Evaluation on The Employment Profile and Graduates' Perception on Employability Among Biomedical Science Graduates from 2016-2019 of International Islamic University Malaysia (IIUM)

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ABSTRACT

Background: The employment rate among fresh graduates in Malaysia, particularly Biomedical Science graduates, has become a major concern. This survey was conducted to assist the Biomedical Science Education Provider (BSEP) at the International Islamic University Malaysia (IIUM) in tracking alumni employment profiles and gathering feedback for improving learning and teaching activities. The insights gained from this survey will enable the Academic Education Provider (AEP) to evaluate educational outcomes, contributing to the continuous enhancement of biomedical science education standards. **Methods**: An online questionnaire was used as the primary tool for data collection. The questionnaire assessed graduates' job profiles, perceptions of how their education and training aligned with their current employment, and included a section for additional comments and suggestions. A total of 92 graduates (38.3% response rate) from a pool of 240 Biomedical Science alumni participated in this study. **Results**: Findings indicated that 69.6% (n=64) of respondents were employed, 10.9% (n=10) were unemployed, and 19.6% (n=18) were outside the labour force, with 17 of these pursuing further studies. A significant association was found between curriculum score and employment status (p=0.029, Phi=0.317). However, no significant associations were observed between academic performance or year of graduation and employment status. **Conclusions**: In conclusion, the majority of IIUM Biomedical Science graduates benefited from the knowledge and training provided during their studies. The comments and suggestions collected through this survey will be used to inform and strengthen the next curriculum review.

INTRODUCTION

The combined forces of globalisation and rapid technological advancement have intensified competition in the job market, placing increasing pressure on graduates seeking employment. In Malaysia, this challenge has been compounded by the economic disruptions caused by the COVID-19 pandemic. The Department of Statistics Malaysia (DOSM, 2020) reported that national economic growth for the first quarter of 2020 fell to 0.7%, a significant decline from 3.6% in the previous quarter and the lowest recorded growth since the third quarter of 2009. Based on analyses aligned with international standards developed by the United Nations, World Bank and International Monetary Fund, DOSM estimated that the economy would have expanded by 3.9–4.2% had it not been impacted by the pandemic. Instead, Malaysia suffered an economic output loss of approximately RM22.8 billion in the first quarter alone (DOSM, 2020). This downturn has intensified job competition, particularly among recent graduates and individuals displaced from the workforce during the pandemic. In the health and welfare disciplines, including biomedical science, 6,742 students graduated from Malaysian public universities in 2019; however, the domestic job market lacks the capacity to absorb this annual influx of graduates (MOHE, 2020).

Within this broader economic context, the employability of biomedical science graduates faces additional discipline-specific challenges. The field is undergoing rapid transformation, driven by the rise of large-scale, data-intensive and interdisciplinary research that increasingly demands proficiency in bioinformatics, functional genomics, computational analysis, and collaborative scientific practice (National Research Council, 2011;

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Lenfant, 2000). Yet many undergraduate programmes remain rooted in traditional laboratory training, resulting in a skills mismatch that undermines graduates' readiness for modern biomedical and diagnostic environments. Employers continue to highlight gaps in practical competencies, digital literacy and workplace preparedness, reflecting a persistent disconnect between academic instruction and real-world expectations (Scott et al., 2024). These challenges are further compounded by the expanding complexity of biomedical science, which often necessitates extended or specialised training in areas such as systems biology, translational research and point-of-care diagnostics (Lenfant, 2000). Additionally, inconsistent incorporation of employability focused components such as simulation-based learning, interprofessional training and competency-based assessments across institutions contributes to variability in graduate readiness and competitiveness (Scott et al., 2024). Addressing these issues requires a more systematic integration of interdisciplinary, data-driven and professional skills within biomedical science curricula to ensure graduates are adequately equipped for an evolving and demanding workforce landscape.

MATERIALS AND METHODS

Study Design and Subjects
This study employed a cross-sectional design, as data were collected at a single point in time through an online questionnaire. This design allowed for the simultaneous measurement of exposures (academic performance, curriculum score, and year of graduation) and outcomes (employment status prevalence). Purposive sampling was used to focus specifically on Biomedical Science graduates from the International Islamic University Malaysia (IIUM) between 2016 and 2019, prior to the Covid-19 pandemic that significantly disrupted the global economy and resulted in approximately 13 million people becoming unemployed worldwide (Verma & Prakash, 2020). Inclusion criteria required participants to be former Biomedical Science students who graduated from IIUM between these years, while exclusion criteria included students who did not complete their studies or were terminated. The total target population comprised 240 graduates from 2016 to 2019. Out of these, 92 graduates responded, resulting in a response rate of 38.2%.

Questionnaire
The questionnaire was adapted from the tracer study surveys conducted by the Ministry of Higher Education (MOHE). The questionnaire consisted of three sections: Part A gathered demographic information; Part B recorded current job status (employed, unemployed, outside the labor force); and Part C assessed graduates' perceptions on employability, specifically focusing on suggestions for enhancing the marketability of Biomedical Science graduates and identifying preferred training programs.

Statistical Analysis
Data were analyzed using SPSS software version 25.0. Descriptive statistics were used to determine the prevalence of employment profiles among IIUM Biomedical Science graduates. Inferential statistics, including the Chi-square test, were applied to examine associations between categorical variables within the same population.

RESULTS

Demographic Profile of Graduates
Out of the 240 graduates from 2016 to 2019, the study received 92 responses, resulting in a response rate of 38.2%. A post hoc power analysis for the chi-square test of independence (df = 1, α = .05, Cohen's w = 0.30) with the obtained sample size of N = 92 indicated a statistical power of approximately 0.82, which is generally considered adequate. Female graduates outnumbered male graduates, comprising 71.7% (n=66) female and 28.3% (n=26) male respondents. Participants' ages ranged from 25 to 30 years. Table 1 presents the response rate for each graduation year, with the highest response from the 2019 cohort (49.1%, n=28), followed by the 2018, 2017, and 2016 cohorts. All participants were Malaysian nationals, with most residing in various states across Malaysia, except for one graduate currently residing in the United Kingdom for further studies.

Table 1: Total Responses of graduates based on each year of graduation

Year of Graduation	Total graduates	Total graduates participated in the study	Percentage (%)
2016	53	13	24.5
2017	70	24	34.3
2018	60	27	45
2019	57	28	49.1

Academic Performance and Curriculum Score of Graduates
Academic performance was categorized by degree class. Table 2 shows that 15 graduates achieved a first-class degree, 75 graduated with an upper-second class degree, and two with a lower-second class degree. A chi-square analysis indicated a significant association between gender and academic performance, χ^2 (2, n=92) = 6.768, p=0.034, Cramer's V = 0.271, showing a small association, with female graduates tending to perform better academically than their male counterparts. Graduates also self-assessed

their curriculum involvement, scoring from one (not active at all) to five (very active). Seven graduates rated below average, while 85 scored above three. The median curriculum score of four indicated that the majority of graduates were actively engaged in extracurricular activities.

Table 2: Academic performance of graduates based on class of degree

Class of Degree	Frequency	Percentage (%)
First class (3.50 and above)	15	16.3
Upper-Second class (2.80-3.49)	75	81.5
Lower-Second class (2.00-2.79)	2	2.2

Employment Status of Biomedical Science Graduates

Employment status was classified into three categories: employed, unemployed, and outside the labour force. Employed refers to individuals who are currently engaged in any form of paid job, whether full time, part time, contract-based, or self-employed. Unemployed refers to individuals who are not working but are actively seeking and available for employment. Outside the labour force refers to individuals who are neither working nor actively seeking work, such as those pursuing further studies or those not currently available for employment. Of the graduates, 64 were employed, 10 unemployed, and 18 outside the labour force, with 17 of these pursuing further studies. The chi-square test results showed no significant association between the year of graduation and employment status, $\chi^2(3, n=74) = 3.816$, $p=0.282$, indicating that graduation year did not influence employment outcomes. Likewise, no significant association was found between academic performance and employment status, $\chi^2(2, n=74) = 0.526$, $p=0.769$, suggesting that academic performance alone did not impact employment status. However, a significant association was found between curriculum activity scores and employment status, $p=0.029$, Phi=0.317, highlighting that graduates actively engaged in extracurricular activities had higher employability.

Graduates' Perceptions on Employability

In the employability perception section, graduates were presented with statements on factors affecting employment, including academic performance, skills, and education level, and asked to agree or disagree. Most graduates (95.7%, n=88) agreed that "both academic performance and skills are important for securing a job." Additionally, 82 graduates believed that "academic performance, skills, and a higher education level are critical for employment."

An open-ended question invited graduates to suggest ways to enhance the employability of Biomedical Science graduates. Graduates also indicated the types of training they would like to pursue to improve their job prospects. A total of 33 graduates (35.9%) recommended increasing practical sessions over theoretical classes. Fourteen graduates suggested that students should focus on developing soft skills such as communication, interpersonal abilities, and public speaking through extracurricular activities. Twelve graduates recommended that students gain job exposure in the biomedical science sector to familiarize themselves with potential career paths. Among the types of training preferred, 35.9% (n=33) indicated interest in laboratory certifications, such as polymerase chain reaction (PCR) training, quality laboratory management, and phlebotomy. Additionally, 31 graduates expressed a desire to attend soft skills training, including leadership and communication, to enhance employability.

DISCUSSION

Demographic Profile of Graduates

Among the 92 responses, female graduates exceeded male graduates. The DOSM reported that female enrolment at the tertiary level surpassed that of males, reaching 50.3% (DOSM, 2019), resulting in more female graduates annually. However, this distribution varies by field; data from the MOE indicate that, in 2018 and 2019, female graduates outnumbered male graduates across all fields except for "Engineering, Manufacturing, and Construction," where male graduates were predominant (MOHE, 2019).

According to Hdii & Fagroud (2018), female students often outperform males academically, which may explain the observed association between gender and academic performance in this study, with most female graduates achieving higher academic results than males. The median curriculum activity score of four (active) aligns with the 2019 IIUM tracer study report, which found that most IIUM students were highly involved in co-curricular activities (Selamah et al., 2018). This result affirms that IIUM successfully cultivates students who perform well academically and actively participate in extracurricular activities.

Employment Status of Biomedical Science Graduates

The MOHE tracer study data indicated that the employment rates of IIUM Biomedical Science graduates from 2016 to 2019 were 69.8%, 55.7%, 66.7%, and 77.4%, respectively, with 2019 recording the highest pre-convocation employment rate (Ministry of Higher Education, 2019). This translates to an average

employment rate of 67.4% for this period. Current study data show that the overall employment rate for graduates from 2016 to 2019 has risen to 69.6% (n=64). According to DOSM's 2019 employment statistics, the trend observed in this study where employed graduates having the highest percentage, followed by those outside the labour force and then unemployed graduates, mirrors the national trend (DOSM, 2019).

Although no significant association was found between year of graduation and employment status, an imbalance in response rates across graduation years could have influenced this analysis. It was expected that the 2016 cohort, with over three years since graduation, would have the highest employment rate due to longer time and greater experience in the job market. This study also found that academic performance alone did not significantly impact employment status. As noted by Tentama and Abdillah (2019), while higher academic achievement may enhance employability, skills are equally important alongside strong academic performance. The significant association observed between curriculum activity scores and employment status suggests that skills, particularly those developed through extracurricular involvement, play a critical role in employment outcomes. This finding aligns with studies indicating that active involvement in co-curricular activities positively influences graduate employability (Akinrinmade & Ayeni, 2017).

The unemployment rate of 10.9% among IIUM Biomedical Science graduates prior to the Covid-19 pandemic can be explained by several structural and graduate-related factors. Employment opportunities in core biomedical fields are relatively limited and competitive, often favouring candidates with specialised laboratory experience or prior exposure to regulated environments, a pattern also noted in STEM-related labour-market analyses (Rahmah, Ishak, & Lai, 2011). Graduates additionally compete with applicants from closely related science disciplines, which further intensifies competition for entry-level positions. Moreover, some graduates delay entering the workforce due to personal commitments or preparation for postgraduate studies, placing them temporarily in the unemployed category. Location constraints, strong preference for public sector positions, and the generally longer transition period observed among science graduates in Malaysia (Ministry of Higher Education, 2020) also contribute to the overall unemployment rate observed in this cohort.

On the other hand, the substantial number of IIUM Biomedical Science graduates who pursued further studies reflects the academic and professional nature of the field, which often requires advanced qualifications for meaningful career progression. Biomedical Science is heavily research-oriented, and many roles within medical research, diagnostics, and laboratory-based sciences prefer candidates with postgraduate training due to the need for specialised methodological skills and research competency. These graduates may also view postgraduate education as a strategic pathway to enhance employability and long-term career prospects, a trend that aligns with national patterns in STEM disciplines where graduates frequently extend their studies to strengthen their professional competitiveness (Rahmah et al., 2011; Ministry of Higher Education, 2020). Furthermore, strong interest in scientific discovery and encouragement from academic mentors likely contributed to their decision, making postgraduate studies a natural continuation of their academic trajectory.

Graduates' Perception on Employability
Understanding graduates' perceptions of employability is essential to bridge the gap between employer and graduate expectations. Discrepancies between these perspectives can contribute to the rising number of unemployed graduates (Hwang, 2017). Most graduates agreed that both academic performance and skills are crucial for securing employment. While academic performance is essential, technical and employability skills have become increasingly important in today's competitive job market (Mwita, 2014). Many graduates recommended increasing practical sessions over theoretical classes. Although IIUM provides sufficient lectures and practical sessions, graduates believe additional hands-on experience would enhance technical skills, thereby improving employment prospects (Mwita, 2024).

Graduates also emphasized the importance of soft skill development, noting that skills such as communication, personal qualities, teamwork, problem-solving, organizational skills, technological proficiency, and continuous learning all influence employability (Abdullah et al., 2019). They further suggested that students should gain job exposure, recommending that the department invite alumni or industry representatives to share job-related insights and experiences relevant to Biomedical Science graduates.

Graduates identified specific training they believe would be beneficial, including laboratory certifications (e.g., PCR training, quality laboratory management, and phlebotomy), which could enhance their qualifications for roles in the healthcare sector. Given the rapid development of new technology, adequate training on advanced tools and techniques is essential for job performance (Roco et al., 2002). Many graduates also

chose soft skills training, as employers increasingly value interpersonal skills and professional expertise as essential for job security and advancement (Sato et al., 2019). Overall, graduates believe that these training programs could aid in securing employment, and they suggest that the university consider implementing these initiatives to better prepare students for post-graduation success.

CONCLUSIONS

In conclusion, the employment outcomes of IIUM Biomedical Science graduates from 2016 to 2019 indicate that 69.6% (n = 64) were employed, 10.9% (n = 10) were unemployed, and 19.6% (n = 18) were outside the labour force, with the majority of the latter group pursuing further studies. The analysis identified curriculum score as a significant factor influencing graduates' employment status, whereas academic performance and year of graduation showed no meaningful association. These findings suggest that the Biomedical Science programme has largely succeeded in producing graduates who are competitive and equipped with relevant knowledge and skills for the job market.

However, the study is not without limitations. The total number of respondents was relatively low, which may restrict the generalisability of the findings to the broader population of IIUM Biomedical Science graduates. Time constraints also limited the opportunity to extend data collection and increase the sample size. Additionally, the study did not conduct separate reliability and validity assessments for the questionnaire, as it utilised an instrument developed by the Ministry of Higher Education for Malaysian graduates across institutions. While the MOHE questionnaire is widely adopted, the absence of instrument validation within the specific context of IIUM Biomedical Science graduates may introduce potential measurement limitations. Despite these constraints, the study provides valuable insight into graduate employability trends and highlights areas for further investigation.

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