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STRATEGIC ANALYSIS OF THE ONLINE EDUCATION INDUSTRY AMONG UNIVERSITY STUDENTS USING SWOT AND AHP APPROACH

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ABSTRACT

This study examines the strategic factors influencing the development of online education in Malaysia, particularly among university students, using an integrated SWOT-AHP framework. The rapid expansion of online education in higher education institutions has created new opportunities for learning flexibility and accessibility, while simultaneously presenting challenges related to assessment integrity, lecturer readiness, digital infrastructure, and equitable access to technology. The study applies SWOT analysis to identify the key strengths, weaknesses, opportunities, and threats affecting the effectiveness and sustainability of online education. Subsequently, the Analytic Hierarchy Process (AHP) is employed to evaluate and prioritise these strategic factors through pairwise comparison and consistency analysis. The findings reveal that weaknesses represent the most critical strategic category, with assessment integrity emerging as the highest-priority issue requiring immediate attention to maintain academic credibility. Lecturer digital readiness and government support for digital infrastructure were also identified as significant factors influencing the success of online education initiatives. The study provides practical insights for higher education institutions and policymakers in developing targeted strategies to enhance the quality, accessibility, and reliability of online learning. By integrating SWOT and AHP methodologies, this research offers a systematic and evidence-based approach for strategic planning and decision-making in the Malaysian online education sector.

Keywords: Online education, SWOT analysis, Analytic Hierarchy Process (AHP), University students, Strategic planning, Malaysia

1.0 Introduction

The online education industry refers to the delivery of teaching and learning through digital platforms such as learning management systems, video conferencing tools, and educational applications including Moodle, Google Classroom, Zoom, and Microsoft Teams. The rise of online education was significantly accelerated in Malaysia following the COVID-19 pandemic, which prompted the nationwide adoption of Emergency Remote Teaching (ERT) by higher education institutions (Kamaludin & Sundarasen, 2023). Online education has transformed traditional learning by enabling flexible and self-paced study regardless of time or location. However, it has also highlighted ongoing challenges in digital readiness, assessment credibility, and equitable access, particularly among students from rural or low-income backgrounds (Yong, 2024). The online education industry continues to shape the higher education landscape in Malaysia, influencing how universities develop, deliver, and evaluate academic programmes. It offers new pathways for inclusivity and innovation but requires strategic focus to address emerging risks and quality concerns. This research applies the SWOT–AHP strategic analysis method to the online education industry in the context of university students. The influencing factors have been quantified and ranked to identify the most critical priorities for improving the effectiveness and trustworthiness of digital learning in Malaysia.

1.1 Problem Statement

The rapid expansion of online and blended learning in Malaysian higher education—accelerated by the COVID-19 pandemic—has significantly widened access to tertiary education, with estimates indicating that over 70% of Malaysians have enrolled in at least one online course since 2020 (Digital Defynd, 2024). While this shift has provided greater flexibility and cost-efficiency, it has simultaneously exposed several enduring systemic vulnerabilities that threaten the credibility and sustainability of online education in the Malaysian context.

First, issues of assessment integrity remain prevalent. Even with the integration of digital-proctoring tools, recent findings from a study at Universiti Kuala Lumpur indicate that academic dishonesty continues to be a concern, and students often perceive virtual assessments as lacking fairness and rigour (Shamsudin, Ahmad, & Abu Hassim, 2024). This perception contributes to a broader erosion of trust in digital credentials among employers and stakeholders.

Second, there are disparities in digital readiness among academic staff, with significant variation in technological proficiency, pedagogical innovation, and attitudes toward digital instruction. Many educators still face challenges in designing interactive and learner-centred content for virtual delivery, leading to inconsistent student learning experiences across institutions (Muniandy & Kamsin, 2024).

Third, connectivity inequity remains a critical barrier to inclusive online learning. Despite advancements in national broadband infrastructure, students from rural areas and lower-income (B40) backgrounds frequently experience unstable internet connections, limited access to suitable devices, and prohibitive data costs. These factors continue to restrict equitable participation in digital classrooms (Ali, Wan Zainodin, & Tengku Mahamad, 2024).

Although existing literature has acknowledged these challenges, much of the discourse remains descriptive in nature. A critical gap exists in establishing a prioritised, data-driven framework that ranks these factors by their relative strategic importance. Without such a hierarchy, institutional responses risk becoming fragmented and reactive, thereby misallocating resources and perpetuating disparities within Malaysia's evolving online education ecosystem.

1.2 Research Objective

Given the persistent challenges facing the online education sector in Malaysian higher education—particularly concerning assessment integrity, lecturer digital-readiness, and connectivity inequities (Ali et al., 2024; Muniandy & Kamsin, 2024; Shamsudin et al., 2024)—there is a clear need for structured, evidence-driven prioritisation to inform strategic planning. Building upon prior scholarly work that employs hybrid SWOT and Analytic Hierarchy Process (AHP) methods in educational strategy (Ramaditya et al., 2023; Więckowski & Sałabun, 2023), this research aims to systematically prioritise strategic factors influencing the sustainability and effectiveness of online education among Malaysian university students. Specifically, this research addresses the following objectives:

i. To systematically identify and categorise the internal strengths and weaknesses, along with external opportunities and threats, affecting the online education landscape among Malaysian university students. This diagnosis is informed by recent empirical and qualitative assessments conducted within Malaysia's higher education context (Ali et al., 2024; Muniandy & Kamsin, 2024).

ii. To quantify the relative strategic importance of identified SWOT factors using the Analytic Hierarchy Process (AHP). By performing pairwise comparisons, this study converts qualitative assessments into numerical weights, following best-practice guidelines in higher education strategic analysis (Ramaditya et al., 2023).

iii. To validate the robustness of the derived AHP prioritisation through sensitivity analysis, ensuring reliability under varying conditions and expert judgement scenarios (Więckowski & Sałabun, 2023).

iv. To formulate evidence-based strategic recommendations, leveraging the ranked outcomes of the SWOT–AHP analysis, thus providing actionable insights for university policymakers. These insights will specifically focus on quality assurance, lecturer capacity building, and initiatives to mitigate digital equity issues, following the structured strategic conversion approach recommended by recent studies (Culduz et al., 2023).

Addressing these objectives will offer Malaysian universities a structured strategic roadmap, allowing targeted interventions that enhance online education quality, integrity, and equity, thus maximizing systemic impacts.

2.0 Methodology and Application

A research methodology describes the methods and procedures used to identify and examine information related to a specific research topic (Lada et al., 2024; Sreekumar, 2023). This research applies strategic tools such as SWOT analysis and Analytic Hierarchy Process (AHP) to identify and rank important factors that affect the e-commerce preferences among university students.

2.1 SWOT Analysis

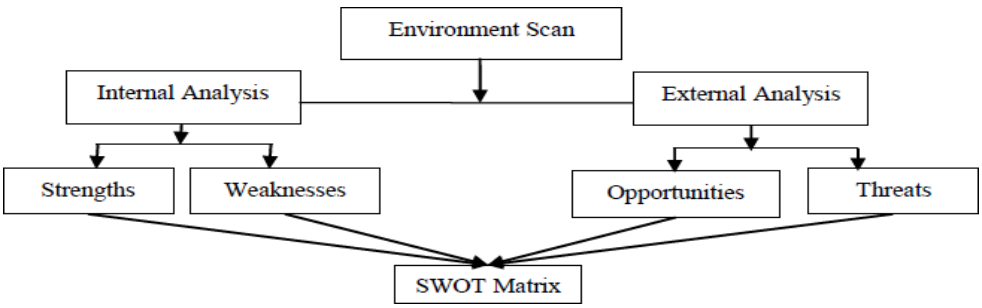

Figure 1: Framework of SWOT Analysis

SWOT analysis is a strategic planning tool used to analyse internal and external factors in order to acquire a systematic approach and support for a decision situation (Kenton, 2024). The internal and external factors are most considerable for the industry or organization's future and are referred to as strategic factors. In SWOT, these factors are grouped into four parts known as SWOT groups which include strengths, weaknesses, opportunities and threats as shown in figure 1.

Strengths and weaknesses are internal factors. They are characteristics of a business firm that offer relative advantages or disadvantages over its competition. Strengths may be any number of areas or characteristics where a business excels and has a competitive advantage over its competitors while weaknesses are the aspect or characteristics where a business is at a competitive disadvantage relative to its competitor. On the other hand, opportunities and threats are the external factors. Opportunities are elements of the external environment that are able to improve business performance growth. However, threats are elements of the external environment that could cause trouble for the business firm (Peterdy, 2024).

2.2 Analytic Hierarchy Process (AHP)

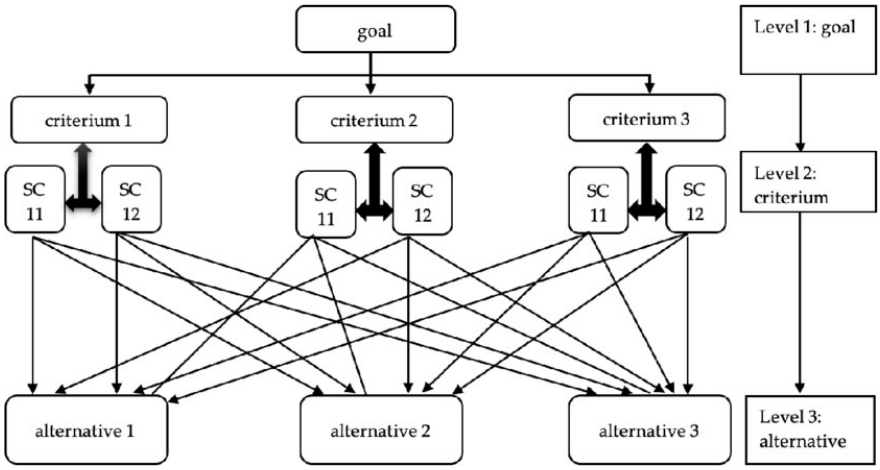

Figure 2: Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) developed by Thomas L Saaty in the 1970s (Taherdoost, 2017). It is a multi-criteria decision-making approach that breaks down the decision problem into a hierarchical structure consisting of goals, factors, sub factors and alternatives. AHP is based on three key principles. First is the structure of the model, second is the comparative evaluation of the criteria or alternatives and third is the synthesis of the priorities. In the literature, AHP has been widely applied to address various decision-making problems. The AHP organizes objectives, decision criteria and alternatives into hierarchical structure similar to a family tree. This hierarchy typically consists of at least three levels including the overall goal of the problem at top, multiple criteria defining the alternatives in the middle and the alternatives at the bottom level.

In this research, the AHP method is used to prioritize SWOT elements. After following the decomposition of the problem and construction of the hierarchy, the prioritization process begins by determining the relative importance of the criteria. In each of the levels, criteria are compared in pairs against each other with respect to their influence and in relation to the criteria at the higher level. The AHP employs a standardized comparison scale of nine levels to conduct the pairwise assessment. The AHP approach in decision-making involves four stages as mentioned below.

Stage 1: define the problem and set up the structure of the hierarchy.

The initial first level involves defining all decision components of the problem. The first top level is broad general objective. The lower levels contain the sub- objectives and attributes that influence the decision itself. The various possible alternatives exist at bottom level.

Stage 2: collection of input data.

Input data implies to the impact of each element on each sub-objective in the adjacent upper level of hierarchy. The information is placed in a matrix for pair-wise comparisons. For example, if we have seven elements on level L and two elements on level L-1, we have 7 x 7 matrix for each of the two elements on level L-1. The matrix is called as reciprocal judgement matrix. To fill this matrix, we need to make 10L (L*(L- 1)/2 5 7*6/2) comparisons. The diagonal cells of this matrix are filled with 1 and rest of the matrix is filled with reciprocal values. AHP uses a 1–9 scale of measurement in pair-wise comparisons. Nine implies to highly preferred element over the other element to which it is compared. One implies to an equally important element. In between values are signifying various degrees of relationship.

Stage 3: find the relative weights with the eigenvalue method

The relative priorities of different criteria (sub-criteria) are not easily plausible from the judgement matrix. In this stage, relative weights of a set of objects (criteria, sub-criteria and alternatives) are calculated with the matrix of pair-wise comparison B=bij which is positive and reciprocal (1–9, and 1–1/9).

Thus, the given matrix B such that

$$B = \begin{bmatrix} b_{11} & b_{12} & \cdots & b_{1n} \\ b_{21} & b_{22} & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots \\ b_{n1} & \cdots & \cdots & b_{nm} \end{bmatrix}$$

Where $B_{ij} = 1/B_{ji}$ for all I, j = 1,2,3…, n

Compute a vector of relative priorities w = (w1, w2... w3). The w is normalized so that it adds up to 1 or 100. If all the judgements are consistent, then

$$b_{ik} \; b_{kj} = b_{ij} \text{ for all I, j = 1, 2, ….. , n Then,}$$

normalizing any column j of matrix B will generate the wts

$$W_i = \frac{b_{ij}}{\Sigma_{K=1} \, b_{kj}} \text{ for all I, j = 1, 2K ···, n}$$

Pair-wise judgement is often error-prone and condition in the second equation may not be

confirmed. Consequently, the final result of priorities may depend upon the column chosen for normalization. Such a problem can be solved either by logarithmic least square (LLS) or eigenvector method developed by Saaty. Latter is a simpler procedure than former and also involves averaging all possible ways of comparing alternatives (Harker & Vargas, 1987). Calculations of the wt. vector as the right eigenvector of the matrix B:

$$Bw = \lambda_{max} W$$

where λ max is the maximum eigenvalue of matrix B. So the weight vector can be enumerated as

$$Wi = \frac{\sum_{j-1}^{n} bij * wj}{\lambda_{max}}$$

Inconsistencies in judgement can be calculated by eigenvector method. Satty research depicts for λ max n for positive reciprocal matrix. For a perfectly consistent matrix then λ max = n.

Satty defined a consistency index by the formula

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Also, consistency ratio (CR) is measured as ratio of CI and random index (RI)

$$CR = CI/RI$$

Therein RI the random index is computed as the mean of CI of randomly generated matrices of size n.

If CR < 0.1, it is acceptable, and if CR > 1, the DM has to re-evaluate the decisions in order to reduce inconsistencies.

Stage 4: develop a composite priority vector for bottom most level of the hierarchy to rate alternative decision strategies

The aim of employing AHP is to rank or prioritize different decision alternatives depending on how well each one meets the objective or goal. The final aggregate ranking for the decision alternatives is done by adding up all the weighted eigen entries corresponding to all levels (right down to the alternatives). Eigenvectors are weighted according to weight of the criteria.

2.3 SWOT-AHP Hybrid Methodology

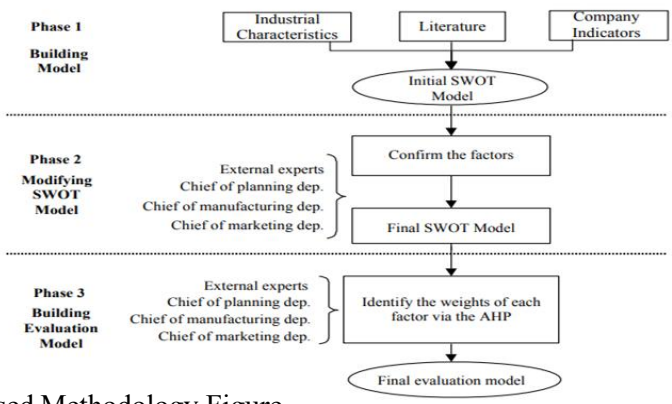

Figure 3: Phases of Proposed Methodology Figure

3: Phases of Proposed Methodology

Figure 3 show a SWOT-AHP based strategic management model. In order to create a SWOT-AHP based strategic management model, three phases model needed which is building initial task, modifying factors, and building an evaluation model. SWOT factors are subjected to pairwise comparisons concerning higher level factors, in order to generate the priority factors using eigenvalue calculations. Although SWOT analysis lacks the quantitative feature needed to generate ranking mechanism for identified factors, the integration of the Analytic Hierarchy Process (AHP) addresses this limitation. The hybrid model of SWOT-AHP systematically qualifies the relative importances of SWOT factors and evaluates their intensity, thereby providing a robust framework for strategic decision-making.

Application of AHP in the SWOT framework is supposed to quantify and evaluate the importance of the SWOT factors systematically. Three major steps are followed in this regard. First and foremost is the identification of the internal and external key factors such as strengths, weaknesses, opportunities and threats. Next is applies the pairwise comparisons to capture the weights of each SWOT group. Finally uses the AHP to derive the relative priorities of each factor within the SWOT groups. The overall weight and ranking of each factor are obtained by multiplying its local weight by the weight of its respective group, resulting in a comprehensive prioritization framework.

Table 1: Pairwise Comparison Scale

Expert opinion on pair-wise ranking of importance of two sub-criteria with reference to the main criteria in tree hierarchy	
If option A and option are equally important	1
If option A is moderately more important than option B	3
If option A is strongly more important than option B	5
If option A is very strongly more important than option B	7
If option A is extremely more important than option B	9
If option A and option B are equally important	1

Table 1 provides a clear representation of the AHP scale which often used for pairwise comparisons in decision-making. In decision-making frameworks such as AHP, a pairwise comparison scale is needed to quantify the relative importance of two criteria or sub-criteria with respect to a higher-level goal or main criterion. After identifying all the key factors for each SWOT category, they are subjected to pairwise comparisons to evaluate their relative importance within each group. For instance, comparing one strength to another strength. Furthermore, higher-level comparisons are conducted to determine the weight of each SWOT category relative to others. For example, the importance of strengths versus threats. Eigenvalue calculations are used to generates quantitative weights for all the SWOT factors and ranking them based on their strategic significance. The pairwise comparison scale is based on a set of values ranging from 1 to 9. This scale ensures consistency and allows decision-makers to mathematically evaluate subjective judgements which are then processed to calculate weights for the key factors of SWOT categories. Furthermore, these weights provide a quantitative foundation for prioritization in strategic analysis.

3.0 SWOT Matrix

Table 2: SWOT Matrix of E-commerce Industry

Strength (S)
(S1) Flexible time and location for students (Salleh & Subbarao, 2021) (S2) Lower costs for transport and living (Yong, 2024) (S3) Students are used to digital tools (Rathinam et al., 2023) (S4) LMS like Moodle are widely used in universities (Kamaludin & Sundarasen, 2023) (S5) Government supports digital learning infrastructure (MOF, 2021)
Weaknesses (W)
(W1) Online exams raise cheating concerns (Yong, 2024) (W2) Poor internet in rural areas (Salleh & Subbarao, 2021) (W3) Lecturers lack online teaching skills (Albelbisi & Yusop, 2020) (W4) Too many assignments and poor course design (Yong, 2024) (W5) Less interaction and support from peers (Salleh & Subbarao, 2021)
Opportunities (O)
(O1) Better course design using mixed methods (Asmawi & Jaladin, 2018) (O2) Analytics can detect struggling students (Rathinam et al., 2023) (O3) AI tools for online learning can personalise feedback (Yong, 2024) (O4) More digital training to help lecturers improve (Albelbisi & Yusop, 2020) (O5) Microcredentials within formal degrees (Kamaludin & Sundarasen, 2023)
Threats (T)
(O1) Cybersecurity risks with online platforms (Yong, 2024) (O2) Employers doubt online degree quality (Kamaludin & Sundarasen, 2023) (O3) Students multitask and lose focus online (Salleh & Subbarao, 2021) (O4) Heavy use of digital platform causes risk to national data (MOF, 2021) (O5) Digital gaps hurt poor students' learning (Yong, 2024)

SWOT matrix provides a comprehensive understanding of the online education industry's internal strengths and weaknesses as well as external opportunities and threats. According to Table 2, there are five factors for each of the key elements for the SWOT categories.

The online education industry offers several strengths that benefit university students. One of the key advantages is the flexibility of time and location, which allows students to attend classes and complete coursework from anywhere at their convenience (Salleh & Subbarao, 2021). This is especially helpful for students balancing studies with part-time jobs or family commitments. In addition, online education helps reduce costs related to transportation and accommodation, making it more financially accessible for students from lower-income households (Yong, 2024). Most university students today are digital natives, making it easier for them to adapt to online platforms and learning tools (Rathinam et al., 2023). Furthermore, learning management systems (LMS) such as Moodle and Google Classroom are already widely used in Malaysian universities, allowing for consistent and structured content delivery (Kamaludin & Sundarasen, 2023). Government initiatives such as JENDELA and MyDIGITAL have also improved internet infrastructure and supported digital learning growth across the country (MOF, 2021).

Despite these strengths, the online education industry also presents several weaknesses that affect students' learning experiences. Firstly, concerns about academic integrity remain significant, as online exams can be more vulnerable to cheating compared to in-person assessments (Yong, 2024). Moreover, many students, particularly those in rural areas, face difficulties accessing stable internet and digital devices, limiting their ability to participate effectively (Salleh & Subbarao, 2021). Another major concern is the lack of digital teaching skills among lecturers, which can lead to poor content delivery and reduced student engagement (Albelbisi & Yusop, 2020). Students have also reported excessive workloads and poorly designed assessments that contribute to stress and burnout (Yong, 2024). Lastly, the lack of peer interaction and direct support from lecturers can make students feel isolated and less motivated to learn (Salleh & Subbarao, 2021).

The online education industry also has several opportunities for further improvement and growth. Better course design using interactive and blended approaches can enhance learning outcomes and engagement (Asmawi & Jaladin, 2018). The use of learning analytics allows institutions to track student progress and identify those who may be struggling, enabling early interventions (Rathinam et al., 2023). Artificial Intelligence (AI) tools such as automated feedback and adaptive learning systems can offer a more personalised learning experience (Yong, 2024). There is also an opportunity for universities to invest more in structured training for lecturers to improve their online teaching effectiveness (Albelbisi & Yusop, 2020). Lastly, the expansion of microcredential programmes within formal degree structures provides flexibility and allows students to build skills that are relevant to the job market (Kamaludin & Sundarasen, 2023).

However, online education faces a number of external threats that could impact its effectiveness for university students. Cybersecurity remains a key concern, with risks such as data breaches and identity theft that can undermine trust in online systems (Yong, 2024). Employers may also continue to question the quality and rigour of fully online degrees, which could affect graduate employability (Kamaludin & Sundarasen, 2023). Students often multitask or become distracted during online classes, leading to low engagement and shallow learning (Salleh & Subbarao, 2021). The heavy reliance on third-party platforms such as Zoom and Google also raises issues related to data ownership and national digital sovereignty (MOF, 2021). Lastly, digital inequality remains a critical threat, as students from disadvantaged backgrounds struggle with limited access to devices and connectivity, widening the education gap (Yong, 2024).

Table 3: Importance of Degree of SWOT Factors (SWOT Standardized Matrix)

SWOT Number	SWOT Groups	Weight	Rank	(+)	(-)
1.	Weaknesses (W)	46.6%	1	15.5%	15.5%
2.	Strength (S)	35.5%	2	11.1%	11.1%
3.	Opportunities (O)	12.8%	3	3.0%	3.0%
4.	Threats (T)	5.1%	4	1.0%	1.0%

The SWOT Standardised Matrix (Table 3) reveals that Strengths carry the heaviest weight at 46.6

per cent, closely followed by Weaknesses at 35.5 per cent. Opportunities account for 12.8 per cent, while Threats contribute the remaining 5.1 per cent. These figures show that positive internal capabilities now outweigh vulnerabilities and external factors in determining the strategic direction of online education among university students.method course design) that can be captured once core strengths and weaknesses are addressed. Threats receive the lowest weight (5.1 %), suggesting that external risks are considered important but relative to internal issues less pressing for immediate strategy.

Table 4: Importance of Degree of Strengths

Categories	Strength (S)	Weight	Rank	(+)	(-)
1.	Flexible time and location (S1)	24.8%	3	7.7%	7.7%
2.	Lower transport and living cost (S2)	32.2%	1	10.0%	10.0%
3.	Student used to digital tools (S3)	25.6%	2	12.8%	12.8%
4.	LMS used widely in universities (S4)	10.8%	4	1.9%	1.9%
5.	Government supports digital learning infrastructure (S5)	6.7%	5	1.2%	1.2%

Table 4 indicates that lower transport and living costs (32.2 %) are regarded as the most valuable strength. Students' familiarity with digital tools (25.6 %) and flexible time and location (24.8 %) rank second and third respectively, emphasising convenience as a pivotal driver of online learning. The widespread use of LMS platforms (10.8 %) and ongoing government support for digital infrastructure (6.7 %), although weighed lower, still play supportive roles in sustaining the system.

Table 5: Importance of Degree of Weaknesses

Categories	Weaknesses (W)	Weight	Rank	(+)	(-)
1.	Online exams raise cheating concerns (W1)	49.2%	1	11.8%	11.8%
2.	Poor internet in rural areas (W2)	20.7%	2	8.1%	8.1%
3.	Lecturers lack online teaching skills (W3)	11.7%	4	3.4%	3.4%
4.	Too many assignments and poor course design (W4)	12.8%	3	4.1%	4.1%
5.	Less interaction and support from peers (W5)	5.6%	5	1.5%	1.5%

As shown in Table 5, concerns over cheating in online examinations (49.2 %) stand out as the most critical weakness. Poor internet connectivity in rural areas (20.7 %) follows, highlighting persistent digital divides. Excessive workload and weak course design (12.8 %) and lecturers' limited online-teaching skills (11.7 %) occupy third and fourth positions, while reduced peer interaction (5.6 %) remains the least-weighted weakness.

Table 6: Importance of Degree of Opportunities

Categories	Opportunities (O)	Weight	Rank	(+)	(-)
1.	Better course design using mixed methods (O1)	45.2%	1	22.4%	22.4%
2.	Analytics can detect struggling students (O2)	17.0%	3	6.0%	6.0%
3.	AI tools can personalize feedback (O3)	18.2%	2	4.3%	4.3%
4.	More training to help lecturers improve (O4)	1.6%	4	3.5%	3.5%
5.	Microcredentials within formal degrees (O5)	9.0%	5	6.8%	6.8%

Table 6 shows that improving course design through mixed methods (45.2 %) is the foremost opportunity. AI tools that personalise feedback (18.2 %) and analytics that detect struggling students (17.0 %) rank next, signalling growing interest in data-driven support mechanisms. Expanded lecturer training (10.6 %) and micro-credential integration (9.0 %) round off the opportunity set.

Table 7: Importance of Degree of Threats

Categories	Threats (T)	Weight	Rank	(+)	(-)
1.	Cybersecurity risks with online platforms (T1)	49.8%	1	27.0%	27.0%
2.	Employers doubt online degree quality (T2)	25.4%	2	8.5%	8.5%
3.	Students multitask and lose focus online (T3)	9.0%	4	2.2%	2.2%
4.	Heavy use of Zoom and Google tools (T4)	6.4%	5	2.0%	2.0%
5.	Digital gaps hurt poor students' learning (T5)	9.4%	3	3.7%	3.7%

In Table 7, cyber-security risks associated with online platforms (46.5 %) emerge as the dominant threat. Employer scepticism toward the quality of online degrees (29.0 %) is the second-largest concern. The remaining threats, students' tendency to multitask and lose focus (9.4 %), heavy reliance on Zoom and Google tools (7.8 %), and digital gaps affecting disadvantaged learners (7.3 %) are weighted considerably lower, yet still warrant attention.

Table 8: Overall Priority Scores of SWOT Factors

SWOT Group	Group Priority	SWOT Factors	Factor Priority Within the Group	Overall Priority of Factor	Rank
Strength	46.6%	Flexible time and location (S1)	24.8.9%	11.56%	4
		Lower transport and living cost (S2)	**32.2%**	**15.01%**	**2**
		Student used to digital tools (S3)	25.6%	11.93%	3
		LMS used widely in universities (S4)	10.8%	5.03%	7
		Government supports digital learning infrastructure (S5)	6.7%	3.12%	10
		Online exams raise cheating concerns (W1)	**49.2%**	**17.47%**	**1**
Weaknesses	35.5%	Poor internet in rural areas (W2)	20.7%	7.35%	5

		Lecturers lack online teaching skills (W3)	11.7%	4.15%	9
		Too many assignments and poor course design (W4)	12.8%	4.54%	8
		Less interaction and support from peers (W5)	5.6%	1.99%	14
Opportunities	12.8%	**Better course design using mixed methods (O1)**	**45.2%**	**5.7%**	**6**
		Analytics can detect struggling students (O2)	17.0%	2.18%	13
		AI tools can personalise feedback (O3)	18.2%	2.33%	12
		More training to help lecturers improve (O4)	10.6%	1.36%	16
		Microcredentials within formal degrees (O5)	9.0%	1.15%	17
Threats	5.1%	**Cybersecurity risks with online platforms (T1)**	**46.5%**	**2.37%**	**11**
		Employers doubt online degree quality (T2)	29.0%	1.48%	15

		Students multitask and lose focus online (T3)	9.4%	0.48%	18
		Heavy use of Zoom and Google tools (T4)	7.8%	0.40%	19
		Digital gaps hurt poor students' learning (T5)	7.3%	0.38%	20

Table 8 illustrates the ranking of the SWOT factors and pinpoints the principal elements shaping the online-education industry among university students. According to the revised results, strengths now emerge as the most influential group, commanding a group priority of 46.6 per cent. This emphasises the strategic importance of advantages such as lower transport and living costs, students' familiarity with digital tools and the widespread use of LMS platforms. Collectively, these strengths underpin learning by enabling flexibility, cost efficiency and reliable course delivery.

Weaknesses occupy the second position with a priority of 35.5 per cent. Although no longer the dominant category, they still highlight pressing vulnerabilities—chief among them academic-integrity concerns in online examinations and uneven internet connectivity in rural areas. Addressing these shortcomings remains essential to safeguard educational credibility and ensure equitable access.

Opportunities account for 12.8 per cent, signalling meaningful but secondary growth potential. Key opportunities include improving course design through mixed or blended methods, deploying AI-driven personalised feedback and expanding micro-credential offerings. By capitalising on these areas, universities can enrich learner engagement and support lifelong upskilling.

Threats carry the smallest share at 5.1 per cent, yet they continue to pose non-trivial risks. Cyber-security vulnerabilities top this list, followed by employer scepticism toward fully online qualifications. Digital inequity and dependence on third-party platforms complete the threat landscape, underscoring the need for robust risk-mitigation and trust-building measures.

Overall, the findings chart a clear roadmap: leverage major strengths, remedy critical weaknesses, pursue high-value opportunities and contain emerging threats. The analysis required 46 pairwise comparisons (40 within the four groups plus six at the group level). The overall Consistency Ratio is 4.2 per cent, well below the 10-per-cent threshold, confirming reliable judgements. The principal eigenvalue for the four-group comparison is 4.114, and the eigenvector solution stabilized after five iterations ($\delta = 2.2 \times 10^{-8}$), attesting to the robustness of the results. This structured SWOT–AHP approach thus offers a sound, evidence-based framework for strategic decision-making aimed at strengthening online education in Malaysian universities.

4.0 Limitation

This research focuses solely on a single sector, which is also a broad and evolving domain, namely online education. Furthermore, the focus of this study is on university students, which may not fully represent the perspectives of other important user segments such as working adults, school-aged learners, or educators

themselves, whose needs and challenges may differ significantly. In conducting the analysis, this research employed strategic tools such as SWOT analysis and the Analytic Hierarchy Process (AHP) to identify and rank key factors across the SWOT categories — strengths, weaknesses, opportunities, and threats. The ranking of these factors was carried out based on simulated expert judgement and supported by secondary sources, which were then systematically evaluated using the AHP method. Although this approach provides a structured framework for prioritising strategic issues, the reliance on expert assumptions and secondary data may limit the scope and diversity of viewpoints considered. Nonetheless, this combination of methodologies ensures a comprehensive and analytical evaluation of the strategic priorities within the online education sector in Malaysia and yields consistency ratios below five per cent, indicating reliable judgements.

5.0 Conclusion

In a nutshell, the strategic analysis of the online-education industry using the SWOT–AHP approach offers a robust framework for identifying the key factors that influence its effectiveness, particularly for university students. The results indicate that strengths carry the greatest weight in shaping strategic direction (46.6 %), followed by weaknesses (35.5 %), opportunities (12.8
%), and threats (5.1 %).

Strong internal advantages—lower living and transport costs, student familiarity with digital tools, flexible schedules, and the widespread use of LMS platforms provide a solid foundation for online learning. Nevertheless, notable weaknesses remain: online-exam integrity issues, rural connectivity gaps, heavy workloads, and uneven lecturer readiness continue to affect student engagement and satisfaction.

Although opportunities rank third, they still offer meaningful paths for advancement. These include blended-course redesign, AI-driven personalised feedback, learning analytics, and micro-credential integration, all of which can enhance learning personalisation and foster lifelong upskilling. Threats hold the lowest overall weight, yet factors such as cyber-security risks, employer scepticism about online degrees, and digital inequity still require vigilant management to sustain trust in online qualifications.

Taken together, the findings guide higher-education institutions and policymakers toward a more resilient, student-centred online-learning ecosystem. By leveraging dominant strengths, remedying critical weaknesses, harnessing high-value opportunities, and containing emergent threats, universities can improve educational quality, bolster student confidence, and position Malaysian higher education for sustained digital innovation and growth.

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