joint, which is most common in varied economies with complicated production and supply chains [19]. This illustrates that universities and industry play a vital role in developing digital literacy involving the dynamics between the education

and industry sectors. University-industry collaboration serves both academics and industry, but a three-way collaboration approach that involves end users can better align product development with customer needs [20]. University and industry research and development collaboration boosts product innovation, especially for enterprises with insufficient knowledge, while crises restrict innovation chances [21]. The good association between the role of universities and the role of industry implies that both parties have relevant duties in assisting Confectionery firms.

Next, this study intends to evaluate the relationship between perceptions of entrepreneurs in the confectionery industry about the role of the university and government in digital literacy based on the Triple Helix model. Table 3 shows that the coefficient value is 0.304, significance level or p= 0.001 regarding the role of the university and government in digital literacy based on the Triple Helix model. The correlation between universities and government (0.304) reflects a lower level of association, implying minimal governmental influence on university-driven digital literacy initiatives.

Table 3: Correlation Between The University and Government Role

		University Role	Government Role
University Role	Pearson Correlation	1	0.304
	Sig (2 tailed)		0.001
	N	57	57
Government Role	Pearson Correlation	0.304	
	Sig (2 tailed)	0.001	
	N	57	57

Traders anticipate that the industry will continue to offer innovative and easy-to-use digital solutions that help boost operational efficiency and expand their markets [22]. In addition, traders also expect support in the form of training, workshops, and collaborative programs that can help them become more adept in using digital technology, further developing their firm in an increasingly competitive digital world. Training programs in digital literacy increase individual digital talents and overall well-being, especially for underprivileged persons in developed and developing countries [23]. This shows that investment in practical training programs by industry has a significant role in fostering digital literacy. in the baking sector.

Although collaboration between universities and governments helps, it is typically less significant than the partnership between universities and industry in generating innovation and economic success. This is partially because government initiatives tend to focus broad policy frameworks and regulatory support over direct commercialization of research items. [24] observed that, although government initiatives and money are vital in fostering collaborations, the predicted results typically fail due to misaligned aims and bureaucratic impediments. These elements contribute to a lower-than-expected influence on innovation and economic advancement. Universities and governments can provide comprehensive digital literacy training programs.

Lastly, table 4 shows that the coefficient value is 0.488, the level of significance or p= <0.001 between the industry and government roles towards digital literacy based on the Triple Helix model. The correlation between industry and government (0.488) signifies a relatively stronger connection, suggesting a moderate level of cooperation in promoting digital literacy policies and practices.

Table 4: Correlation between The Industry and Government Roles

		Industry Role	Government Role
Industry Role	Pearson Correlation	1	0.488
	Sig (2 tailed)		0.001
	N	57	57
Government Role	Pearson Correlation	0.488	
	Sig (2 tailed)	0.001	
	N	57	57

Traders perceive the government as a dominant force in creating policy and providing the necessary infrastructure to increase digital literacy among entrepreneurs [25]. They anticipate the government to continue to give subsidies, incentives, and training programs that can help them adapt digital technologies more efficiently. In addition, merchants also hope that the government will intensify efforts in digitizing the economy through awareness campaigns, technical support, and the provision of platforms that can facilitate the integration of technology in their everyday business operations. According to [26], the uncertainty of the government's economic policies increases the interest rate on bank loans dramatically, which potentially increases the chance of borrower default. Although government funding for digital literacy projects is considerable, collaboration between government and institutions in producing personalised programs still needs greater emphasis

The positive relationship between the role of the industry and the role of the government indicates that both parties play a related role in supporting the industry, including in the confectionery business, and has the potential to give positive significance to the development of the industry. This could mean that collaboration between the industry and the government can lead to the development of policies and initiatives that support the growth of the industry. Programs and initiatives carried out by the government may receive support and participation from the industry, which can help in increasing the efficiency and progress of this sector.

This misalignment between the two parties of the industry and the government can hinder effective collaboration [27]. Furthermore, the emphasis of local governments on basic industries in development strategies reveals that these industries are often prioritized when other options are not available or are not a government priority [28]. Overall, this significant relationship demonstrates the importance of collaboration between industry and government in advancing and supporting the growth of the industry. Therefore, ensuring alignment of objectives between both parties is critical to maximizing the benefits of joint initiatives, mitigating risks, and enhancing the competitiveness and effectiveness of the Confectionery sector and other industries as a whole.

4. CONCLUSION

The research presents several measures to increase collaboration between universities and industry in the baking business. It offers combination training programs to develop students' technical and entrepreneurial abilities and giving more funding and support choices for Confectionery businesses. Universities and governments can also organise substantial digital literacy training programs, including online courses, workshops, and conferences. The government can give incentives and cash for enterprises to raise their digital literacy, such as grants, loans, and tax exemptions. A joint awareness campaign and collaborative activities can help boost the collaboration. Future research should widen the study to new areas or businesses and evaluate the stance of universities or governments towards digital literacy utilising the Triple Helix approach. This research can serve as a reference for future studies and give substantial resources for understanding the perception of merchants in the bread business industry. Next, it is intended that the next study can evaluate the view of universities or governments towards digital literacy based on the Triple Helix model so that future researchers can verify the relationship between the three parties can be related to each other. Finally, maybe the study that has been undertaken can be a reference for future researchers and give a beneficial resource for the attitudes of traders in the confectionery business field towards digital literacy based on the Triple Helix model.

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