

## Assessing the relevance of the applied bachelor's curriculum in culinary arts to industry competency needs: A needs assessment study

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### ABSTRACT

Rapid changes in the culinary industry require vocational higher education institutions to continuously align their curricula with evolving industry competency needs. However, few studies have comprehensively evaluated curriculum alignment in Applied Bachelor Culinary Arts programs by integrating industry competency requirements, future workforce challenges, and normative gap analysis. Therefore, this study aimed to assess curriculum alignment and identify priorities for curriculum improvement. This study employed a needs assessment approach using a descriptive quantitative design supported by qualitative interviews. Data were collected from 50 industry stakeholders and complemented by interviews with 20 lecturers and industry representatives. The questionnaire consisted of 12 items across three dimensions: Graduate Competencies, Curriculum Relevance, and Future Challenges. Content validity was established through expert judgment, with Aiken's V values ranging from 0.833 to 0.917. Data were analyzed using descriptive statistics, ranking analysis, interpretation criteria, and normative gap analysis. The findings indicate that the curriculum is generally well aligned with industry needs. The Future Challenges dimension achieved the highest mean score ( $M = 4.55$ ;  $\text{Gap} = 0.46$ ), followed by Curriculum Relevance ( $M = 4.23$ ;  $\text{Gap} = 0.78$ ), whereas Graduate Competencies showed the largest gap ( $M = 3.97$ ;  $\text{Gap} = 1.03$ ). Among the indicators, industry-relevant learning materials received the highest rating ( $M = 4.76$ ), while the balance between theory and practice ( $M = 3.32$ ) and the development of soft skills ( $M = 3.38$ ) received the lowest ratings. These findings provide empirical evidence to guide curriculum developers in strengthening workplace learning, industry collaboration, digital competencies, entrepreneurship, and the integration of Industry 4.0 principles, thereby enhancing graduate readiness for the evolving culinary workforce.

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### INTRODUCTION

The culinary industry is undergoing substantial changes driven by digital transformation, food service automation, changing consumer expectations, and growing demands for sustainable practices. These developments require vocational higher education institutions to continually review whether their curricula remain aligned with evolving industry competency requirements (Aminah et al., 2025; Soldavini et al., 2025; Vogel et al., 2021). As culinary workplaces become increasingly technology-enabled and data-informed, professional roles are expanding beyond conventional food preparation and production skills (Muniar et al., 2025; Park & Kim, 2024; Yue Fen et al., 2026). For applied bachelor's programs in culinary arts, technical proficiency alone is therefore no longer sufficient to prepare graduates for contemporary workplace demands (Namjildorj, 2025). Culinary professionals are increasingly expected to combine technical expertise with managerial competence,

technological literacy, adaptability, and the ability to respond effectively to changing market conditions (Badillo-Amador & Vila, 2013; Fang & Huang, 2026; Fisher et al., 2025).

Ensuring that these competencies are adequately represented in the curriculum requires sustained engagement between higher education institutions and industry. Previous studies have shown that active industry involvement can strengthen curriculum relevance and improve graduates' preparation for employment (Gholibi et al., 2024; Komariah et al., 2024). Curriculum alignment, however, is often evaluated retrospectively through approaches such as tracer studies and curriculum mapping (De Silva et al., 2025; Frost & Ackrill, 2025). Although these approaches are valuable for assessing existing curriculum performance, they may provide limited insight into competencies that are becoming increasingly important as the culinary industry changes. This concern is particularly relevant in light of evidence that culinary graduates may demonstrate adequate technical competence while remaining less prepared in areas such as communication, teamwork, adaptability, and creative problem-solving (Rahmawati, 2024; Suhairom et al., 2019). Such competencies are particularly important when graduate preparation is considered against occupational expectations and national competency standards such as the Indonesian National Work Competency Standards (Standar Kompetensi Kerja Nasional Indonesia, SKKNI).

The issue is also important at the level of higher vocational education. Culinary education encompasses different educational levels and purposes, yet existing evaluations do not always distinguish clearly between the competencies expected of secondary vocational graduates and those required of graduates from university-level applied programs. An applied bachelor's program is expected not only to develop occupational proficiency but also to prepare graduates for broader professional responsibilities involving management, innovation, decision-making, and adaptation to changes in industry. Evaluating curriculum relevance at this level therefore requires attention to both established occupational competencies and the emerging capabilities expected of future culinary professionals.

Existing curriculum relevance studies have largely emphasized conventional areas such as technical culinary competence, entrepreneurship, and workplace readiness (Mursiti et al., 2024; Putri & Yulastri, 2022). Less attention has been given to how curricula respond to emerging competencies associated with Industry 4.0, artificial intelligence, digital food service management, and other forms of technological change. Consequently, there remains limited evidence on how well applied bachelor's curricula in culinary arts align simultaneously with current industry expectations and emerging workforce requirements. More specifically, few studies have combined an assessment of industry competency needs with an evaluation of curriculum relevance and a systematic analysis of the gaps between current conditions and expected competency levels. Without such evidence, curriculum revision risks responding primarily to existing shortcomings rather than anticipating the competencies graduates will need as the culinary industry continues to evolve.

A needs assessment provides a useful basis for addressing this problem because it moves curriculum evaluation beyond determining whether existing content is generally relevant. By examining discrepancies between current conditions and desired competency expectations, needs assessment can identify areas in which curriculum improvement is most necessary and help establish priorities for intervention. In the context of culinary higher education, this approach is particularly valuable because not all competency areas require the same degree of revision. Some components may already correspond closely to industry expectations, whereas others may require more substantial strengthening in response to technological, organizational, and workforce changes.

Against this background, the present study evaluates the relevance of the curriculum of a bachelor's program in applied culinary arts to current and emerging industry competency needs. Rather than proposing a new curriculum model, the study contributes an integrated needs assessment approach that combines expert-validated competency indicators, curriculum relevance assessment, normative gap analysis, and priority classification. This approach extends conventional descriptive assessments of curriculum relevance by identifying not only the extent of curriculum–industry alignment but also the specific competency areas that warrant greater attention in curriculum improvement. Accordingly, the study aims to (1) assess the alignment between the existing curriculum and industry competency needs, (2) identify and prioritize competency gaps requiring curriculum enhancement, and (3) formulate evidence-based recommendations for continuous

curriculum improvement. The findings are expected to provide a more actionable basis for curriculum review in applied culinary arts and to support vocational higher education institutions in maintaining curriculum responsiveness amid continuing changes in the culinary workforce.

## METHOD

This study adopted a needs assessment approach based on Kaufman's Needs Assessment Model, employing a descriptive quantitative research design (Barroga et al., 2023; Kaufman et al., 1993; Kaufman & English, 1979; Villamin et al., 2025). This approach was selected to identify gaps between the competencies currently embedded in the bachelor's program in applied culinary arts curriculum and those required by the culinary industry. Guided by Kaufman's framework, the study was operationalized into three stages: (1) identifying industry competency needs, (2) analyzing the alignment between the existing curriculum and industry competency requirements, and (3) formulating evidence-based recommendations for curriculum improvement.

This operationalization reflects Kaufman's principle that needs assessment begins by identifying the discrepancy between the current state and the desired state before determining appropriate improvement strategies. Furthermore, this approach aligns with the principles of vocational education, which emphasize curriculum alignment and industry relevance to ensure that graduates possess competencies required by the labor market through strong collaboration between higher education institutions and industry (Düzgünçinar, 2025). The research framework and procedures are presented in Figure 1 and Figure 2.

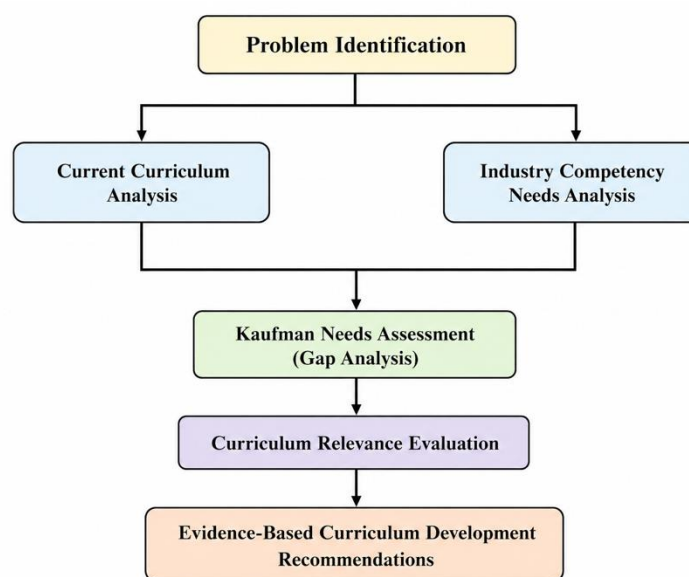


Figure 1. Kaufman's Framework

The participants in this study consisted of lecturers and culinary industry representatives who were directly involved in curriculum development and implementation, student internship supervision, graduate recruitment, and competency assessment. Their experience provided valuable insights into the relevance of the bachelor's program in applied culinary arts curriculum to current industry competency needs. A total of 70 participants were involved in the study. The quantitative phase included 50 industry supervisors (PIT/PIM) from partner culinary industries who completed the questionnaire.

The qualitative phase involved 20 participants, comprising 12 lecturers of the Culinary Arts Department, Faculty of Vocational Studies, Universitas Negeri Yogyakarta, and eight culinary industry representatives selected from partner industries. The industry representatives included executive chefs, human resource (HR) managers, catering business owners, and hotel kitchen supervisors representing various culinary sectors, including hotels, restaurants, catering services,

bakeries, and other food service businesses. Most industry participants had 5-25 years of professional experience, while the lecturer participants had 5-20 years of teaching experience and were actively involved in curriculum development, learning implementation, and student internship supervision.

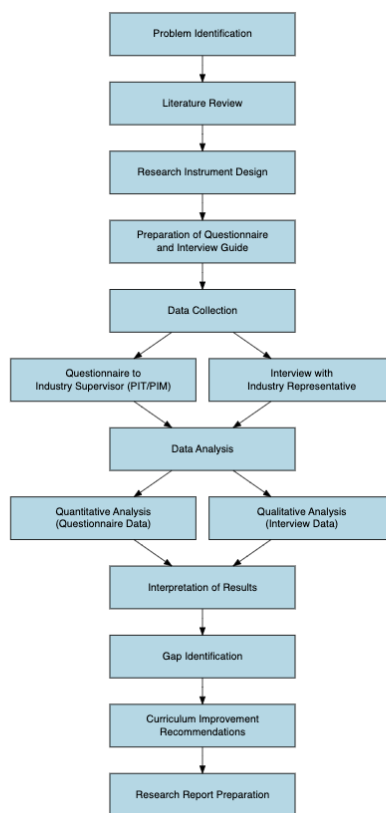


Figure 2. Research Procedure

Participants were selected using purposive sampling based on predefined inclusion criteria. Lecturer participants were required to be actively involved in curriculum development and implementation within the bachelor's program in applied culinary arts. Industry participants were selected based on their experience in supervising student internships, recruiting graduates, or evaluating graduate competencies in the workplace. These criteria ensured that all participants possessed relevant expertise and practical experience to provide comprehensive insights into curriculum relevance and future competency needs.

The research data were collected using a structured questionnaire and semi-structured interview guide. The questionnaire was developed based on the Indonesian National Work Competency Standards (SKKNI) in the culinary field, the learning outcomes (CPL) of Bachelor's Program graduates in the applied culinary arts department, and competency requirements identified from the culinary industry. The instrument consisted of 12 items organized into three dimensions: graduate competencies (4 items), curriculum relevance (4 items), and future challenges and opportunities (4 items). Each item was measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The questionnaire was designed to assess industry perceptions regarding the relevance of graduate competencies and the curriculum in meeting current and future workforce demands. In addition, semi-structured interviews were conducted with 12 lecturers and 8 industry representatives to obtain more in-depth insights into curriculum strengths, competency gaps, and emerging competencies required in the modern culinary industry, including digital transformation, sustainable food production, and culinary innovation. Table 1 presents the dimensions, indicators, and item distribution of the questionnaire.

Table 1. Dimensions and Indicators of the Instrument

| Dimensions           | Indicator                                                                                             | Item Code |
|----------------------|-------------------------------------------------------------------------------------------------------|-----------|
| Graduate             | Mastery of basic and advanced culinary techniques                                                     | Q1        |
| Competencies         | Kitchen management competencies (hygiene, sanitation, and food safety)                                | Q2        |
|                      | Innovation in menu development according to culinary industry trends                                  | Q3        |
|                      | Soft skills (communication, teamwork, and time management)                                            | Q4        |
|                      | Alignment of course content with current industry needs                                               | Q5        |
| Curriculum Relevance | Balance between theoretical and practical learning                                                    | Q6        |
|                      | Effectiveness of the internship program in preparing students for employment                          | Q7        |
|                      | Coverage of culinary business management competencies (cost control, marketing, and entrepreneurship) | Q8        |
|                      | Development of digital competencies for the culinary industry                                         | Q9        |
| Future Challenges    | Graduate readiness for Industry 4.0 in the culinary sector                                            | Q10       |
|                      | Curriculum relevance to professional certification requirements                                       | Q11       |
|                      | University and industry collaboration to improve graduate quality                                     | Q12       |

The questionnaire was developed based on the Indonesian National Work Competency Standards (SKKNI) and relevant literature. Content validity was established through expert judgment using Aiken's V coefficient prior to data collection. Data analysis is carried out through three stages. The first stage was needs analysis, which calculates the difference between the level of competency importance according to industry and the level of competency mastery according to lecturers. The value of the difference indicates the level of the competency gap. The second stage involved descriptive statistical analysis to summarize the data using mean scores, standard deviations, rankings, and interpretation categories.

Mean scores were interpreted as follows: 4.21–5.00 = Very Relevant, 3.41–4.20 = Relevant, 2.61–3.40 = Moderately Relevant, 1.81–2.60 = Poorly Relevant, and 1.00–1.80 = Not Relevant. The third stage involved the priority analysis of needs, which determines the most urgent competencies to be strengthened or included in the curriculum revision. A normative gap analysis was conducted by calculating the difference between the ideal score (5.00) and the observed mean score for each indicator ( $\text{Gap} = 5 - \text{Mean}$ ). The gap values were interpreted as follows: 0.00–0.50 = Very Low Priority, 0.51–1.00 = Low Priority, 1.01–1.50 = Moderate Priority, and 1.51–2.00 = High Priority. Higher gap values indicate greater urgency for curriculum improvement. The qualitative data from the interview results were analyzed thematically to provide context for the quantitative findings and enrich curriculum development recommendations.

All research procedures were carried out through several steps, including the analysis of curriculum documents which include graduate profiles, learning outcomes, and course structures; preparation and validation of competency needs instruments; data collection through the distribution of questionnaires to lecturers, alumni, and industry partners; data analysis to map competency gaps; as well as the preparation of curriculum development recommendations based on the results of needs analysis. Through this needs assessment approach, the study aims to identify industry competency needs and provide empirical evidence to strengthen curriculum relevance by aligning the bachelor's program in applied culinary arts curriculum with current and emerging workforce requirements in the culinary industry.

## RESULTS AND DISCUSSION

### Results

#### *Content Validity of the Research Instrument*

Prior to the main analysis, the content validity of the questionnaire was assessed to determine whether the items adequately represented the competencies and curriculum-related aspects examined in the study. The assessment was conducted through expert judgment using Aiken's V coefficient. The results for the 12 questionnaire items are presented in Table 2.

**Table 2.** Content Validity of the Questionnaire Items

| Item | Aiken's V | Interpretation |
|------|-----------|----------------|
| Q1   | 0.833     | Valid          |
| Q2   | 0.917     | Valid          |
| Q3   | 0.833     | Valid          |
| Q4   | 0.917     | Valid          |
| Q5   | 0.917     | Valid          |
| Q6   | 0.917     | Valid          |
| Q7   | 0.917     | Valid          |
| Q8   | 0.833     | Valid          |
| Q9   | 0.917     | Valid          |
| Q10  | 0.833     | Valid          |
| Q11  | 0.917     | Valid          |
| Q12  | 0.917     | Valid          |

As shown in Table 2, the Aiken's V coefficients ranged from 0.833 to 0.917, indicating satisfactory content validity across all 12 questionnaire items. Eight items (Q2, Q4, Q5, Q6, Q7, Q9, Q11, and Q12) obtained a coefficient of 0.917, while the remaining four items (Q1, Q3, Q8, and Q10) obtained a coefficient of 0.833. Based on the validity criterion adopted in this study, all items were considered valid and were therefore retained for the subsequent data collection and analysis.

Following instrument validation, data were collected using quantitative and qualitative approaches. The quantitative data were obtained from questionnaires completed by culinary industry stakeholders, while the qualitative data were derived from in-depth interviews with lecturers and industry representatives. Consistent with the needs assessment framework, the findings are organized around three dimensions: (1) graduate competencies, (2) curriculum relevance to industry needs, and (3) future challenges and competency requirements, including digital competencies, professional certification, Industry 4.0, and university–industry collaboration.

### **Quantitative Results**

Data collection was carried out by distributing questionnaires to 50 industry supervisors (PIT/PIM) from various culinary sectors. Quantitative descriptive analysis produced the average score of each question item, as shown in Table 3.

**Table 3.** Mean Score of Curriculum Relevance Questionnaire

| Question                           | Mean | SD    | Rank. | Interpretation      |
|------------------------------------|------|-------|-------|---------------------|
| Q1. Culinary Techniques            | 4.5  | 0.505 | 4     | Very Relevant       |
| Q2. Kitchen management             | 4.5  | 0.505 | 4     | Very Relevant       |
| Q3. Soft skills                    | 3.38 | 0.49  | 11    | Moderately Relevant |
| Q4. Trend adaptation               | 3.5  | 0.505 | 10    | Relevant            |
| Q5. Industry-appropriate materials | 4.76 | 0.431 | 1     | Very Relevant       |
| Q6. Theory vs Practice             | 3.32 | 0.471 | 12    | Moderately Relevant |
| Q7. Internship Program             | 4.5  | 0.505 | 4     | Very Relevant       |
| Q8. Culinary business              | 4.32 | 0.471 | 9     | Very Relevant       |
| Q9. Digital skills                 | 4.34 | 0.479 | 8     | Very Relevant       |
| Q10. Industry 4.0 & AI             | 4.5  | 0.505 | 4     | Very Relevant       |
| Q11. Professional certification    | 4.66 | 0.479 | 3     | Very Relevant       |
| Q12. Industry cooperation          | 4.68 | 0.471 | 2     | Very Relevant       |

Table 3 presents the descriptive statistics of the industry needs assessment across the twelve questionnaire indicators, including the mean score, standard deviation (SD), ranking, and interpretation of each item. Overall, the results indicate that most curriculum components were perceived as very relevant to current industry needs, with mean scores ranging from 3.32 to 4.76 and relatively low standard deviation values (SD = 0.431–0.505), indicating a high level of agreement among respondents.

Among the twelve indicators, Industry-appropriate materials (Q5) received the highest evaluation (M = 4.76, SD = 0.431, Rank = 1), indicating that the learning materials provided by the

curriculum are well aligned with the competency requirements of the culinary industry. This was followed by Industry cooperation (Q12) ( $M = 4.68$ ,  $SD = 0.471$ ,  $Rank = 2$ ) and Professional certification (Q11) ( $M = 4.66$ ,  $SD = 0.479$ ,  $Rank = 3$ ), suggesting that collaboration with industry and the integration of professional certification into the curriculum are considered highly relevant by industry stakeholders.

Several indicators shared the same ranking ( $Rank = 4$ ), namely culinary techniques (Q1), kitchen management (Q2), internship program (Q7), and Industry 4.0 & AI (Q10), each obtaining a mean score of 4.50 with an  $SD$  of 0.505. These findings indicate a consistently positive perception regarding graduates' technical competencies, practical learning experiences, and readiness to address technological developments in the culinary sector. Likewise, digital skills (Q9) ( $M = 4.34$ ,  $SD = 0.479$ ,  $Rank = 8$ ) and culinary business (Q8) ( $M = 4.32$ ,  $SD = 0.471$ ,  $Rank = 9$ ) were also categorized as Very Relevant, demonstrating that entrepreneurial and digital competencies are considered essential components of the curriculum.

In contrast, trend adaptation (Q4) obtained a mean score of 3.50 ( $SD = 0.505$ ,  $Rank = 10$ ) and was classified as Relevant, indicating that while respondents generally perceived this competency as important, there remains room for further enhancement. The two lowest-ranked indicators were soft skills (Q3) ( $M = 3.38$ ,  $SD = 0.490$ ,  $Rank = 11$ ) and theory vs practice (Q6) ( $M = 3.32$ ,  $SD = 0.471$ ,  $Rank = 12$ ), both categorized as Moderately Relevant. These findings suggest that strengthening soft skills development and improving the balance between theoretical instruction and practical learning should be prioritized in future curriculum revisions.

The relatively low standard deviation values across all indicators indicate a high degree of consensus among respondents, suggesting that industry representatives' perceptions of curriculum relevance were generally consistent. Collectively, these findings demonstrate that although the curriculum is well aligned with most industry expectations, greater attention should be directed toward enhancing soft skills, adapting to emerging culinary trends, and achieving a more effective balance between theoretical and practical learning experiences. Overall, these results illustrate that the curriculum is quite relevant to the needs of the culinary industry, especially in technical aspects, internships, and technology integration (Castelló et al., 2023). However, improvements need to be focused on strengthening soft skills, improving adaptability to trends, and balancing theory and practice so that graduates are more competitive in the world of work (Ma et al., 2023). The results can also be seen in Figure 3.

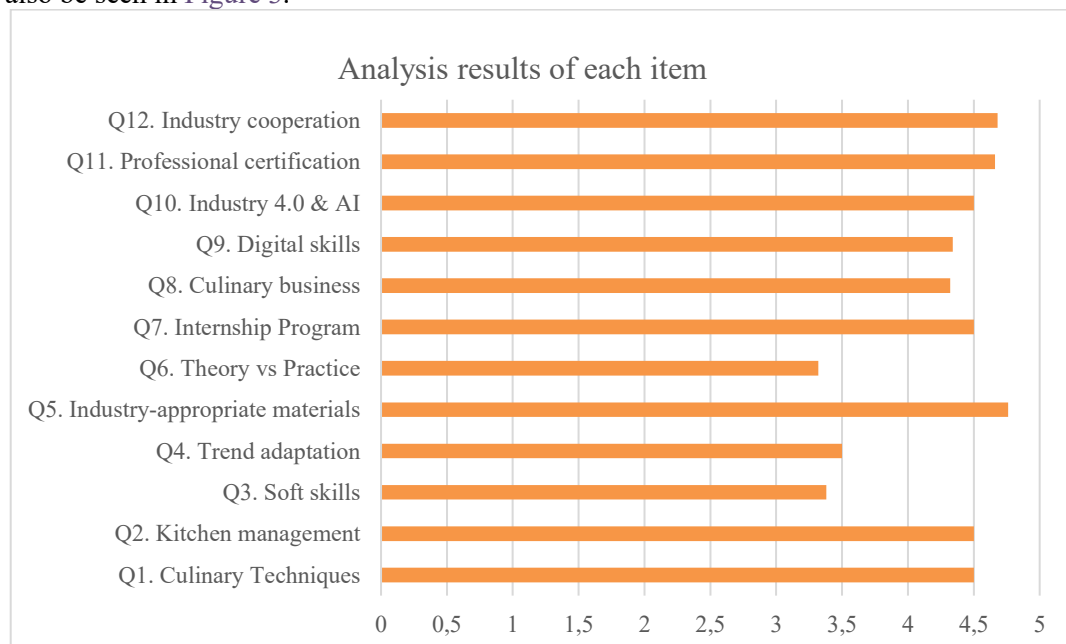


Figure 3. Mean Scores of Curriculum Relevance Indicators

The graph in Figure 3 shows that almost all aspects of the curriculum are rated highly (average above 4), especially the relevance of learning materials to industry needs (Q5), industry cooperation (Q12), and professional certification (Q11). This means that the curriculum is relevant to the needs of the world of work. However, three aspects scored lower: soft skills (Q3), trend adaptation (Q4), and theory-practice balance (Q6). This indicates that although technical aspects and cooperation with industry are already strong, strengthening soft skills, adapting to culinary trends, and greater attention should be given to practical learning experiences.

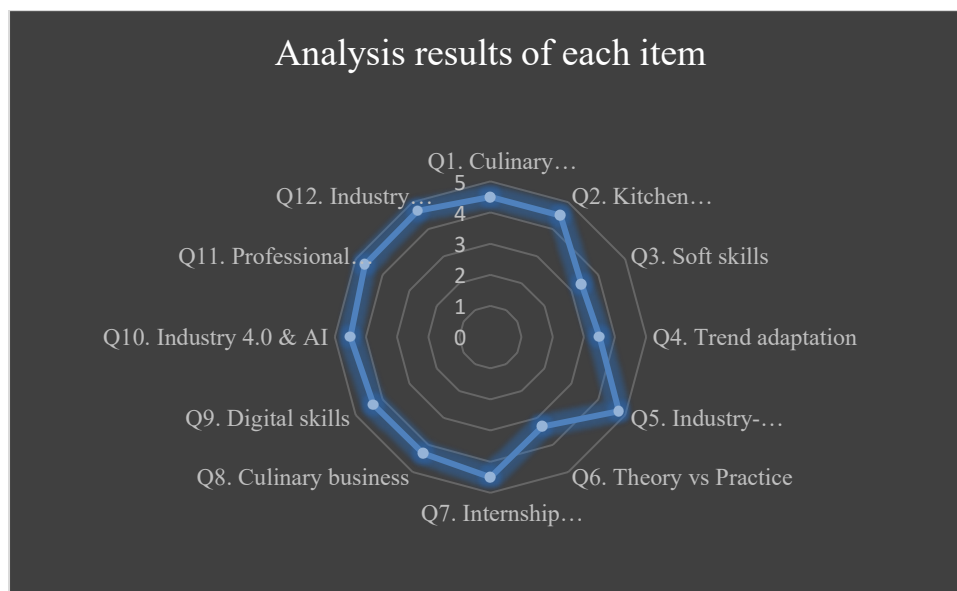


Figure 4. Profile of Curriculum Relevance Across Indicators

From the graph in Figure 4, it can be seen that most aspects stand out with high scores (close to 5), especially industry-appropriate materials (Q5), industry cooperation (Q12), professional certification (Q11), culinary techniques (Q1), kitchen management (Q2), internship programs (Q7), and Industry 4.0 & AI readiness (Q10). This shows that the curriculum is already very relevant to the technical needs and industry collaboration. Meanwhile, three aspects have decreased significantly on the chart: soft skills (Q3), trend adaptation (Q4), and the balance of theory and practice (Q6). This illustrates that strengthening non-technical skills, adaptability, and the proportion of practice needs more attention so that graduates are better prepared to face real challenges in the culinary industry.

#### Results of Comparative Analysis Between Dimensions

To provide a broader view of curriculum alignment with industry competency needs, the 12 questionnaire items were grouped into three dimensions: graduate competencies, curriculum relevance, and future challenges. Table 4 presents the mean scores, standard deviations, rankings, normative gaps, and interpretation of each dimension.

Table 4. Descriptive Statistics and Gap Analysis Across the Three Curriculum Dimensions

| Variable              | Mean  | SD    | Rank. | Gap   | Interpretation |
|-----------------------|-------|-------|-------|-------|----------------|
| Graduate Competencies | 3.97  | 0.614 | 3     | 1.03  | Relevant       |
| Curriculum Relevance  | 4.225 | 0.629 | 2     | 0.775 | Very Relevant  |
| Future Challenges     | 4.545 | 0.158 | 1     | 0.455 | Very Relevant  |

Note. Gap = 5 – Mean. Higher gap values indicate higher priority for curriculum improvement. Rank is based on descending mean scores. Interpretation criteria: 4.21–5.00 = Very Relevant; 3.41–4.20 = Relevant; 2.61–3.40 = Moderately Relevant; 1.81–2.60 = Less Relevant; 1.00–1.80 = Not Relevant.

As shown in Table 4, the three dimensions differed in their degree of alignment with industry expectations. Future challenges received the highest mean score ( $M = 4.55$ ,  $SD = 0.158$ ) and the smallest normative gap (0.46), indicating strong alignment between the curriculum and competencies

associated with future developments in the culinary industry. The low standard deviation also indicates relatively consistent responses among industry stakeholders regarding this dimension. Curriculum relevance ranked second ( $M = 4.23$ ,  $SD = 0.629$ ), with a normative gap of 0.78. This dimension was also classified as very relevant, suggesting that the existing curriculum generally reflects current industry requirements. However, its higher variability compared with the future challenges dimension indicates some differences in respondents' assessments of specific curriculum components.

In contrast, graduate competencies received the lowest mean score ( $M = 3.97$ ,  $SD = 0.614$ ) and the largest normative gap (1.03). Although this dimension remained within the relevant category, the larger gap indicates greater room for improvement relative to the other two dimensions. This pattern is consistent with the item-level results, in which soft skills and theory–practice balance received comparatively lower ratings. Taken together, the dimension-level analysis indicates that the curriculum is generally well aligned with current and emerging industry requirements, particularly in relation to future-oriented competencies and overall curriculum relevance. Nevertheless, the comparatively larger gap in graduate competencies identifies this dimension as the primary area requiring further attention. Figure 5 provides a visual comparison of the mean scores across the three dimensions.

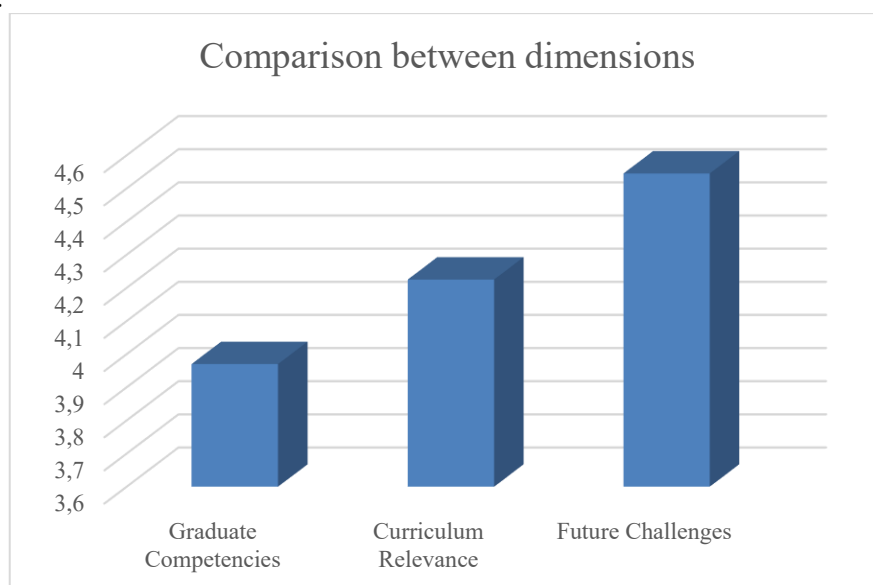


Figure 5. Mean Scores Across the Three Curriculum Dimensions

Table 5. Priority Competency Gaps Based on Normative Gap Analysis

| Indicator                          | Mean | Gap  | Priority |
|------------------------------------|------|------|----------|
| Q1. Culinary Techniques            | 4.50 | 0.50 | Very Low |
| Q2. Kitchen Management             | 4.50 | 0.50 | Very Low |
| Q3. Soft Skills                    | 3.38 | 1.62 | High     |
| Q4. Trend Adaptation               | 3.50 | 1.50 | Moderate |
| Q5. Industry-Appropriate Materials | 4.76 | 0.24 | Very Low |
| Q6. Theory–Practice Balance        | 3.32 | 1.68 | High     |
| Q7. Internship Program             | 4.50 | 0.50 | Very Low |
| Q8. Culinary Business              | 4.32 | 0.68 | Low      |
| Q9. Digital Skills                 | 4.34 | 0.66 | Low      |
| Q10. Industry 4.0 & AI             | 4.50 | 0.50 | Very Low |
| Q11. Professional Certification    | 4.66 | 0.34 | Very Low |
| Q12. Industry Cooperation          | 4.68 | 0.32 | Very Low |

### ***Qualitative Findings***

The qualitative analysis drew on in-depth interviews with 20 participants, comprising 12 Culinary Arts lecturers and eight industry representatives, including executive chefs, human resource managers, catering business owners, and hotel kitchen supervisors. The interviews explored participants' perspectives on curriculum relevance, graduate competencies, and emerging workforce requirements. Thematic analysis identified six interrelated themes: (1) relevance of curriculum content, (2) theory–practice integration, (3) soft skills, (4) adaptation to culinary trends and innovation, (5) digital and emerging technology competencies, and (6) industry collaboration.

Overall, participants considered the curriculum broadly relevant to current culinary industry requirements, particularly in relation to fundamental culinary techniques, hygiene and sanitation, and kitchen management. At the same time, they emphasized that curriculum relevance depends not only on the content taught but also on the extent to which students can apply their knowledge in authentic workplace settings. Several participants therefore called for greater emphasis on practical learning and more sustained exposure to professional kitchen environments.

Theory–practice integration emerged as one of the most prominent areas requiring improvement. Participants indicated that students were generally familiar with theoretical concepts but did not always demonstrate the same level of readiness when entering professional kitchens. More intensive and varied practical experiences were considered necessary to help students translate classroom knowledge into workplace performance and adapt more confidently to actual kitchen operations. This finding corresponds with the quantitative results, in which theory–practice balance recorded the largest normative gap (Gap = 1.68).

A closely related theme concerned soft skills. Participants consistently emphasized communication, teamwork, discipline, time management, and the ability to work effectively under pressure as essential competencies in professional culinary environments. Some participants observed that students could experience difficulty communicating with kitchen teams or adapting to workplace routines during internships. These accounts reinforce the quantitative finding that soft skills represented the second-largest competency gap (Gap = 1.62).

Participants also highlighted the importance of adaptability to culinary trends and innovation. They noted that changes in consumer preferences, food preparation techniques, healthy menu development, modern plating, and the creative use of local ingredients require graduates to remain responsive to developments in the culinary sector. The interviews therefore indicated a need for curriculum content and learning experiences that expose students to both contemporary industry trends and opportunities for culinary innovation.

Another recurring theme was the growing importance of digital and emerging technology competencies. Participants referred to digital marketing, kitchen and inventory management applications, and the potential use of artificial intelligence in areas such as consumer trend analysis and kitchen automation. These perspectives indicate that digital competence is increasingly viewed as part of professional culinary practice rather than as a separate supplementary skill. Participants therefore supported greater integration of relevant digital tools and emerging technologies into the learning process.

Finally, participants emphasized the importance of sustained university–industry collaboration. Internships, industry guest lecturers, joint training activities, and professional certification were identified as important mechanisms for maintaining curriculum responsiveness to changing workplace requirements. Participants viewed stronger collaboration as a means of ensuring that curriculum development remains informed by current professional practices and competency standards. Table 6 summarizes the six themes and their associated subthemes, together with illustrative participant quotations and their interpretation.

Table 6. Themes Identified from the Qualitative Interviews

| Main Theme                        | Subtheme                                   | Illustrative Quotation                                                                                             | Interpretation                                                                                                                   |
|-----------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Curriculum Content Relevance      | Alignment with industry needs              | "In general, the material provided is appropriate; students already understand basic cooking techniques."          | Core curriculum content is generally aligned with fundamental competencies required in professional kitchens.                    |
|                                   | Need for stronger practical emphasis       | "There are still too many theories; if the practice is more intense, students will be ready for work faster."      | Participants perceived a need for greater practical exposure to strengthen workplace readiness.                                  |
| Theory–Practice Integration       | Limited practical exposure                 | "In the hotel kitchen, students are often surprised because they are used to theory, not directly working."        | Greater integration of theoretical learning with authentic workplace experience is needed.                                       |
| Soft Skills                       | Communication and teamwork                 | "Students sometimes get awkward when communicating with the kitchen team."                                         | Communication and teamwork require further development for effective workplace participation.                                    |
|                                   | Discipline and time management             | "Sometimes they lack discipline with time and kitchen SOPs."                                                       | Workplace discipline and time management remain important areas for improvement.                                                 |
| Culinary Trends and Innovation    | Contemporary culinary trends               | "There must be learning about healthy menus or modern plating, which is now in great demand."                      | Curriculum content needs to remain responsive to changing culinary practices and consumer preferences.                           |
|                                   | Use of local ingredients                   | "The industry needs chefs who can explore local ingredients to be more creative."                                  | Creative use of local ingredients provides an opportunity to connect local resources with contemporary culinary innovation.      |
| Digital and Emerging Technologies | Digital marketing                          | "Now that many culinary businesses are developing through Instagram and TikTok, students must be able to do that." | Digital marketing is increasingly relevant to contemporary culinary business practice.                                           |
|                                   | Kitchen management applications            | "If students can use stock management software, it will be very helpful to the industry."                          | Familiarity with digital management tools can strengthen graduates' readiness for technology-enabled workplaces.                 |
|                                   | Artificial intelligence and Industry 4.0   | "In the future, AI can be used to predict food trends; students must be introduced to it from college."            | Participants supported early exposure to AI and other emerging technologies in culinary education.                               |
| Industry Collaboration            | Internships and professional certification | "Cooperation with industry must be further strengthened, especially in chef certification."                        | Sustained university–industry collaboration can support workplace learning and alignment with professional competency standards. |

## Discussion

The findings provide a nuanced picture of the alignment between the bachelor's program in applied culinary arts and the competency requirements of the culinary industry. Overall, the curriculum was perceived as highly relevant, particularly in relation to curriculum content and competencies associated with future industry developments. However, the needs assessment revealed an important distinction between the relevance of the curriculum itself and graduates' readiness to translate that curriculum into professional practice. Curriculum relevance ( $M = 4.23$ ) and future challenges ( $M = 4.55$ ) received high ratings, whereas graduate competencies received a

comparatively lower score ( $M = 3.97$ ) and the largest normative gap ( $\text{Gap} = 1.03$ ). This pattern suggests that curriculum alignment cannot be judged solely by whether appropriate content is formally included. It also depends on how effectively learning experiences enable students to develop and demonstrate the competencies expected in authentic workplace settings.

This distinction becomes clearer when the quantitative and qualitative findings are considered together. Industry-appropriate learning materials received the highest item-level rating ( $M = 4.76$ ), while industry cooperation ( $M = 4.68$ ), professional certification ( $M = 4.66$ ), and several technical and future-oriented competencies were also evaluated positively. By contrast, theory–practice balance ( $M = 3.32$ ;  $\text{Gap} = 1.68$ ) and soft skills ( $M = 3.38$ ;  $\text{Gap} = 1.62$ ) emerged as the two highest-priority areas for improvement. The interviews reinforced this pattern: participants generally regarded the curriculum content as relevant but repeatedly emphasized the need for greater practical exposure, stronger communication and teamwork, better time management, and greater confidence in professional kitchen environments. Taken together, these findings point to an implementation gap rather than a fundamental curriculum-content gap. In other words, the principal challenge is not simply what the curriculum contains, but how effectively that content is translated into professional competence.

The relatively strong evaluation of curriculum relevance is consistent with previous research emphasizing the value of sustained industry involvement in vocational curriculum development. Active employer participation can help institutions maintain alignment between learning outcomes and changing occupational requirements, particularly when industry partners are involved not only in internships but also in curriculum planning, implementation, and evaluation (Cedefop, 2022). Baker et al. (2024) similarly highlighted the importance of systematic engagement with industry stakeholders in strengthening curriculum responsiveness and graduate employability. In the present study, the high ratings for industry cooperation, internship provision, and professional certification suggest that established links between the program and the culinary sector provide an important foundation for maintaining curriculum relevance. However, these strengths should not be interpreted as evidence that the curriculum requires no further development. The culinary sector continues to change rapidly, and curriculum–industry alignment is therefore better understood as an ongoing process than as a fixed outcome.

This need for continuous adaptation is particularly evident in the future challenges dimension, which received the highest overall rating and the smallest normative gap. Industry cooperation, professional certification, digital competencies, and readiness for Industry 4.0 and artificial intelligence were all viewed positively. These findings are consistent with international discussions of vocational education that emphasize the growing importance of digital competence and the capacity to respond to technological change (Allais, 2023; Roll & Ifenthaler, 2021). UNESCO (2022) likewise stresses that vocational education needs to anticipate digital transformation, innovation, and changing workforce requirements rather than respond only after new technologies have become established in the workplace. The qualitative findings add further context to this result, as participants identified digital marketing, kitchen and inventory management applications, and potential uses of AI as increasingly relevant to culinary practice. Thus, the relatively small gap in this dimension should not be interpreted as reducing the importance of future-oriented competencies. Rather, these competencies represent an existing strength that needs to be continually updated as technologies and industry practices evolve.

At the same time, the findings reveal that graduate competencies remain the most pressing area for improvement. The lower ratings for soft skills are particularly important because employability in culinary and hospitality settings depends on more than technical proficiency. Professional kitchens are highly collaborative environments in which communication, teamwork, discipline, adaptability, problem-solving, and the ability to perform under time pressure are integral to everyday work. The present findings are consistent with Succi and Canovi (2020), who found that employers attach substantial importance to soft skills in graduate employability. They also align with the OECD Skills Outlook (OECD, 2023), which identifies communication, collaboration, adaptability, problem-solving, and digital literacy as important competencies for participation in rapidly changing labor markets. In this context, soft skills should not be treated as supplementary attributes added to technical training. They need to be embedded within practical learning activities

in which students are required to communicate, collaborate, make decisions, manage time, and respond to realistic workplace problems.

The theory–practice gap reinforces this interpretation. Of all the indicators examined, theory–practice balance had the largest normative gap (Gap = 1.68), making it the most immediate curriculum-development priority. Interview participants similarly reported that students could understand theoretical concepts but sometimes experienced difficulty adapting when confronted with the pace, expectations, and routines of professional kitchens. This finding is consistent with the principles of work-based learning, which emphasize that professional competence develops through the integration of conceptual knowledge, authentic workplace experience, and reflection on practice (Billett, 2011). From this perspective, simply increasing the number of practical hours may not be sufficient. What matters is the quality and authenticity of those experiences. Internships, industry-based projects, simulated professional kitchens, problem-based assignments, and industry-led practical activities could provide opportunities for students to apply technical knowledge while simultaneously developing communication, teamwork, adaptability, and professional judgment.

The normative gap analysis also identified adaptation to culinary trends as a moderate-priority area (Gap = 1.50). The qualitative findings help explain this result: participants referred to healthy menu development, modern plating, creative use of local ingredients, and changing consumer preferences as areas in which graduates need to remain adaptable. This finding suggests that curriculum responsiveness involves more than incorporating new technologies. It also requires mechanisms that allow curriculum content and learning activities to evolve alongside changes in consumer behavior, culinary practices, sustainability concerns, and market trends. Regular consultation with industry practitioners may therefore be useful not only for major curriculum reviews but also for smaller and more frequent adjustments to course content, practical assignments, and workplace-learning activities.

Entrepreneurial and digital competencies present a somewhat different pattern. Culinary business (Gap = 0.68) and digital skills (Gap = 0.66) were classified as low-priority areas, indicating that they are already reasonably represented in the curriculum but still offer scope for refinement. The relatively positive assessment of culinary business competencies is encouraging given the importance of entrepreneurship in vocational education. As Lackéus (2015) argues, entrepreneurship education is most meaningful when learners have opportunities to create value through authentic activities rather than learning entrepreneurship only as theoretical business knowledge. In the culinary context, integrating business management, cost control, digital marketing, product development, and technology-enabled entrepreneurship into practical projects could strengthen students' capacity not only to obtain employment but also to develop innovative culinary ventures.

Taken together, these findings support the underlying logic of the needs assessment approach used in this study. Rather than treating curriculum relevance as a binary judgment of whether a curriculum is relevant or irrelevant, the analysis identifies the discrepancy between the existing condition and the desired level of performance. The normative gap analysis therefore adds practical value to conventional descriptive curriculum evaluation by distinguishing areas that require immediate intervention from those that primarily require maintenance and continuous monitoring. In this study, that distinction is particularly clear: technical competencies, industry-oriented learning materials, internships, professional certification, and industry collaboration represent relative strengths, whereas theory–practice integration and soft skills require more immediate attention. Trend adaptation occupies an intermediate position, while digital and entrepreneurial competencies require continued refinement rather than substantial restructuring.

This prioritization also constitutes an important contribution of the study. Previous curriculum relevance studies have often focused on describing the extent of alignment between educational provision and industry expectations. The present study extends this approach by combining expert-validated competency indicators, descriptive curriculum relevance analysis, normative gap analysis, priority classification, and qualitative evidence. The value of this integration lies not simply in generating another measure of curriculum relevance, but in translating stakeholder assessments into differentiated curriculum-development priorities. The qualitative findings further strengthen this interpretation by explaining why particular gaps matter in professional practice. In this sense, the study provides a more actionable basis for curriculum review: areas with small gaps

can be sustained through continuous quality assurance, whereas high-priority gaps can receive targeted intervention.

From a broader vocational education perspective, the findings underline the importance of treating curriculum–industry alignment as a continuous and collaborative process. Maintaining a relevant curriculum requires regular interaction among higher education institutions, employers, professional bodies, and other industry stakeholders. This is especially important in sectors such as culinary arts, where technological innovation, changing consumer preferences, sustainability concerns, and new business models can rapidly reshape competency requirements. The findings therefore support periodic needs assessment as part of curriculum quality assurance rather than as an activity conducted only during major curriculum revisions. Such an approach is consistent with UNESCO (2022), which advocates competency-based and future-oriented vocational education developed through close collaboration between education providers and industry.

In practical terms, curriculum improvement should focus first on strengthening the connection between classroom learning and authentic professional practice. This could involve enhancing the quality of workplace learning, increasing opportunities for industry-based projects, embedding soft-skill development within practical courses, and involving industry practitioners more systematically in learning activities and curriculum review. At the same time, existing strengths in industry collaboration, professional certification, digital competence, and Industry 4.0 readiness should be maintained and periodically reassessed. The aim should therefore not be to redesign the entire curriculum, but to make targeted improvements in areas where the needs assessment identified the greatest discrepancy between current provision and industry expectations.

### ***Limitations and Future Research***

Several limitations should be considered when interpreting these findings. First, the study was conducted within a single bachelor's program in applied culinary arts, which limits the extent to which the findings can be generalized to other vocational higher education institutions, regions, or culinary education contexts. Second, the quantitative analysis was based primarily on stakeholder perceptions rather than direct assessments of graduates' competencies or employment performance. The findings therefore reflect perceived curriculum–industry alignment rather than objective evidence of graduate performance. Third, the cross-sectional design captures industry expectations at a particular point in time and may not fully reflect the speed with which technological developments, consumer preferences, and occupational requirements are changing within the culinary sector.

Future research could address these limitations by involving multiple vocational higher education institutions and a broader range of culinary industry sectors and regions. Longitudinal studies would also be valuable for examining whether curriculum revisions based on identified competency gaps lead to measurable improvements in graduate employability and workplace performance over time. In addition, future studies could combine stakeholder perceptions with objective indicators such as employment outcomes, employer satisfaction, professional certification attainment, and workplace performance. Repeated needs assessments may also help determine how competency priorities change as artificial intelligence, automation, sustainability practices, and digital business models become more deeply embedded in the culinary industry.

## **CONCLUSION**

This study shows that the bachelor's program in applied culinary arts is broadly aligned with current and emerging competency requirements in the culinary industry, although the degree of alignment varies across competency areas. Curriculum relevance and readiness for future challenges were rated particularly highly, supported by strengths in industry-oriented learning materials, technical culinary competencies, industry collaboration, internships, professional certification, and the integration of digital and Industry 4.0-related competencies. Nevertheless, the normative gap analysis identified an important distinction between overall curriculum relevance and graduate readiness: the graduate competencies dimension showed the largest gap, with theory–practice integration and soft skills emerging as the most immediate priorities for improvement, followed by

adaptability to emerging culinary trends. By combining stakeholder assessment with normative gap analysis and priority classification, this study moves beyond describing whether a curriculum is relevant and provides a more actionable basis for identifying where curriculum development is most needed. The findings suggest that curriculum improvement should focus on strengthening authentic workplace learning and embedding communication, teamwork, adaptability, and other transferable skills more systematically into practical learning, while maintaining existing strengths and continuously updating digital competencies, entrepreneurship, artificial intelligence, and sustainable culinary practices in response to industry change.

These findings should be interpreted in light of several limitations. The study focused on a single applied culinary arts program, which limits the transferability of its findings to other vocational higher education contexts, and the quantitative evidence was based primarily on stakeholder perceptions rather than direct measures of graduate competence, employment outcomes, or workplace performance. In addition, the cross-sectional design captures industry expectations at a particular point in time and cannot fully account for the rapidly changing competency demands of the culinary sector. Future research should therefore extend the analysis across multiple institutions, regions, and culinary industry settings and employ longitudinal designs to examine whether curriculum revisions based on identified competency gaps lead to measurable improvements in graduate employability and career development. Combining stakeholder perceptions with objective indicators, such as employment outcomes, employer evaluations, professional certification attainment, and workplace performance, would provide stronger evidence of curriculum effectiveness and help inform the continuing development of adaptive, industry-responsive vocational curricula.

## AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

| Name of Author            | C | M | So | Va | Fo | I | R | D | O | E | Vi | Su | P | Fu |
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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

## CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial or non-financial interests that could have appeared to influence the work reported in this paper.

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