

Employability of Bio System Technology Non-University-Bound A/L Completers in Sri Lanka

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Abstract

This exploratory study examined the employability status of non-university-bound A/L completers who sat for the G.C.E. (Advanced Level) examination from 2015 to 2018 in the Bio System Technology stream and were not selected for university education in Sri Lanka. Since the technology stream was introduced in 2013 to align secondary education with labour market requirements, it is timely to evaluate whether this objective has been achieved. The study was conducted across three educational zones: Piliyandala, Mathugama, and Ratnapura. Data were gathered from 61 past students via structured questionnaires distributed through Google Forms, and semi-structured interviews were conducted with 21 Bio System Technology teachers from the Colombo, Kalutara, and Ratnapura districts. Binomial logistic regression was employed to examine the influence of gender, living district, English proficiency, and third subject selection on employability. Findings indicate that male students showed higher employability rates (89.3%) compared to females (81.8%). Students who selected Information Technology as their third subject recorded zero unemployment. Vocational training opportunities were highest among those who selected Agriculture as the third subject. English language proficiency (O/L grade) did not emerge as a statistically significant predictor of employability in this sample. The results reveal a mismatch between the current curriculum and evolving labour market demands. The study recommends strengthening career guidance, introducing occupational components from junior secondary level, and improving industry-school linkages to enhance the employability of Bio System Technology stream completers.

Keywords: Employability, Vocational Training, Labour Market, Curriculum

Introduction

The mismatch between the supply of educated labour and the demands of the job market has long been a critical challenge confronting the Sri Lankan education system. For over seven decades, successive governments have attempted to restructure school curricula to better reflect occupational realities, introducing crafts in the 1950s, agriculture in the 1960s, prevocational subjects in the 1970s, and practical skills in the late 1990s (Medagama, 2014). Despite these efforts, the structural disconnect between education and employment has persisted, particularly for graduates of the arts stream.

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A turning point came in 2013 when the Ministry of Education introduced the Technology Subject Stream at the Advanced Level (A/L) under Circular No. 25/2013. Initially launched in 250 schools, the stream was designed to equip students with competency-based skills applicable in the world of work, and to redirect enrolment away from the arts stream. The two main disciplines under this stream are Engineering Technology and Bio System Technology, the latter encompassing agriculture, aquaculture, biotechnology, food science, and agri-engineering.

Despite the growing relevance of bio-based industries in Sri Lanka, enrolment in Bio System Technology has remained comparatively low, and the stream has not attracted the levels of student interest that policymakers had anticipated. Moreover, the employability outcomes of its A/L completers, particularly those who did not gain university admission, remain poorly documented. This study addresses that gap by examining the employability status of Bio System Technology A/L completers who completed their A/L examinations between 2015 and 2018 but were not selected for university education. Specifically, the study investigates whether the Bio System Technology stream has achieved its core policy mandate of improving the employability of school leavers who do not proceed to university, and identifies structural, geographic, and curricular factors that influence their labour market outcomes. Given the limited sample size and geographic scope, the study is positioned as an exploratory investigation of three educational zones rather than a definitive national evaluation.

Aim and Objectives

Aim

The primary aim of this study was to investigate the employability status of past students of the Bio System Technology stream who were not selected for university education.

Objectives

1. To examine employment outcomes for A/L cohorts from 2015 to 2018.
2. To analyse the relationship between gender and employability.
3. To determine how the living district influences employability.
4. To assess the role of English language proficiency.
5. To identify the influence of the third subject selection on employment outcomes.

Literature Review

Employability in Education

Employability is broadly understood as a set of skills, understandings, and personal attributes that make individuals more likely to gain and maintain employment (Knight & Yorke, 2003). Cole and Tibby (2013) describe it as a lifelong process that extends beyond securing a job, encompassing a range of skills, behaviours, and attitudes that enable success in both professional and broader life contexts. From an employer's perspective, employability often connotes work-readiness, that is, the ability to contribute productively from the outset of employment (Mason et al., 2009).

Several theoretical frameworks inform this study. The Human Capital Theory, associated with economists Gary Becker and Theodore Schultz, holds that investment in education and training increases individual productivity and ultimately employability (Ntemngweh, 2016). The USEM model (Knight & Yorke, 2003) proposes four interrelated components of employability: subject understanding, skilful practices, efficacy beliefs, and metacognition. The CareerEDGE model (Pool & Sewell, 2007) similarly stresses the integration of degree-specific knowledge, generic skills, emotional intelligence, and career development learning. The UKCES model further underlines the foundational role of communication, numerical, and technological skills in enabling broader competencies such as problem solving and self-management.

Research on employability in the Sri Lankan context confirms a persistent mismatch between educational outcomes and labour market requirements. Grero (2018) identified critical gaps in soft skills, English communication, ICT proficiency, and career guidance as primary contributors to this mismatch. Weerasiri and Samaraweera (2021) found that the probability of unemployment is higher among young females and post-secondary educated youth, reinforcing the importance of targeted policy interventions. In the specific context of Bio System Technology, Katukurunda et al. (2018) demonstrated a significant positive relationship between programme quality dimensions and student satisfaction, suggesting that curriculum quality directly shapes student outcomes.

Technology Stream in Sri Lanka

The introduction of the Technology stream in 2013 was among the most significant reforms in the post-Kannangara era of Sri Lankan education. The stream aimed to broaden educational horizons, enrich learning through practical experience,

and strengthen links with industry and vocational institutions (Ministry of Education, 2013). Students passing Bio System Technology may access degree and diploma programmes at UNIVOTEC, NAITA-affiliated technical colleges, and university colleges under the Ministry of Skills Development.

Studies examining the stream's outcomes have noted persistent challenges. Jayathilake (2020), in a study of the Southern Province, found that the total number of students sitting the A/L examination did not increase significantly following the introduction of the Technology stream, suggesting that it redirected students from existing streams rather than expanding overall participation. Meanwhile, a growing body of evidence from international contexts demonstrates that the quality of TVET qualifications, including language and numeracy skills and green skills for a sustainable economy, must extend beyond technical training alone (Wheelahan & Curtin, 2010; King & Palmer, 2007).

Methodology

Research Design

This study employed a mixed-methods approach, combining quantitative survey data with qualitative insights from semi-structured interviews. The research can be characterized as an impact evaluation, examining whether the Bio System Technology stream has achieved its objective of improving the employability of school leavers who do not proceed to university.

Participants and Sampling

The target population consisted of all A/L students who studied Bio System Technology in the Piliyandala, Mathugama, and Ratnapura educational zones between 2015 and 2018, and did not gain university admission, as well as Bio System Technology teachers from the Colombo, Kalutara, and Ratnapura districts. Cluster sampling was used to select participants. A total of 61 student questionnaires and 21 teacher questionnaires were collected. The sample comprised 54.1% male and 45.9% female students, with the majority aged 23 to 26 years.

Data Collection

Closed-ended structured questionnaires were distributed via Google Forms to students and teachers. Google Forms is a reliable, cloud-based instrument for collaborative data collection, offering convenience and efficiency for survey administration (Vasantha Raju & Harinarayana, 2016). In addition, semi-structured interviews were conducted with teachers to gather in-depth information on

employment experiences and curriculum perceptions. Semi-structured interviews allow for formal engagement with a predetermined set of topics while permitting the interviewer to follow emerging threads in the conversation (Cohen & Crabtree, 2006).

Data Analysis

Quantitative data were analysed using SPSS. Descriptive statistics were used to present demographic profiles and employment patterns. Binomial logistic regression was employed for inferential analysis, given that the dependent variable, employability, was binary (employed or not employed). This method estimates the probability of a case falling into one of two outcome categories based on one or more predictor variables (continuous or categorical). The model included four independent variables: gender, living district, English proficiency, and third subject selected.

Results and Discussion

Demographic Profile

The sample of 61 students comprised a slight male majority (54.1%) and was concentrated in the age groups 25-26 (47.5%) and 23-24 (42.6%), consistent with the A/L cohorts of 2015-2018. Students were almost evenly distributed across the three districts: Colombo (34.4%), Ratnapura (34.4%), and Kalutara (31.1%). This distribution broadly reflects enrolment patterns in the target educational zones, though it diverges from the overall gender profile of the Bio System Technology stream, in which females typically predominate nationally (Ministry of Education, 2018). The underrepresentation of females in the sample is attributable to many female students having secured university admission and therefore being outside the scope of this study. Table 1 presents the full demographic profile of the student respondents.

Table 1

Demographic Profile of Student Respondents

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	33	54.10
	Female	28	45.90
Age Group	21-22	6	9.84
	23-24	26	42.62
	25-26	29	47.54
District	Colombo	21	34.43
	Kalutara	19	31.15
	Ratnapura	21	34.43

Note. Data collected from student questionnaires across Piliyandala, Mathugama, and Ratnapura educational zones.

Gender and Employability

Employment rates were high for both genders, with 89.3% of males and 81.8% of females having some form of employment, yielding unemployment rates of approximately 10.7% and 18.2%, respectively (see Table 2). This pattern aligns with national unemployment data from the Department of Census and Statistics (2018), which recorded male and female unemployment rates of 4.8% and 12.5% overall. The binomial logistic regression results indicate that male students were approximately five times more likely to be employed than female students, though this result did not reach conventional levels of statistical significance, possibly due to the modest sample size.

Significant gender differences were observed in the type of employment. A majority of females (57.6%) were engaged in training positions, compared to only 14.2% of males, while the highest proportion of males (60.7%) was found in private sector employment. Public sector employment was low across both genders. More females (18.2%) than males (10.7%) reported being in unsatisfying employment. Males were more likely to pursue entrepreneurial pathways, consistent with broader findings that women are less inclined towards entrepreneurship than men (Rocha & Van Praag, 2020). These findings underscore the need for gender-responsive curriculum design and targeted career guidance, particularly in highlighting entrepreneurial pathways available within the Bio System Technology domain. Teacher perspectives corroborate this pattern: in semi-structured interviews, female students from Kalutara and Ratnapura specifically noted that private sector jobs were perceived as more physically demanding and therefore less suitable for women, highlighting the role of attitudinal barriers in shaping gender-differentiated employment outcomes.

Table 2

Employment Rate by Gender Among Bio System Technology Stream Completers

Gender	Employed (%)	Unemployed (%)
Male	89.3	10.7
Female	81.8	18.2

Note. Data derived from student survey responses.

Third Subject Selection and Employability

Agriculture was the most commonly selected third subject (approximately 75% of the sample), and students with this selection demonstrated strong vocational training uptake. Most Agriculture students accessed programmes at agricultural schools in Kundasala, Angunukolapelessa, Ratnapura, and similar institutions, with approximately 80% of students enrolled in Food Technology courses at UNIVOTEC having selected Agriculture. Despite these pathways, the unemployment rate among Agriculture students was 25.9%.

The most striking finding in this domain was that students who selected Information Technology (IT) as their third subject recorded a zero unemployment rate across 13 respondents. This result is consistent with the growing integration of the Sri Lankan economy with the global digital marketplace, where computer literacy has become an accepted criterion for recruitment even in the public sector (Hettige, 2000). Pirapuraj et al. (2019) similarly found that students selecting the ICT subject cited career preparation as a primary motivation. The findings strongly suggest that expanding IT laboratory facilities in schools to enable more students to choose IT as a third subject would substantially improve employment outcomes within the Bio System Technology stream.

Advanced Level Results and Employability

Students who passed all three A/L subjects exhibited the highest employability rate (84.4%), compared to those who passed only two subjects (83.3%). However, students who did not pass any subject were not entirely without employment; many secured jobs in the private sector through alternative pathways. The highest proportion of students who passed all three subjects was engaged in training positions, which is consistent with the requirement by UNIVOTEC, NAITA, and technical colleges that three subject passes are a minimum qualification for most diploma and degree programmes. This suggests that higher A/L attainment, rather than leading directly to stable employment, leads students into further vocational training, which eventually improves long-term employment prospects.

Living District and Employability

Private sector employment was available in all three districts. Public sector employment was relatively more observable in Kalutara, while Ratnapura showed the highest concentration of students in training positions. Semi-structured interviews revealed that Ratnapura students benefited from more systematic career awareness programmes at the provincial, zonal, and school levels. Students in Mathugama

similarly reported participation in school-organised career guidance activities, whereas the Piliyandala zone, despite being proximate to many vocational training institutions, offered comparatively fewer awareness programmes. Logistic regression results suggested that students from Ratnapura were approximately 19 times more likely to be employed than those from Colombo, though statistical significance was marginal ($p = .062$), likely due to the small sample size. Entrepreneurial career pursuit was highest in the Colombo district, possibly reflecting the higher socioeconomic resources available in urban settings. Teachers from Matugama and Ratnapura zones reported maintaining active databases of past students to track their career trajectories, enabling more targeted guidance. In contrast, no such systematic tracking was reported in the Piliyandala zone, consistent with the weaker career guidance outcomes observed there.

English Language Proficiency and Employability

Objective four of this study sought to assess the role of English language proficiency in determining employability outcomes. English proficiency was operationalised using the grade obtained by students at the G.C.E. (Ordinary Level) English language examination. The binomial logistic regression model included this variable (OLEngl_cat) as a predictor. The overall effect was not statistically significant (Wald = 2.032, $df = 3$, $p = .566$), and no individual proficiency level reached significance in the model.

These findings suggest that, within this sample, O/L English grade did not significantly differentiate between employed and unemployed students. One explanation is that the cohort, having attempted O/L multiple times as needed, generally secured at least a credit pass in English, reducing variance in this variable. As Hettige (2000) notes, English communication has become a widely accepted recruitment criterion in Sri Lanka; however, the lack of significance here may also reflect that English proficiency affects the quality or type of employment rather than the binary employed/unemployed outcome measured in this study. This warrants investigation in larger-scale studies using more nuanced proficiency measures.

Teacher Perspectives

Teacher surveys provided valuable contextual insights. A majority of teachers (43%) reported that most of their students were engaged in training positions, while 29% believed most students were not in satisfactory employment or training. Around 47% of teachers attributed examination failure primarily to students entering the stream with only the minimum qualifications. This is a structural vulnerability in the

current system: the minimum entry requirement (credit passes in Mathematics and Science at O/L level) does not adequately prepare students for conceptually demanding components of the curriculum.

Regarding university entrance, 81% of teachers reported that students gained a comparative advantage from the technology stream due to reduced competition. Data from the Sri Lanka University Statistics (2018, 2020) support this view, showing that the percentage of Bio System Technology students selected for undergraduate programmes consistently exceeded that of Arts stream students across most academic years from 2015 to 2020 (see Table 3)

Table 3

Percentage of Students Selected for Undergraduate Programmes by Stream (2015/2016-2019/2020)

Stream	2015/16	2016/17	2017/18	2018/19	2019/20
Engineering Technology	28.63	18.10	21.22	16.79	20.76
Bio System Technology	24.81	18.18	22.26	16.32	22.42
Arts	16.33	15.67	14.48	15.03	16.53

Note. Source: Sri Lanka University Statistics 2018 & 2020.

On career guidance, 57% of teachers expressed that existing school-level provisions could be significantly improved. Teachers identified the absence of a structured, calendar-driven career guidance programme, insufficient engagement with parents, and limited ICT resources as critical barriers (Piyasiri, 2014). Among teachers who responded to the open-ended question on twenty-first-century curriculum reform, 28.5% advocated for external vocational training placements alongside school-based theory delivery, 21.4% called for more in-curriculum practical activities, and 10.7% recommended the introduction of formal on-the-job training.

Conclusion and Implications

This study contributes to a sparse but growing body of literature on the employability of Bio System Technology non-university-bound A/L completers in Sri Lanka. The overall employment rate among the sample was reasonably high, with the majority of students having secured some form of work or vocational training.

However, the nature and quality of employment indicate that significant structural and pedagogical challenges remain.

Several patterns emerged consistently across the data. Males are more likely to be employed and to access private sector jobs, while females disproportionately occupy training roles or report job dissatisfaction. Students who selected IT as their third subject recorded zero unemployment, signalling the transformative potential of digital literacy in improving graduate outcomes. Students with three A/L passes largely channel into further training, reflecting both the opportunity and the necessity of vocational qualifications for entry-level employment in bio-related industries.

Geographically, proximity to career guidance programmes appears to be a stronger predictor of positive outcomes than proximity to vocational institutions *per se*. Ratnapura, despite being more remote, produced students with better immediate engagement in training, owing to superior school-level guidance. This finding highlights the systemic importance of structured, school-based career guidance programmes, particularly for students from non-urban areas.

Based on these findings, the study recommends: (i) the introduction of occupational and vocational components into the curriculum from the junior secondary level; (ii) a systematic, calendar-driven career guidance programme anchored at school level and supported by trained teachers; (iii) strengthened school-industry linkages to enable on-the-job training and field experience during the school period; (iv) urgent investment in ICT infrastructure to enable more students to select IT as a third subject; and (v) targeted entrepreneurship education integrated into the Bio System Technology curriculum, with a focus on gender equity.

As an exploratory study of three educational zones, the findings should be interpreted with caution. The sample size of 61 students limits the statistical power of the regression analysis, and the study is best positioned as a pilot investigation that generates testable hypotheses for larger-scale research. From a policy perspective, the Bio System Technology stream holds genuine potential to address Sri Lanka's labour market mismatch. However, realising that potential requires more than curriculum design: it demands a coherent ecosystem linking schools, vocational institutions, industry partners, and career guidance services. Future research should extend this analysis to the Engineering Technology stream to enable comparative assessment, and should examine long-term employment trajectories through longitudinal methods.

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