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STRATEGIC CURRICULUM REVIEW FRAMEWORK USING HOUSE OF QUALITY (HOQ)

Norliana Mohd Abbas*, Azli Abd Razak, Nor Fazli Adull Manan, Mohd Afzan Mohd Anuar & Idris Saad

Faculty of Mechanical Engineering, Universiti Teknologi MARA, 40450 Shah Alam*

norliana@uitm.edu.my*

ABSTRACT

Curriculum review (CR) is a periodic process for an academic program. In higher education, the process is conducted once every 3-5 years for the purpose of continual improvement, addressing feedback from stakeholders and compliance with relevant standards and policies. House of Quality (HOQ) is a graphical presentation that integrates key information to support decision making and is widely used in the manufacturing industry. There is a need for a structured framework in addressing the CR process due to complexity and multitude of variables involved. This work proposes a framework to support the CR process utilizing the HOQ. The process began with the identification of a theme for the new CR. Then, potential courses were brainstormed and organized by using an affinity diagram which clustered the courses into (i) four main academic areas and (ii) the four academic years of the program. Each academic year was then assigned a theme to represent the level of the courses offered. A double relationship diagram was employed to determine (i) the interrelationship among the proposed courses and (ii) the alignment with sustainable criteria and the technical requirement. These elements were then incorporated into the HOQ. A matrix analysis together with correlation matrix were then calculated. A competitive evaluation and benchmark performance were conducted by comparing to one (1) local university and one (1) international university, respectively. Through this framework, the most influential variables in the CR process were identified and benchmarked, enabling comprehensive analysis of the strengths of the new curriculum relative to the selected institutions.

Keywords: *Curriculum review (CR), House of Quality (HOQ), Framework*

INTRODUCTION

Curriculum review (CR) is an essential and continuous process in higher education that ensures academic programs remain adaptable, progressive, and aligned with the evolving expectations of stakeholders and the demands of the job market. In the Malaysian context, universities are guided by frameworks such as the Malaysia Education Blueprint 2015–2025, which mandates systematic curricular renewal every three to five years to maintain consistency with both national and global standards. An effective review process typically involves comprehensive needs analysis, stakeholder consultations, benchmarking against comparable programs, compliance with accreditation requirements and relevant policies, and the fulfillment of institutional expectations.

The utilization of HOQ in curriculum review is not new. Ayse Aytac and Veli Deniz, 2005 have employed the method in the Tyre Technology Department at the Kocaeli University Kosekoy Vocational School of Higher Education (KU-KVSHE), Turkey. In the study, questionnaires were distributed to stakeholders and the list of courses to be offered were the observed criteria. Akundi et al. (2022) focus on assessing the effectiveness of course structure and instructional implementation in the classroom while Satter et al. (2010) and Cropley (2020) emphasis on the program outcomes. Yet, benchmarking with other universities is essential in identifying the competitive advantage of the offered program. A very comprehensive approach was conducted by Gonzalez et al. (2011). Hundreds of questionnaires were distributed to stakeholders to formulate the sustainability criteria which in the end can offer several new courses. However, the work is overwhelming and time consuming.

This work presents the use of HOQ as a strategic and simplified CR framework. This framework can be used to highlight important issues in the program and analysis can be done from various perspectives simultaneously. The framework can be employed in any academic program in higher education. The example presented here pertains to the Bachelor in Mechanical Engineering with Honours at Faculty of Mechanical Engineering, Universiti Teknologi MARA.

METHODS

The process commenced with the identification of the main theme for the new CR. This is essential to ensure the content is streamlined with the theme. Subsequently, potential courses were brainstormed. Then, by using an affinity diagram, the courses were grouped according to (i) four main academic areas offered by the program, and (ii) the four academic years of the program. Each academic year was assigned with a specific theme to reflect the intended level of course complexity. The first relationship diagram was utilized to examine the interrelationships among the proposed courses. Following this, the draft of the courses consisting of the course outcomes, course content and the assessment were developed based on comments from the External Examiner (EE), Industrial Advisory Panel (IAP) and Round Table Discussion (RTD) with alumni and industry stakeholders, audit report and market survey. A second relationship diagram was then constructed to assess the alignment sustainability criteria and technical requirements selected. These components were subsequently integrated into the House of Quality (HOQ). Matrix and correlation analyses were then performed. Finally, a competitive evaluation and benchmarking exercise were conducted by comparing the proposed curriculum with those of one selected local and one international university. Figure 1 shows the flowchart for the framework.

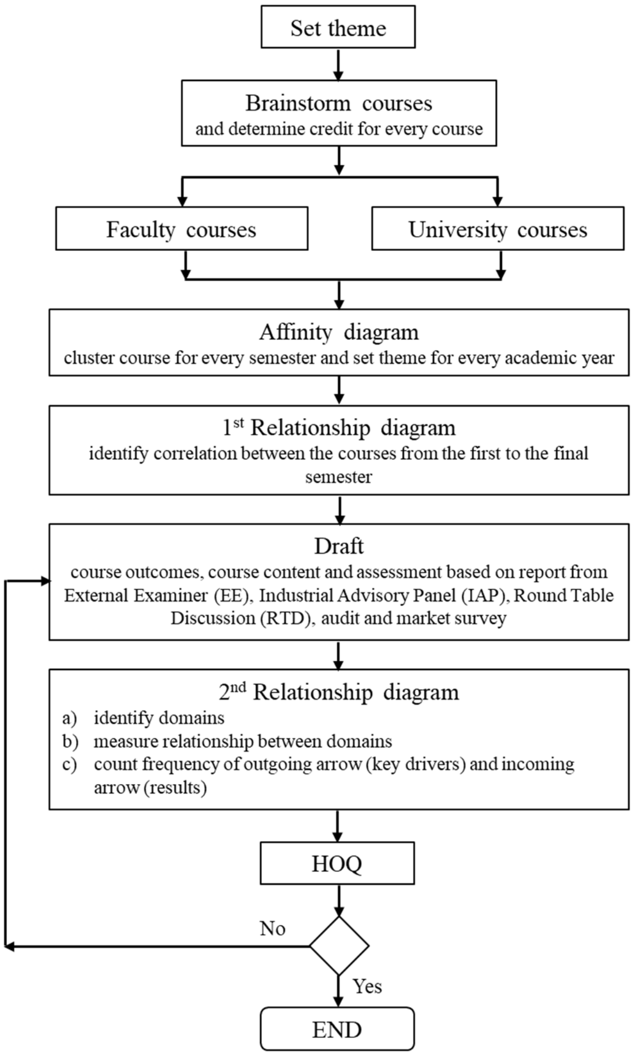

Figure 1.: Framework of Strategic Curriculum Review

RESULTS AND DISCUSSION

The Faculty of Mechanical Engineering, Universiti Teknologi MARA adopted "Driving Innovation for Industry Readiness" as the theme for the new curriculum review. Following a structured brainstorming session, a total of 54 course were to be completed for the program. Of these, 39 courses offered by the faculty were categorized under four academic areas. The 30 main compulsory courses were nine from Manufacturing and Industrial Engineering (MIE), six from Mechanics and Materials (M&M), seven from Thermofwluids (TFS) and eight from Dynamics and Control Engineering (DCE). The remaining faculty courses included industrial training, two final-year projects, two electrical courses and three elective courses which can be selected from any of the four academic areas. In addition, 16 university-mandated courses were included in the program covering courses such as Islamic and civilization, co-curriculum, second and third language, mathematics and one cross faculty course. With the identified courses, the course credit hours were predetermined.

Then, another affinity diagram was made to cluster the courses into suitable semesters and years of studies regarding a given theme : Year 1 - Fundamental courses, Year 2 - Fundamental and Applied Courses, Year 3 - Applied & Experiential Learning and Year 4 - Research, Industry Immersion & Experiential Learning. The first relationship diagram was constructed to identify the correlation among the courses starting from the first to the final semester. The interdependencies among the courses can be visible including the pre-requisite and the co-requisite. This process is essential for ensuring the logic sequence and the development of course content across the program. Then, the course outcomes, course content and the assessment can be drafted.

The second relationship diagram was subsequently created to visualize the interconnections between the domains. The domains were identified based on critical elements for the curriculum review. The diagram facilitated the identification of key drivers and the resultant connections. In this context, the primary key drivers and domains were selected to represent sustainability requirements and technical requirements to be incorporated into the HOQ. The main identified domains were Content, Facilities, Recognition, Employability, Industry related, Collaboration and Cost. After constructing the diagram, the number of incoming and outgoing arrows for each primary domain were counted. Outgoing arrows represented the key driving factors, while incoming arrows indicated the resultant effects. The frequencies were then ranked as presented in Table 1. Based on these findings, the top three domains with the highest frequency of outgoing arrows were selected as criteria for sustainability requirements namely Content, Facilities and Collaboration. The five technical elements identified from the domains with the highest frequency of incoming arrows are Recognition, Employability, Collaboration, Cost and Facilities. A matrix analysis was performed on these selected domains before integrating into the HOQ.

Table 1.: Frequency of the key drivers and the results from the relationship diagram

No	Key drivers (Outgoing Arrow)	Frequency	Results (Incoming Arrow)	Frequency
1	Content	6	Recognition	5
2	Facilities	6	Employability	5
3	Collaboration	5	Collaboration	5
4	Recognition	4	Cost	5
5	Employability	4	Facilities	4
6	Industry related	3	Industry related	4
7	Cost	2	Content	3

To complete the HOQ as illustrated in Figure 2, a matrix analysis was conducted to examine the relationships between the identified sustainability and technical requirements. The technical requirements with the highest ratings were considered most critical to the success of the CR, with Employability receiving the highest score. This highlights the curriculum's strong emphasis on enhancing graduate marketability. Subsequently, a correlation matrix was computed in the triangular section at the top of the HOQ diagram to evaluate the interrelationships among the technical requirements. A competitive benchmarking exercise was also conducted by comparing the proposed curriculum with those of one local (University A) and one international (University B) institution. The results indicated that both benchmarked universities demonstrated strong alignment with the identified sustainability requirements. Benchmark performance indicators were positioned at the bottom of the HOQ diagram, representing the target performance levels for each technical requirement. The comparative analysis revealed that the revised curriculum is on par with the benchmarked institutions, demonstrating its competitiveness and alignment with both national and international academic standards.

This example illustrates how the framework can be effectively utilized during the CR process. If the program is not satisfied with the results of the benchmarking performance, the draft course outcomes, course content, assessment methods, and relevant domains may be revisited and refined accordingly.

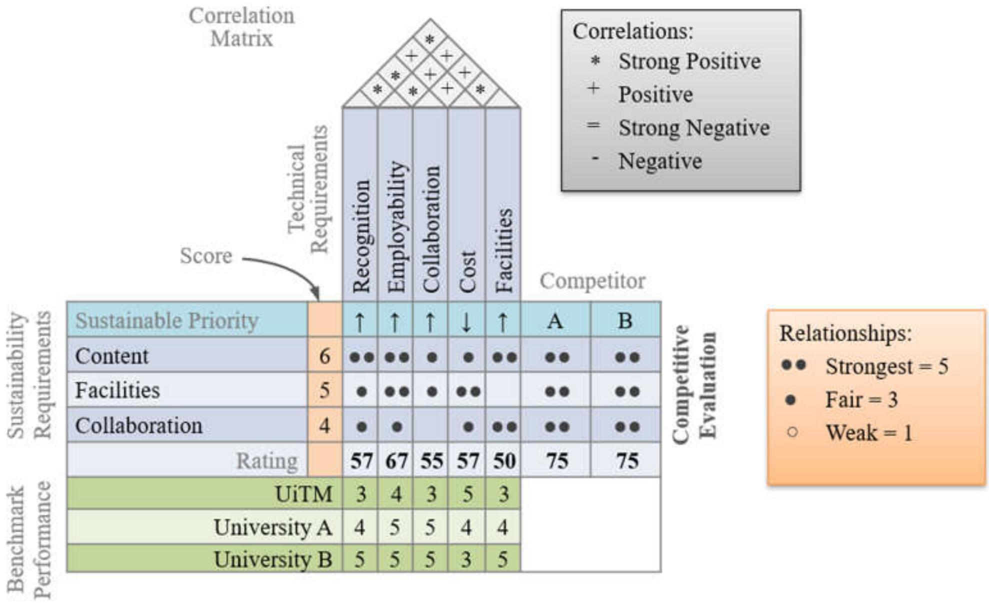

Figure 2.: House of Quality (HOQ) diagram

CONCLUSION

The CR process can often become overwhelming due to the multitude of activities and extensive information to be analyzed. The development of the framework adopted a structured and data-driven approach, incorporating thematic alignment, affinity and relationship diagrams, and the HOQ. Through systematic analysis, key sustainability and technical requirements were identified, with employability emerging as the most critical factor. Benchmarking against local and international institutions demonstrated that the revised curriculum is both competitive and aligned with global standards. Overall, the redesigned curriculum strengthens course coherence, industry relevance, and graduate marketability.

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