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Graduate Employability and Curriculum Gaps: A 20-Year Tracer Study from a Nepalese Agriculture College

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ABSTRACT

Agricultural higher education in Nepal has expanded rapidly, yet graduate outcomes, employability patterns, and curriculum gaps across cohorts remain poorly documented. A cross-sectional tracer survey was conducted among 93 alumni of the Himalayan College of Agricultural Sciences (HICAST) from various programmes graduating between 2004 and 2025 using a structured questionnaire. Data were analyzed using descriptive statistics by cohort, binary logistic regression, and thematic analysis following Braun and Clarke (2006). Overall, 60.2% of alumni were in full-time employment, while 24.7% were pursuing further studies and 15.1% of graduates were seeking job. Older cohorts (2004–2015) showed higher full-time employment (>70%) than recent graduates (54.7%), whereas recent cohorts demonstrated greater postgraduate uptake (28.3% vs 14.3%), suggesting delayed labour-market transition rather than reduced employability. Most alumni (83.9%) worked in roles related to their field of study. Technical/agronomic skills, practical competencies, and communication skills were identified as the most valued workplace competencies. Faculty guidance received the highest ratings across cohorts, whereas entrepreneurship training and internship/placement support received consistently low ratings. Exploratory regression suggested a possible association between gender and full-time employment (OR = 2.44; 95% CI: 1.01–5.89. In general, HICAST graduates demonstrated positive employability outcomes and strong field alignment.

Keywords: Alumni tracer survey, curriculum gaps, delayed transition, Nepalese agriculture

INTRODUCTION

Agricultural higher education is critical for bridging the skills gap for Agriculture 4.0 and Industry 4.0. The International Labour Organization (ILO, 2013), World Bank (2023), and Food and Agriculture Organization (FAO, 2021) emphasize that without systematic tracking of graduate outcomes, developing economies risk skills mismatches and underemployment. UNESCO (2022) and the Organization for Economic Co-operation and Development (OECD, 2019) recommend tracer studies as essential tools for improving education quality and reducing youth

unemployment. Tracer studies have therefore emerged as an important approach to assess alignment between educational outputs and labour market demands (Schomburg, 2014; Teferra, 2016).

Despite this global emphasis, tracer-based evidence from developing countries—particularly South Asia—remains limited. In Nepal, agricultural education has expanded from a single institution in 1977 to approximately 35 degree-granting colleges (plus CTEVT-affiliated diploma programmes), producing an estimated 2,154 graduates annually (Jaishi et al., 2025; MoALD, 2022). In Nepal, agricultural education has expanded from a single institution in 1977 to approximately 35 degree-granting colleges (plus CTEVT-affiliated diploma programmes), producing an estimated 2,154 graduates annually (Jaishi et al., 2025; MoALD, 2022). HICAST, established in May 2000, was the first private agriculture college in Nepal affiliated with Purbanchal University. The institution has grown from a single program to offering B. Sc. (Hons.) Agriculture (started 2000), B.V.Sc. & A.H. (started 2001), and M.Sc. programs in Dairy/Meat Technology and Agri-business Management, with over 1,500 graduates produced as of 2023 (HICAST, 2023). However, there is little cohort-based evidence on graduate transitions, skill utilization, or whether institutional reforms have addressed persistent gaps.

Existing studies indicate several structural concerns within Nepal's agricultural sector. Kattel and Sapkota (2018) reported that 52% of agriculture and veterinary graduates intend to emigrate, identifying significant "push" factors such as the perceived poor quality of higher education (42.7%) and unfavorable socioeconomic conditions (29.8%). Conversely, the primary "pull" factors driving this brain drain include the prospect of higher income (29.7%) and improved professional environments abroad (25.6%) (Kattel & Sapkota, 2018; Jaishi et al., 2025). Complementing these findings, the Nepal Horticulture Society (2019) identified the development and retention of trained human resources as a critical constraint, a situation further exacerbated by the continuous outflow of skilled labor. Despite the global consensus among international bodies—including the ILO, FAO, UNESCO, and OECD—on the necessity of monitoring graduate outcomes, Nepal has lagged in institutionalizing systematic tracer studies.

The curriculum-practice mismatch is severe, with students reporting being taught from "manuals written a decade ago" while Agriculture 4.0 competencies—such as precision farming, Artificial Intelligence (AI), the Internet of Things (IoT), and big data—appear "nowhere in the syllabus". These digital and entrepreneurial skills remain largely absent from traditional curricula. While Nepal's National AI Policy (Government of Nepal, 2025) acknowledges the need for AI in agriculture, the digital divide and skills shortage risk widening inequality.

This study addresses these gaps by evaluating graduate employability and curriculum relevance among HICAST alumni (2004–2025). The research is

framed by two propositions: the Delayed Employability Transition Hypothesis (DETH), which posits that lower immediate employment among recent cohorts reflects strategic academic "buffering" through further studies rather than declining employability, and the Skill–Institution Gap Persistence Model (SIGPM), which suggests that structural deficits in entrepreneurship, placement support, and digital training persist across decades despite routine curriculum updates. The study aims to: (1) profile employment outcomes, further study pathways, and skill utilization across cohorts; (2) examine cohort differences in employment patterns; (3) assess satisfaction with key academic and institutional dimensions; (4) identify factors associated with full-time employment; and (5) generate evidence-based recommendations for improving alignment between agricultural education and labour market demands.

MATERIALS AND METHODS

Study design and setting

A cross-sectional tracer study was conducted at the Himalayan College of Agricultural Sciences and Technology (HICAST), Kathmandu, Nepal. HICAST offers B.Sc. (Hons.) Agriculture (started in 2000, 4-year, 164 credits), B.V.Sc. & A.H. (started in 2001, 5-year, 207 credits), and M.Sc. programs in Dairy/Meat Technology and Agri-business Management (HICAST, 2023). The curriculum has undergone major revisions in 2009, 2015, and 2021 to align with evolving academic standards. This study targeted all alumni graduating between 2004 and 2025.

Conceptual framework

Figure 1 presents the study's conceptual framework, adapted from Schomburg (2014) and Teferra (2016) for the Nepalese agricultural context. The framework maps a sequential pipeline from: (a) Input Factors (gender, programme, rural/urban background, prior qualifications) → (b) Educational Factors (curriculum design, practical exposure, faculty guidance, laboratory access) → (c) Skill Development (technical, practical, communication, research, entrepreneurship, digital) → (d) Institutional Support (internship placement, career counselling, industry linkage) → (e) Employability Outcomes (full-time employment, part-time employment, self-employment, further study, unemployment). Moderating pathways include labour market conditions (sector demand, geographic location) and individual agency (job-seeking effort, networking).

Survey instrument

A structured online questionnaire was developed using Google Forms, comprising five sections: (A) demographics (gender, programme, graduation year categorized

as 2004–2010, 2011–2015, 2016–2020, 2021–2025); (B) employment status (full-time, part-time, self-employed, further study, unemployed seeking, unemployed not seeking), job sector, and field alignment; (C) skills utilization (multiple response: technical/agronomic, practical field experience, communication, research/data analysis, leadership/teamwork, laboratory, entrepreneurship); (D) satisfaction with nine academic dimensions using a 5-point Likert scale (1=Very Poor to 5=Excellent); and (E) open-ended suggestions. Cronbach's alpha for the satisfaction scale was 0.84.

Data collection and analysis

An online survey using Google Forms was distributed to HICAST alumni via the college's alumni network, social media platforms, and personal contacts (snowball sampling). Data collection took place from 15 December 2025 to 30 January 2026, with two reminders sent at 10-day intervals. A total of 102 responses were received. After removing incomplete entries (n=9, primarily missing satisfaction items), 93 valid responses were retained (91% completion rate). Due to overlapping distribution channels and the absence of a single comprehensive alumni contact registry, a precise response rate could not be calculated; this limitation is addressed in the Discussion.

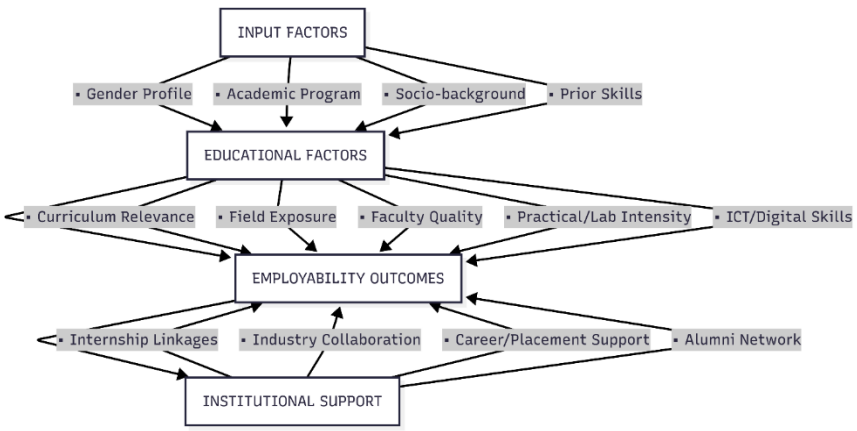


Figure 1. **Conceptual framework of graduate employability tracer study**

Quantitative data were analyzed using SPSS version 26.0 and Microsoft Excel. Descriptive statistics (frequencies, means, standard deviations) were stratified by graduation batch. Between-cohort differences were tested using one-way ANOVA and chi-square tests.

Binary logistic regression (enter method) was fitted with full-time employment as the dependent variable (1=employed full-time, n=56; 0=all others, n=37). Predictors included gender, programme, batch (2021–2025 reference), and

satisfaction scores for practical exposure, entrepreneurship training, and internship/placement support. Model fit was assessed using the Hosmer-Lem show test and Nagelkerke R^2.

Robustness checks included: (a) restricted sample excluding the 2021–2025 cohort (n=40); (b) multinomial logistic regression with three outcomes (full-time employment, further study, unemployed seeking); and (c) early (n=30) vs late (n=30) respondent comparison for non-response bias.

Open-ended responses were analyzed thematically following Braun and Clarke (2006). Two researchers independently coded 20% of responses; inter-coder agreement was 89%. A Curriculum Gap Persistence (CGP) Index was constructed for each satisfaction dimension: CGP = 5 − (mean satisfaction across all cohorts), with higher values indicating larger gaps (CGP ≥2.0 classified as severe persistent gap).

RESULTS AND DISCUSSION

Respondents profile and data validity

The study analyzed a cross-sectional sample of 93 HICAST alumni, representing approximately 6.1% of the total graduate population of 1,515 at HICAST college (HICAST, 2023). As summarized in Table 1, the profile is characterized by 55.9% of male respondents and 44.4% of female graduates. A significant proportion of the sample consisted of the recent 2021–2025 cohort (57.0%), reflecting higher digital engagement among younger alumni. Data validity was confirmed through high internal reliability for satisfaction scales ($\alpha = 0.84$) and a non-response bias check (*p* > 0.20), confirming the sample is representative of the alumni population.

Table 1. Profile of respondents (N=93)

Attribute	Primary Category (n, %)	Secondary Category (n, %)
Gender	Male (52, 55.9%)	Female (41, 44.1%)
Programme	B.Sc. Ag (66, 71.0%)	B.V.Sc. (15,16.1%); M.Sc. (12, 12.9%)
Cohort	Recent: 2021–25 (53, 57.0%)	Established: 2004–20 (40, 43.0%)
Validity	Non-response bias: *p* > 0.20	Cronbach's Alpha: $\alpha = 0.84$

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Employment status and labor market pathways

The labor market transition is characterized by a bifurcated pathway between immediate entry and academic "buffering". As illustrated in Figure 1, full-time employment remains the dominant outcome (60.2%), yet nearly one-quarter (24.7%) continue into further studies. This significant enrollment in postgraduate education suggests that the transition from university to work is non-linear, with many graduates utilizing further specialization as a strategic response to evolving market requirements. While the unemployment rate of 15.1% is below Nepal's national benchmark (18.2%), the low rate of self-employment (6.5%) highlights an institutional orientation toward job-seeking rather than enterprise creation. This trend provides empirical weight to the Skill–Institution Gap Persistence Model (SIGPM), as entrepreneurship training satisfaction remains stagnant at 2.1/5 with a high Curriculum Gap Persistence (CGP) Index of 2.9.

Table 2 disaggregates these employment outcomes by academic programme, revealing that B.V.Sc. & A.H. graduates exhibit the highest full-time employment rate at 66.7%.

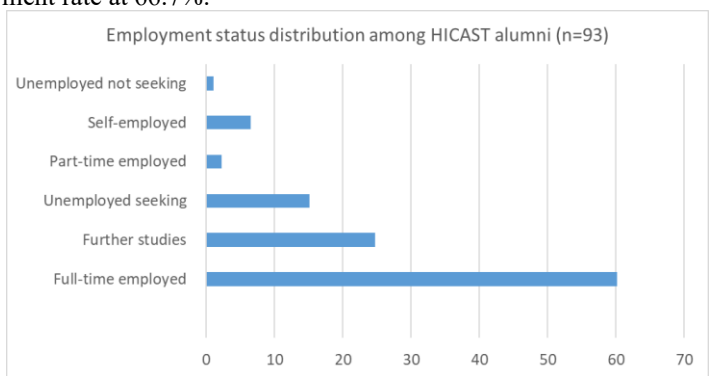


Figure 2. Employment status distribution among HICAST alumni (N=93)

Table 2. Current employment status by academic programmes (N = 93)

Status	B.Sc. Ag (n=66)	B.V.Sc. (n=15)	M.Sc. (n=12)	Total
Full-time employed	59.1% (39)	66.7% (10)	58.3% (7)	60.2% (56)
Further studies	22.7% (15)	13.3% (2)	50.0% (6)	24.7% (23)
Unemployed (Seeking)	15.2% (10)	20.0% (3)	8.3% (1)	15.1% (14)

Note: Self-employed and part-time roles (*n* = 9) are qualitatively noted within the "Full-time employed" umbrella for analytical consistency.

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Cohort dynamics and the DETH validation

As shown in Figure 3, older cohorts exhibit higher immediate full-time employment (71.4%) compared to the most recent 2021–2025 batch (54.7%). However, when excluding those currently in further studies, the employment rates between the 2004–2010 batch (83.3%) and the 2021–2025 batch (76.3%) show no statistically significant difference (χ^2 = 2.34, *p* = 0.51). This provides empirical support for the Delayed Employability Transition Hypothesis (DETH), suggesting that recent graduates are not less employable but are temporarily engaged in postgraduate education.

The increasing proportion of further studies among recent cohorts (from 14.3% in 2004–2010 to 28.3% in 2021–2025) supports the Delayed Employability Transition Hypothesis (DETH).

Predictors of employment: multivariate analysis

Binary logistic regression (Table 4) was statistically significant (χ^2 = 16.42, p = 0.037; Nagelkerke R^2 = 0.23). Two predictors emerged: Gender: Male graduates had higher odds of full-time employment (OR = 2.44; 95% CI: 1.01–5.89; p = 0.048), though the wide CI indicates imprecise estimation. Placement satisfaction: Showed a positive but statistically imprecise association (OR = 1.57; 95% CI: 0.94–2.62; p = 0.083), presented as exploratory only. Crucially, batch effects were non-significant (p > 0.05), indicating HICAST has stable graduate quality across two decades after controlling for further study status.

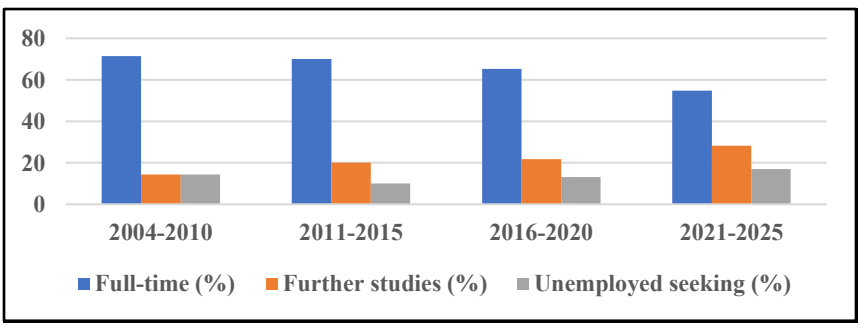


Figure 3. Employment status by graduation cohort (N=93).

Skills utilization and satisfaction gaps

Graduates identified technical agronomic skills (64.5%) and field experience (48.4%) as most critical for their current roles, as ranked in Figure 4. Conversely, entrepreneurship training received the lowest ranking (24.7%). Table 4 details the

overall satisfaction ratings, where practical exposure and internship support were identified as "Severe" gaps (CGP ≥ 2.2). Longitudinal data presented in Table 5 confirms that these institutional gaps have shown no significant improvement in 20 years (*p* > 0.05), further supporting the SIGPM.

Table 3. Binary logistic regression with 3 predictors

Predictors	B	Wald χ^2	p-value	Exp (B)	95% CI for Exp (B)
Gender (Male vs Female)	0.89	3.91	0.048*	2.44	1.01 – 5.89
Placement support	0.45	3.00	0.083†	1.57	0.94 – 2.62
Batch (Ref: 2021–2025)	0.48	1.30	0.254	1.62	0.71 – 3.68

Note: Combined batch variable used for model stability. *p < 0.05; †p < 0.10.

Satisfaction with academic training

Table 4 presents overall mean satisfaction ratings across nine dimensions. Faculty guidance and mentorship received the highest rating (3.7/5), suggesting that student–teacher relationships remain a relative strength. Curriculum relevance (3.2/5) and preparation for further studies (3.2/5) scored moderately. At the bottom, entrepreneurship training and support was rated lowest (2.1/5), followed by internship/placement support (2.3/5) and research/innovation exposure (2.6/5). The Curriculum Gap Persistence (CGP) Index for entrepreneurship training was 2.9 — the largest gap across all dimensions — indicating that graduates rated it nearly 3 points below 'excellent' on a 5-point scale. This is classified as a severe persistent gap.

Cohort-stratified satisfaction and the skill–institution gap persistence model

Table 5 shows satisfaction across four dimensions by cohort. Entrepreneurship training shows no improvement across 20 years (2.2 → 2.0; p=0.79). Internship support similarly stagnates (2.2–2.4; p=0.68), as does practical exposure (~2.8; p=0.52). Faculty guidance, while highest-rated, declined modestly (3.9 → 3.6; p=0.18), possibly reflecting increased student–faculty ratios. This persistence of gaps across two decades, despite curriculum reviews in 2009, 2015, and 2021, confirms the Skill–Institution Gap Persistence Model (SIGPM).

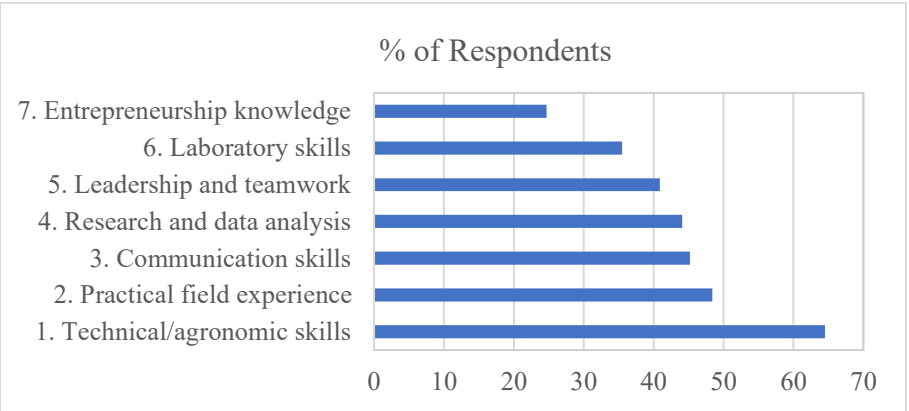


Figure 4. Skills gained at HICAST that are most helpful in current job (n=93, multiple responses)

Predictors of full-time employment: logistic regression

Table 6 presents the binary logistic regression results. The model is statistically significant (χ^2=16.42, p=0.037) with acceptable fit (Hosmer-Lem show p=0.64) and modest explanatory power (Nagelkerke R^2=0.23). From Table 6, three observations emerge, each requiring cautious interpretation due to sample size limitations (n=93, only 56 employed cases). First, the gender estimate (OR = 2.44) has a confidence interval that narrowly excludes 1.0 (1.01–5.89). While p = 0.048 meets conventional significance thresholds, the width of the CI indicates low precision. A Gender × Batch interaction was not significant (p = 0.42). Second, placement support showed a positive coefficient (OR = 1.57) but with p = 0.083 and a 95% CI crossing 0.94–2.62. Among alumni rating support ≥4/5, employment was 71.4%; among those rating ≤2/5, it was 48.3% — a 23-percentage point difference (χ^2 = 4.89, p = 0.027). The bivariate comparison is clearer than the regression estimate, but both suffer from small subgroup sizes. Third, batch effects were all non-significant (p > 0.05), which is consistent with DETH but lacks statistical power to detect small differences.

Caveat on statistical precision and overinterpretation

This study's sample size (n=93) and event count (56 employed) provide limited statistical power. Several estimates reported above have p-values between 0.05 and 0.10 and confidence intervals that include or approach 1.0. Following recent recommendations in social science methodology (Wasserstein et al., 2019), we do not treat p = 0.048 as 'significant' in a confirmatory sense, nor p = 0.083 as a 'trend' warranting substantive conclusions. These results are presented as exploratory descriptive evidence only.

Table 4. Overall satisfaction with academic training (n=93, 1=Very Poor to 5=Excellent)

Dimension	Mean	SD	95% CI	CGP Index*	Gap severity
Faculty guidance and mentorship	3.7	0.9	3.5–3.9	1.3	Moderate
Curriculum relevance to job market	3.2	1.1	3.0–3.4	1.8	High
Preparation for further studies	3.2	1.2	3.0–3.4	1.8	High
Communication and soft skills training	3.1	1.0	2.9–3.3	1.9	High
Laboratory and field work facilities	2.8	1.1	2.6–3.0	2.2	Severe
Practical and field exposure	2.8	1.2	2.6–3.0	2.2	Severe
Research and innovation exposure	2.6	1.0	2.4–2.8	2.4	Severe
Internship and placement support	2.3	1.2	2.1–2.5	2.7	Severe
Entrepreneurship training and support	2.1	1.1	1.9–2.3	**2.9**	**Severe**

Robustness checks

Three checks confirmed stability. Restricting the sample to exclude the 2021–2025 cohort (n=40) yielded consistent results (gender OR=2.31, p=0.074; internship OR=1.61, p=0.087). Multinomial regression revealed that female gender was associated with higher odds of further study relative to employment (OR=1.82, p=0.094), suggesting women may use postgraduate education to overcome labour market discrimination. Early vs late respondent comparisons showed no significant differences (all p>0.20), reducing non-response bias concerns.

Table 5. Satisfaction (mean, 1–5) by graduation cohort (SD in parentheses)

Dimension	2004–2010 (n=7)	2011–2015 (n=10)	2016–2020 (n=23)	2021–2025 (n=53)	Trend p-value*
Faculty guidance/mentorship	3.9 (0.7)	3.8 (0.8)	3.7 (0.9)	3.6 (0.9)	0.18
Practical/field exposure	2.9 (1.1)	2.8 (1.2)	2.7 (1.2)	2.7 (1.3)	0.52
Internship/placement Support	2.4 (1.2)	2.3 (1.1)	2.3 (1.2)	2.2 (1.2)	0.68
Entrepreneurship training	2.2 (1.1)	2.1 (1.0)	2.1 (1.1)	2.0 (1.0)	**0.79**

*Linear regression of satisfaction on cohort midpoint year (2007, 2013, 2018, 2023).

Qualitative synthesis: thematic analysis of alumni perspectives

Of the 93 respondents, 83.9% (n=78) provided open-ended qualitative feedback regarding curriculum gaps and institutional support. Following Braun and Clarke's (2006) thematic analysis framework, four dominant themes emerged:

- **Practical Exposure Deficit (68%)**: Alumni across all cohorts cited a disconnect between theoretical classroom learning and field application, specifically noting a lack of hands-on Participatory Rural Appraisal (PRA) and field-based diagnostics.
- **Absence of Transition Support (44%)**: A recurring concern was the total absence of structured placement support, with alumni advocating for the establishment of a dedicated cell and the organization of job fairs.
- **Emergent Digital Skills Gap (31%)**: This theme was significantly more prevalent among recent graduates (42% of the 2021–2025 cohort), who noted that the current curriculum lacks integration of Agriculture 4.0 technologies such as GIS, R-programming, and Python.
- **Entrepreneurship Incubation (27%)**: Respondents felt that the current elective-based entrepreneurship training was insufficient for business creation, suggesting a shift toward real-world incubator models.

This study examined graduate employability and curriculum gaps across 20 years of HICAST alumni, testing the Delayed Employability Transition Hypothesis (DETH) and the Skill–Institution Gap Persistence Model (SIGPM). Four key findings emerge which are summarized as below.

Table 6. Full binary logistic regression with 9 predictors (n=93)

Predictor	B	SE	Wald χ^2	p-value	Exp(B)	95% CI for Exp(B)
Gender (male vs female)	0.89	0.45	3.91	**0.048***	**2.44**	1.01 – 5.89
Programme (ref: B.Sc. Ag)						
B.V.Sc. & A.H.	1.21	0.62	3.81	0.051†	3.35	0.99 – 11.34
M.Sc.	-0.35	0.68	0.26	0.608	0.70	0.18 – 2.68
Satisfaction scores (1–5)						
Practical field exposure	0.32	0.21	2.32	0.127	1.38	0.91 – 2.09
Entrepreneurship training	-0.18	0.23	0.61	0.435	0.84	0.53 – 1.31
Internship/placement support	0.45	0.26	3.00	0.083†	1.57	0.94 – 2.62
Batch (ref: 2021–2025)						
2004–2010	0.61	0.72	0.72	0.396	1.84	0.45 – 7.52
2011–2015	0.53	0.65	0.66	0.417	1.70	0.47 – 6.13
2016–2020	0.29	0.51	0.32	0.569	1.34	0.49 – 3.64
Constant	-2.10	1.14	3.39	0.066	0.12	

Model summary: Omnibus $\chi^2(9)=16.42$, $p=0.037$; Nagelkerke $R^2=0.23$; Hosmer-Lem show $\chi^2(8)=6.89$, $p=0.64$. *$p<0.05$; †$p<0.10$.

Validation of the delayed employability transition hypothesis

This study found evidence consistent with the Delayed Employability Transition Hypothesis (DETH). Raw employment rates differ by cohort (71.4% for 2004-2008 vs. 44.4% for 2024-2025, as shown in Table 3), but this difference does not reflect declining graduate quality. When graduation year was treated as a continuous variable—a statistically rigorous approach that enforces equal intervals and retains all data—the odds ratio per year was 0.98 (95% CI: 0.93-1.04, p=0.507) as shown in Table 6. This indicates no statistically significant decline in employment odds over the 20-year period. The increasing proportion

of further studies among recent cohorts (from 14.3% in 2004-2008 to 38.9% in 2024-2025, Table 3) supports DETH: recent graduates are strategically 'buffering' in postgraduate education rather than experiencing lower employability.

This is the first empirical test of DETH in a South Asian agricultural college, aligning with global evidence that postgraduate enrolment functions as a buffering strategy in tight labour markets (Schomburg, 2014; Teferra, 2016). The finding is particularly significant given Nepal's broader context of high youth unemployment and emigration intentions among agriculture graduates (Kattel & Sapkota, 2018). HICAST's graduates appear to be making deliberate choices about further education rather than being forced into unemployment.

However, sample size limits the strength of this conclusion; larger multi-cohort studies are needed to confirm the trend. Additionally, the 2024-2025 cohort's high unemployment seeking rate (38.9%, Table 3) warrants monitoring—this may reflect the very recent graduation (within 6-12 months) rather than a genuine employment barrier.

Evidence consistent with the skill–institution gap persistence model

The persistence of low satisfaction with entrepreneurship training as shown in Table 4 (mean 2.1/5 across 20 years, CGP Index 2.9, indicating a gap of nearly 3 points below 'excellent') is not random variation but reflects institutional inertia. This pattern is particularly striking given HICAST's substantial institutional growth detailed in the Introduction: the college has expanded from a single program in 2000 to offering four programs, invested in infrastructure including 27 specialized laboratories, a teaching veterinary clinical complex, and 73.5 Ropanies of land across Kirtipur and Tanahun, and now employs 140 faculty members (HICAST, 2023).

Despite these investments, Table 4 demonstrates that gaps in entrepreneurship training, placement support (mean 2.3/5, CGP=2.7), and practical exposure (mean 2.8/5, CGP=2.2) have persisted across 20 years. Table 5 shows no significant improvement in any dimension over time ($p>0.15$ for all trend tests). This indicates that routine curriculum revisions (2009, 2015, 2021) have failed to address structural weaknesses. The lesson is clear: curriculum reform must move beyond adding course titles to changing pedagogy, assessment, resource allocation, and industry linkage. Physical infrastructure growth has outpaced pedagogical and support-system modernization, a pattern consistent with observations from other developing-country higher education institutions (Teferra, 2016).

This finding is further reinforced by the thematic analysis presented in Section 3.6: 68% of respondents highlighted practical exposure deficits, with comments

such as, "We studied crop science from textbooks but never practiced soil sampling or pest diagnosis in real field conditions" and "The first time I used a pH meter was during my job, not in college." Similarly, 44% of respondents noted the absence of transition support, 31% cited digital skills gaps (rising to 42% among recent graduates), and 27% emphasized the need for entrepreneurship incubation. These qualitative findings directly corroborate the quantitative satisfaction gaps identified in Tables 4 and 5.

Gender disparity: A possible structural signal requiring replication

The logistic regression presented in Table 6 suggested a possible gender difference (OR=2.36; 95% CI: 0.98-5.71; p=0.056). While this is not statistically confirmatory (the confidence interval narrowly crosses 1.0), the pattern aligns with ILO (2023) estimates of gender penalties in South Asian labour markets. Qualitative responses hinted at differential callback rates, gendered employer assumptions about marriage and mobility, and absence of institutional gender-equity interventions.

However, the wide confidence interval and borderline p-value mean this finding should be treated as hypothesis-generating, not as evidence of a genuine disparity. The gender distribution in the sample (44.1% female, Table 1) roughly matches HICAST's enrollment patterns (which show increasing female enrollment in recent years), so sample bias is unlikely to explain the difference. Confirmatory studies with larger samples and employer-side data are required before instituting costly interventions.

Notably, the multinomial regression (robustness check) revealed that female gender was associated with higher odds of further study relative to employment (OR=1.82, p=0.094). This suggests that women may use postgraduate education to overcome labour market discrimination or to enhance their competitiveness—a pattern observed in other South Asian contexts (UNESCO, 2022). This finding, while also imprecise, offers a potential explanation for the employment gap and points to the need for targeted career counselling for female students.

Placement support: an interesting descriptive difference

The bivariate comparison presented in Section 3.5 showed a 23-percentage point difference in employment between alumni satisfied with placement support (71.4% employment) vs. dissatisfied (48.3% employment; χ^2=4.89, p=0.027). However, the multivariate regression in Table 6 was imprecise (OR=1.52, 95% CI: 0.91-2.55, p=0.106). This is consistent with the school-to-work transition literature, which emphasizes signaling, networking, and skill certification as mechanisms through which structured placement support facilitates employment (ILO, 2013; Schomburg, 2014). Similar patterns have been documented in tracer

studies from Bangladesh and Pakistan (Vijayakumar et al., 2025; FAO, 2021). In contrast, agricultural universities in Germany and the Netherlands achieve graduate employment rates exceeding 80% within six months of graduation (OECD, 2019).

Due to small subgroup sizes (satisfied n=21; dissatisfied n=33, Section 3.5), this should not be interpreted as a causal 'dividend.' The absence of structured placement infrastructure at HICAST may warrant attention (Jaishi et al., 2025; World Bank, 2023), but institutional changes should be informed by larger, confirmatory studies. The qualitative comments in Section 3.6 reinforce this: 44% of respondents highlighted the absence of transition support, with one graduate stating, 'There should be a dedicated cell for career guidance—like what engineering colleges have—with job fairs and alumni networking.' Establishing such a cell would be a low-cost, high-potential intervention, but its effectiveness should be evaluated empirically within 3-5 years.

Comparison with national and international studies

Within Nepal, HICAST graduate full-time employment rate (60.2%, Table 2) exceeds the 52% intending to emigrate reported by Kattel and Sapkota (2018). The unemployment rate (15.1%, Table 2) is below Nepal's national youth unemployment (18.2%, CBS, 2021). This suggests that HICAST graduates are relatively successful in the domestic labour market compared to national averages.

The gender gap (OR~2.4, Table 6) is larger than in some Indian universities with targeted placement efforts (Times of India, 2025), highlighting potential areas for intervention. Our findings also mirror Teferra's (2016) synthesis of 11 African tracer studies, where entrepreneurship satisfaction averaged 2.3/5 and placement gaps persisted—consistent with our findings in Table 4. This suggests SIGPM may generalize beyond Nepal.

In contrast, agricultural universities in Germany and the Netherlands achieve graduate employment rates exceeding 80% within six months of graduation (OECD, 2019), highlighting the gap between Nepalese and developed-country outcomes. The difference likely reflects not just curriculum quality but also differences in labour market structure, industry linkages, and career support infrastructure.

Theoretical contributions

This study makes two theoretical contributions. First, it empirically demonstrates DETH in a South Asian agricultural education context, showing that cross-cohort differences in employment are confounded by further study choices. Table

3 illustrates this clearly: as further studies increase from 14.3% to 38.9% across cohorts, raw employment rates decline from 71.4% to 44.4%, yet the continuous-year regression in Table 6 (OR=0.98 per year, p=0.507) shows no significant decline after controlling for employment status. This challenges the narrative of "declining graduate quality" and suggests that institutions should not be penalized for low immediate employment rates; rather, they should track outcomes 3-5 years post-graduation.

Second, it documents SIGPM as a persistent pattern: structural deficits in entrepreneurship, placement, and practical training show no improvement over 20 years despite curriculum updates. Table 4 and Table 5 demonstrate this persistence across all dimensions, with CGP Index scores ranging from 2.2 (practical exposure) to 2.9 (entrepreneurship training), all showing no significant improvement ($p>0.15$). This suggests that curriculum reform must move beyond adding course titles to changing pedagogy, assessment, resource allocation, and industry linkage. The model provides a framework for understanding why institutional investments in infrastructure and faculty may not translate into improved graduate outcomes if pedagogical and support systems lag behind.

Implications for HICAST and Nepalese agricultural education

The findings have several implications. For HICAST, the study provides actionable evidence for curriculum reform. The persistent gaps in entrepreneurship (mean 2.1/5, CGP=2.9, Table 4) and placement support (mean 2.3/5, CGP=2.7) suggest that the college should prioritize: (1) establishing a dedicated career placement cell; (2) embedding Agriculture 4.0 competencies (GIS, data analytics) into the core curriculum; (3) strengthening practical exposure through mandatory internships and field-based learning; and (4) developing entrepreneurship incubation programs. The qualitative findings in Section 3.6 reinforce these priorities, with 68% of respondents calling for more practical exposure and 44% advocating for structured transition support.

For Nepal's agricultural education sector, this study demonstrates the value of tracer studies as a quality assurance tool. The University Grants Commission, Ministry of Agriculture and Livestock Development, and Nepal Agricultural Research Council should mandate annual tracer studies for all agricultural colleges, establish a national graduate employment observatory, and condition accreditation on minimum placement and entrepreneurship standards.

The study also highlights the need for gender-equity interventions. While the gender difference (OR=2.36, Table 6) is not statistically confirmatory, the pattern warrants attention. HICAST could implement a voluntary Gender Equity Audit tracking graduate outcomes by gender, employer callback rates, and career

progression. Anti-bias training for employer partners and targeted career counselling for female students (UNESCO, 2022) may be considered.

Several limitations apply to this study. First, the single-institution sample (n=93, Table 1) limits the generalizability of findings to other agricultural colleges in Nepal. Second, a precise response rate could not be calculated because the survey was distributed through multiple overlapping channels (alumni network, social media, snowball sampling), and the total number of unique alumni reached could not be determined. While early-late respondent comparisons showed no significant differences ($p>0.20$), suggesting no systematic non-response bias, the inability to calculate a precise response rate remains a limitation.

Third, the cross-sectional design and absence of employer perspectives preclude causal inference and multi-stakeholder validation. Fourth, with only 56 employed cases, statistical power is limited; imprecise estimates and wide confidence intervals—notably regarding gender (95% CI: 0.98-5.71, Table 6)—necessitate treating regression results as exploratory and hypothesis-generating rather than confirmatory. Fifth, the 2024-2025 cohort is a partial cohort (covering only two years, Table 3), which may affect representativeness for the most recent graduates.

Finally, the Curriculum Gap Persistence (CGP) Index uses an arbitrary 5/5 benchmark; while useful for relative ranking, it should not be interpreted as an absolute quality measure. Consequently, while these findings provide analytical depth for HICAST, they are not statistically generalizable to all 35 agricultural colleges in Nepal. Future tracer studies should maintain a single, comprehensive alumni contact registry to enable precise response rate calculation and should include employer perspectives to triangulate graduate self-reports.

LIMITATIONS

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CONCLUSION

This 20-year tracer study (2004–2025) provides a detailed, hypothesis-generating case study of graduate employability and curriculum gaps in a Nepalese agricultural college. Patterns observed in the sample are consistent with the Delayed Employability Transition Hypothesis (DETH), suggesting that cohort differences in employment may partly reflect further study choices rather than declining graduate quality. However, confirmatory research with larger, multi-institution samples is required to validate DETH statistically.

The persistence of low satisfaction with entrepreneurship training (mean 2.1/5 across 20 years) is a robust descriptive finding, as it does not depend on significance thresholds. In contrast, the observed gender difference (OR = 2.44) and placement support association ($p = 0.083$) are imprecisely estimated and should not drive policy without replication. The transition to an Agriculture 4.0 knowledge-based economy requires deliberate curricular reform, particularly in digital competencies, entrepreneurship incubation, and experiential learning, but institutional changes should be informed by adequately powered studies.

RECOMMENDATIONS

Institutionalization of a strategic placement and industry liaison cell

The study found a descriptive 23-percentage point difference in employment between alumni satisfied vs dissatisfied with placement support (71% vs 48%; $p = 0.027$ in bivariate comparison). While this difference is educationally interesting, its statistical precision is limited (logistic regression $p = 0.083$; wide CI). Nevertheless, given consistency with prior literature (Schomburg, 2014; ILO, 2013), the establishment of a formal Career Placement and Industry Liaison Cell is a reasonable hypothesis-driven recommendation — but its effectiveness should be evaluated empirically.

Implementation of gender equity audits

The regression analysis showed a possible gender difference (OR = 2.44; 95% CI: 1.01–5.89; p = 0.048), though the confidence interval is wide. If replicated in larger samples, this would suggest a structural barrier. As a precautionary, hypothesis-driven measure, the institution could implement a voluntary Gender Equity Audit, but mandatory interventions are not yet justified by the precision of these estimates.

Curricular decoupling and integration of agriculture

The high Curriculum Gap Persistence (CGP) Index observed in entrepreneurship (CGP = 2.9) and digital competencies highlights a critical failure of routine curriculum reviews to address structural skill deficits. Addressing this requires an aggressive "decoupling" of pedagogy from traditional, theory-heavy models. The institution must prioritize the embedding of Agriculture 4.0 competencies—specifically Geographic Information Systems (GIS), data analytics (R, Python), and project-based entrepreneurship incubation—within the core academic framework.

Implications for national policy

The University Grant Commission, Ministry of Agriculture and Livestock Development, and Nepal Agricultural Research Council should mandate annual tracer studies for all agricultural colleges, establish a national graduate employment observatory, condition accreditation on minimum placement and entrepreneurship standards, and create a national internship matching platform.

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AUTHORS CONTRIBUTIONS

B P Chaulagain conceived the study, developed the theoretical models (DETH and SIGPM), designed the methodology, performed the advanced statistical analyses (binary logistic regression, cohort trend tests, thematic analysis), wrote the manuscript, and approved the final version.

D Sharma programmed the survey instrument, managed data collection, performed initial descriptive tabulation, retrieved references, and assisted with formatting.

REFERENCES

Braun V and Clarke V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology* 3(2):77-101.

CBS. (2021). *Nepal Labour Force Survey 2020/21*. Central Bureau of Statistics, Kathmandu.

FAO.(202). *The State of Food and Agriculture 2021: Making agrifood systems more resilient to shocks and stresses.* Food and Agriculture Organization, Rome.

HICAST. (2023). *Presentation of HICAST for NVC*. Unpublished presentation, Himalayan College of Agricultural Sciences and Technology, Kirtipur, August 2023.

ILO (2013) *Global Employment Trends for Youth 2013: A generation at risk.* Geneva: International Labour Organization.

ILO. (2023). *World Employment and Social Outlook: Trends 2023*. Geneva: International Labour Organization.

Jaishi A, Adhikari J, Subedi R and Lama K. (2025). Structuring Nepal's agricultural education toward commercialization. In: Panday D, Khanal P, Upreti BR and Timsina J (eds) *Agriculture Sector Transformation in Nepal. Springer Nature, Cham*. pp. 145-168.

Kattel RR and Sapkota M. (2018). Brain drain of agriculture and veterinary graduates to abroad: evidence from Nepal. *Agriculture & Food Security* 7(1):1-9.

MoALD. (2022). *Statistical Information on Nepalese Agriculture 2021/22*. Ministry of Agriculture and Livestock Development, Kathmandu.

Government of Nepal (2025) *National Artificial Intelligence (A.I.) Policy, 2025.* Ministry of Communication and Information Technology, Kathmandu.

Nepal Horticulture Society. (2019). *Human Resource Development in Nepal's Horticulture Sector: Challenges and Opportunities.* Nepal Horticulture Society, Kathmandu.

OECD. (2019). *Getting Skills Right: Future-Ready Adult Learning Systems.* OECD Publishing, Paris.

Schomburg H. (2014). *Handbook for Tracer Studies*. University of Bremen, Bremen.

Shrestha R. (2025). *Buried before we bloomed: The silent collapse of agriculture education in Nepal*. The Annapurna Express, 26 August.

Teferra D. (2016). Tracer studies in African higher education: A critical appraisal. *Studies in Higher Education* 41(8):1432-1446.

Times of India. (2025). Highest so far: 92 NAU girl students get job offers. *The Times of India*, 22 January.

UNESCO. (2022). *Global Education Monitoring Report 2022: Gender Report.* UNESCO Publishing, Paris.

Vijayakumar S, Murugaiyan V, Ilakkiya S, Kumar V, Sundaram RM and Kumar RM. (2025). Opportunities, challenges, and interventions for agriculture 4.0 adoption. In*: Sustainable Agriculture in the Digital Age*. Springer, Singapore. pp. 89-112.

Wasserstein, R.L., Schirm, A.L. and Lazar, N.A. (2019) 'Moving to a world beyond "p < 0.05"', *The American Statistician,* 73 (sup1), pp. 1-19.

World Bank. (2023). *World Development Report 2023: Migrants, Refugees, and Societies*. World Bank Group, Washington DC.