Employability of forestry graduates: Evidence from a state university in the Philippines

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Abstract

Employability is a measure of the effectiveness of an academic program in the quality of its graduates. However, insufficient data on employability of forestry graduates are still observed, particularly in northern Philippines. Hence, the study aimed to trace the employment of BS Forestry (BSF) graduates in DMMMSU from 2015 to 2022. The study used descriptive research design to describe the BSF graduates' socio-demographic characteristics, educational background, and initial employment profile. Survey was employed as data collection method, and quantitative techniques were used for analysis. Results revealed that majority of graduates were female and had been awarded college scholarships; some graduated with honours and awards. Majority were licensed foresters, while very few had other professional eligibilities. Most were employed at least once after graduation and were professional contractual employees of companies, mainly in agriculture, hunting, and forestry. Salaries and benefits were the primary reason for acceptance of jobs, while most secured forestry-related jobs within six months after their graduation. The gross monthly income for a great majority of the initial forestry-related jobs reported was less than PhP 15,000.00. Most employed graduates agreed that their program and curriculum were related and relevant to their jobs. However, regular updating of curriculum and instruction is the major suggestion of graduates to improve the program. The likelihood of gaining employment after graduation significantly increases when school support services are provided for career and job placement. Honours and awards in college were seen to be significant factors contributing to the employability of forestry graduates.

Keywords
Curriculum enhancement, employment, forestry education, graduate tracer

Introduction

Forests are esteemed as invaluable resources and natural assets crucial for preserving high levels of biodiversity and mitigating climate change on a global scale (Park et al., 2019). Thus, expert forestry personnel are required. These personnel should undergo adequate education or training to provide an understanding of the forestry sector and its various dimensions (Jong et al., 2021). Higher education in forestry, therefore, plays a fundamental role in building the capacity of human resources in forestry (Park et al., 2019). Bullard (2015) asserted that universities must guarantee that their forestry graduates possess the comprehensive knowledge and skills to be effective in the 21st century.

Forest education holds pivotal importance in the pursuit of Sustainable Development Goals and the advancement of sustainable forest management amidst global challenges (Waeber et al., 2023). Educational institutions in developing countries offer forestry programs aimed at enhancing human capacity for these aspects (Park et al., 2019). Recent data for the school year 2018-2019 revealed that 76 educational institutions in the Philippines offered the BSF program and produced new 1,726 graduates in 2019 (Forest Management Bureau, 2019). The Don Mariano Marcos Memorial State University (DMMMSU) is one of the state universities in the Philippines that has offered the BSF program since the 1990s, which caters to forestry human resource demands in various institutions, particularly in Luzon, Philippines.

Reformulating forestry education in the Philippines is more crucial than ever, given a rapidly shrinking industry sector, shifting uses for land and other natural resources, as well as general climatic and environmental change (Cruz et al., 2013). Many countries have already acknowledged the need to innovate forest education in response to the evolving environmental challenges encountered by forestry professionals. (Park et al., 2019). The diversity of employer requirements has also expanded. Prospective employers now span various sectors, including community development, energy exploration, international consulting, and nonprofit conservation. They seek employees with skills in environmental sustainability, carbon sequestration, planning, collaboration, certification, conservation education, and compliance (Connaughton, 2015).

The Philippine Commission on Higher Education (CHED) continuously monitors and evaluates each higher education institution's (HEI) academic and non-academic services to see if they meet the requirements of producing exceptional and competent graduates that meet local and international standards. The employability of graduates is one of the indicators monitored by the CHED, which is considered to be a measure of the quality of education offered by an HEI. A graduate tracer study (GTS) is an approach that collects data on a graduate's college experience, including the skills they learned, the quality of their education, and how all of that relates to employment (Tutor et al., 2021). However, no GTSs have been made since the establishment of the BSF program at DMMMSU in the 1990s, and a lack of information regarding the employability of forestry graduates is still evident, especially in the northern Philippines.

A GTS is a critical tool for identifying the strengths and weaknesses of an institution's graduates and has become a globally recognized practice (Albina & Sumagaysay, 2020; Badiru & Wahome, 2016). GTSs are essential for comprehending the quality and relevance of academic programs as well as the job market (Sanchez & Diamante, 2017). Results from such studies can be utilized by universities to point at areas for enhancement in study programs and institutional service delivery (Cornillez, Jr. et al., 2021).

Cornillez, Jr., et al. (2021) emphasized that one of the main responsibilities of any HEI is to generate outstanding graduates who are ready to compete with the local and international labour market and contribute to the sustainable progress of the nation. HEIs are primarily concerned with ensuring that graduates' skills and competencies fit with the worldwide need for qualified workers. However, Connaughton (2015) pointed out a lack of understanding regarding the job-related experiences of recent forestry graduates, suggesting the need for further inquiry. Therefore, it is imperative to evaluate the perceptions and experiences of recent forestry graduates who have entered the workforce and take into account their insights as a driving force in curriculum reform that helps equip the students, as future foresters, with the skills and competencies that make them highly relevant and sought after. Hence, this study aims to:

1) Determine the socio-demographic characteristics of the BSF graduates in terms of personal profile, educational background, and socio-economic background.

2) Determine the initial employment profile of the respondents.

3) Describe the status of the degree program curriculum and study conditions in terms of relevance of the degree program to the employment of graduates and adequacy of school support services for career and job placement.

4) Describe the employability of BSF graduates in terms of lead time to first employment, employment status on first job, initial monthly gross income, and suitability of educational qualification to the first job.

5) Determine the significant factors contributing to the employability of graduates.

Methodology

Research design

The study made use of a descriptive research design to describe the socio-demographic characteristics, educational background, and employment profile of the BSF graduates, as also used by the Philippine graduate tracer study conducted by Tutor et al. (2021). A survey was employed as data collection method, and quantitative techniques were used to analyse the data gathered and answer the objectives of the study.

Population

The population of the study includes the graduates of the BSF program in DMMMSU - College of Agroforestry and Forestry from school year 2014-2015 to school year 2021-2022. The identification of the graduates during the identified period was obtained from the data bank of DMMMSU. The data obtained include the names and addresses of the graduates. Total enumeration was aimed in the study which was participated by 61 graduates. The distribution of respondents per year graduated is shown in Table 1.

Table 1: Distribution of respondents

Year Graduated	N
2022	16
2021	1
2020	0
2019	13
2018	18
2017	6
2016	3
2015	4
Total	**61**

Instrumentation and Data Collection

Before the conduct of the study, the research proposal underwent an expedited review and was approved by the DMMMSU Research Ethics Committee, with the ethical clearance number 2022-178. A request to conduct the study was also sought from the Campus Chancellor before the distribution of the questionnaire. The primary data-gathering tool used in the study was the CHED graduate tracer survey, which was modified to attain the objectives of the study. An informed consent form bearing the information about the study, certificate of consent, and contact information of concerned offices/individuals was also given and explained to the respondents to identify their willingness to participate. The survey only pushed through when the respondents expressed their willingness to participate. Both face-to-face and online surveys were conducted in the study depending on the accessibility of the respondents and their preferred mode of answering the questionnaire. For the online survey, the modified CHED questionnaire was converted into an e-survey instrument using Google Forms. The survey link was then sent to the targeted respondents through electronic mail (email), and other social media platforms, such as Facebook Messenger.

After the survey, individual short confirmatory interviews were also conducted, as needed, through face-to-face, short message service, Facebook Messenger, or phone calls to validate the data collected in the survey forms, as well as to secure any additional information to support the responses.

Data Analysis

The data gathered were tallied, tabulated, and analysed through frequency counts and percentages. Both tools were used to describe the demographic and employment profile of the respondents. In addition, ranking was utilized to determine the most useful and relevant skills and competencies acquired in the program.

Employability was described as possessing a set of qualifications, skills, understandings, and personal attributes that make the respondents more likely to gain employment and be successful in their respective occupations. The likelihood of gaining employment after graduation was first assessed using binary logistic regression with sex, region of origin, household income before employment, age graduated, honours and awards in college, forestry professional license, and school support in relation to employment as independent variables. The outcome variable is a dichotomous variable on whether the respondent has been employed at least once after graduation or has never been employed until the end of the survey period.

Further, employability was also measured in terms of the length of finding their first job, employment status during their first job, initial gross income, and relatedness of the BSF curriculum to the first job. Included in the analysis were those who have been employed at least once and have disclosed pertinent information about their initial employment. Individual indices were computed for each variable based on the numeric value assignment of categories and relative weights (Table 2).

Table 2: Component variables for employability

Variables	Weight	Possible Values (Code and Descriptive Equivalent)	Sub-index Score
Lead time to first employment	10%	1 - More than one year	5.00
		2 - Less than one year	10.00
Employment status during first job	20%	1 - Contractual	5.00
		2 - Casual	10.00
		3 - Temporary	15.00
		4 – Regular/Permanent	20.00
Suitability of educational qualification to the first job	30%	0 – Unsuitable	0.00
		1 – Very Low	6.00
		2 – Low	12.00
		3 – Moderate	18.00
		4 – High	24.00
		5 – Very High	30.00
Initial gross income	40%	1 - Below P 10,000	5.00
		2 - P 10,000 to less than P 15,000	10.00
		3 - P 15,000 to less than P 20,000	15.00
		4 - P 20,000 to less than P 25,000	20.00
		5 - P 25,000 to less than P 30,000	25.00
		6 - P 30,000 to less than P 35,000	30.00
		7 - P 35,000 to less than P 40,000	35.00
		8 - P 40,000 and above	40.00

An overall employability index was derived as the summation of the four indicators according to their relative weights. Further, multiple linear regression was performed to model employability as measured through the employability index, with sex, region of origin, age graduated, honours and awards in college, forestry professional license, and school support services related to career and job placement as independent variables. It was also used to determine which among the selected variables are significant predictors of employability using $\alpha=0.05$.

Results and Discussion

Personal Profile and Socio-economic Background of BSF graduates

Out of the 61 BSF graduates surveyed, 63.93% are female, and 36.07% are male (Table 3). Most are single (81.97%), while the rest are married (18.03%) as of the survey period. A greater number of female graduates in forestry was also observed by Medina (2015) at a university in Mindanao, Philippines. Onyema et al. (2021) also observed a high enrolment of females (76%) over males in the discipline in Africa, which was perceived to be remarkable compared to decades ago, when men predominated forestry learning and profession. Sample et al. (2015) also observed that gender diversity has increased among forestry students in the United States. This may signify that the forestry profession has developed its attractiveness to both genders over time, which prompted an increase in the number of women venturing into this field. Most graduates came from the Ilocos Region, northern Philippines.

Table 3: Distribution of graduates according to personal profile and socio-economic background (N=61)

Graduates Profile	Frequency	Percentage
Sex		
Female	39	63.93%
Male	22	36.07%
Civil Status		
Single	50	81.97%
Married	11	18.03%
Region of Origin		
Ilocos Region (Region 1)	54	88.52%
MIMAROPA (Region 4B)	4	6.56%
Cordillera Administrative Region (CAR)	3	4.92%
Monthly Household Income (prior to initial employment)		
Below P 5,000.00	3	4.92%
P 5,000.00 to less than P 10,000.00	10	16.39%
P 10,000.00 to less than P 15,000.00	21	34.43%
P 15,000.00 to less than P 20,000.00	17	27.87%
P 20,000.00 to less than P 25,000.00	5	8.20%
P 25,000.00 to less than P 30,000.00	1	1.64%
P 30,000.00 to less than P 35,000.00	1	1.64%
P 35,000.00 to less than P 40,000.00	1	1.64%
P 40,000.00 to less than P 45,000.00	2	3.28%

In terms of their monthly household income before initial employment, no more than ten graduates' households have met or exceeded the monthly family income of the country in 2021 at constant 2018 prices, which is P 23,506.67, based on the report of the Philippine Statistics Authority (PSA, 2022a) (Table 3). Based on the grouped data, the estimated average monthly household income is PhP 15,368.85, while the median income is PhP 15,000.83. In addition, at least 13 graduates (21.31%) belong to families who live below the poverty threshold income of about PhP 12,030.00 per month for a family of five (PSA, 2022b). Hence, it can be observed that some graduates' households are considered poor before initial employment.

Educational Background of BSF Graduates

More than half, 52.46%, of all the graduates have been awarded scholarships. Of the 12 recorded different scholarships, 11 were under government initiatives. Forestry and environmental science graduates who were scholarship beneficiaries during college were found by Medina (2015) to have a significantly lesser chance of having a job mismatch than non-scholars.

In terms of the honours received by graduates, one was awarded Magna Cum Laude / Class Valedictorian, three Cum Laude graduates, and two academic achievers. The various awards received by graduates during college include the following: Leadership Excellence Award (3 individuals), Student Researcher of the Year (2 individuals), Campus Beauty Pageant Award (4 individuals), Athlete of the Year (1 individual), and Forestry Student of the Year that is being awarded to one BSF graduate each school year.

With regards to the professional examinations passed by graduates, only 33 out of 61 graduates (54.10%) passed the Forester's Licensure Examination. Two of them also obtained professional eligibility, and another one obtained sub-professional eligibility through the Philippine Civil Service Commission (CSC). Further, one graduate has sub-professional eligibility from CSC but has no professional forester's license. Overall, the recorded percentage of forestry graduates who took and passed any government exam was higher compared to the reports of Tutor et al. (2021) on the 4th Philippine GTS result, covering 11,547 surveyed graduates from academic years 2008-2009 to 2010-2011 of various HEIs in the Philippines, where they found that only 20% of graduates have taken any government examination. This was found to be low since any college graduate can take a career service exam. Hence, forestry graduates may better perceive working in the government than in the private sector.

The influence of parents or relatives was revealed to be the most significant reason for graduates in pursuing their BSF degree (Table 4). In the tracer studies conducted for teacher education graduates and nursing graduates in Visayas, the influence of parents and relatives was also the primary reason graduates cited as in pursuing these degrees (Cornillez, Jr. et al., 2021; Sanchez & Diamante, 2017). It was followed by their prospects for immediate employment. In the study of Rica et al. (2015), which assessed the status of agriculture, forestry, fisheries, and natural resources (AFNR) human resources in some parts of Visayas, Philippines, they found that one of the main reasons of graduates in pursuing AFNR degree was the prospect for immediate employment, which may relate to the findings of the present study.

Table 4: Distribution of graduates according to reason of program selection (N=61)

Reasons for Taking the Course	Frequency	Percentage
Influence of parents or relatives	22	36.07%
Prospect for immediate employment	21	34.43%
Availability of course offering in chosen institution	19	31.15%
Affordable for the family	17	27.87%
Strong passion for the profession	10	16.39%
Peer Influence	10	16.39%
No particular choice or no better idea	10	16.39%
Inspired by a role model	9	14.75%
Opportunity for employment abroad	9	14.75%
Prospect of career advancement	7	11.48%
Status or prestige of the profession	4	6.56%
Prospect of attractive compensation	3	4.92%
High grades in the course or subject area (s) related to the course	3	4.92%
Good grades in high school	2	3.28%
No response	1	1.64%

Note: multiple responses permitted

Meanwhile, 22.95% of graduates had pursued advanced studies. Among those who pursued advanced studies, many (35.71%) indicated professional development as a reason for doing so, some (21.43%) stated that it was for promotion, while almost half (42.86%) noted that it was for both. In another GTS, the majority of nursing graduates who pursued advanced studies in Cebu, Philippines also argued that it was for their professional development (Sanchez & Diamante, 2017). In addition, some

graduates of a university in Rizal, Philippines also mentioned that they pursued further studies primarily to satisfy their ambition and to ensure their career development (Ramirez et al., 2014). A total of 15 graduates have also continuously enhanced their knowledge and competency in their profession through attending various trainings and seminars after graduation.

Employment Profile of BSF Graduates

Out of 61 BSF graduates, there were a total of 49 graduates who have been employed after graduation as of the survey period. A high percentage of employed BSF graduates from school year 2005-2008 was also recorded by Rica et al. (2015) in the selected areas of Visayas, Philippines during their study. A 100% employment rate of the BSF graduates from a certain state university in Visayas was also recorded by Cuadra et al. (2019). This may signify that there can still be a high employment opportunity for forestry graduates in some parts of the country. Over time, there has been a notable proliferation in the diversity and abundance of employment opportunities available to graduates with an interest in forest conservation. This expansion is attributable to forestry's integration into an expanding global conservation sector (Connaughton, 2015). Medina (2015) mentioned in his study that the National Greening Program launched by the Philippine Government in 2011 has abruptly increased the demand for graduates with degrees in forestry. This program was also extended until the year 2028. Given the current global environmental issues and concerns, creating jobs related to forestry can be a practical solution as a national thrust (Medina, 2015).

It should be noted, however, that while the employment rate of the BSF respondents is not 100%, a great majority of the remaining respondents who have not yet been employed since graduation were not actively looking for a job during the survey period (Figure 1). Aside from this, lack of necessary work experience to land a job was also among the reasons for unemployment, as reported by the graduates. This reason also concerns most nursing graduates, which they feel would impact their future employability (Sanchez & Diamante, 2017). In a GTS conducted by Gines (2014) to Philippine Normal University graduates, the author observed that although the majority of graduates found employment immediately following graduation and application, some still had difficulty finding employment and cited a lack of experience as a perceived challenge.
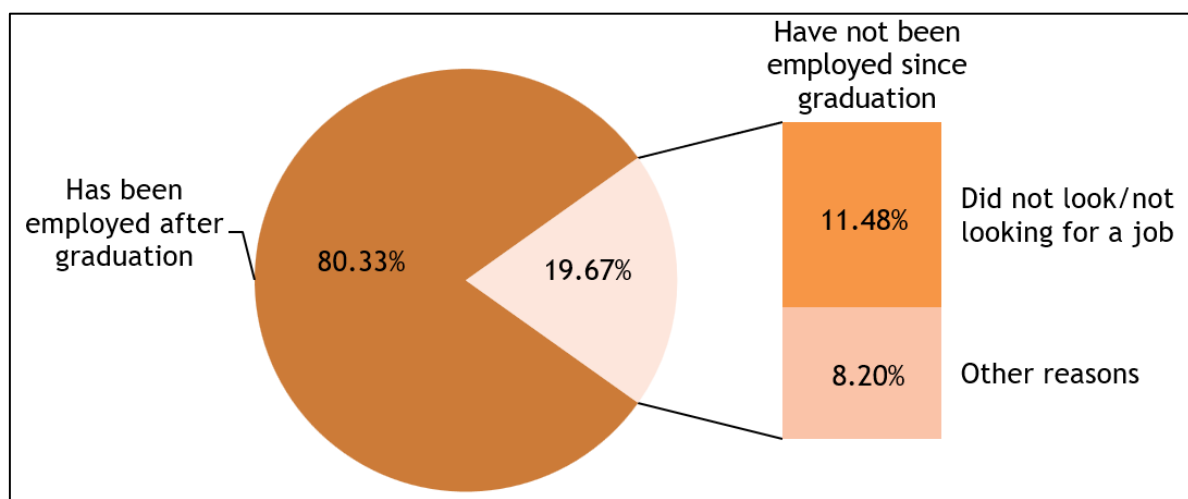
Figure 1: Percentage Distribution of BS Forestry Graduates SY 2015-2022 according to Initial Employment and Reasons for Unemployment

In addition, two individuals mentioned that there is no job opportunity for them, while another is still applying for work. Despite the perceived availability of jobs for forestry graduates in some parts of the country, it still cannot be denied that the labour market has become very competitive and that graduates may be competing among themselves, making others unemployed. Other reasons recorded were the following: advance for further study, family concern and decided not to find a job, and due to the COVID-19 pandemic. The majority of these reasons were also recorded in the GTS of information technology graduates conducted by Albina and Sumagaysay (2020).

On the other hand, almost half of the graduates who acquired their first job are classified as professionals based on the International Standard Classification of Occupations (ISCO) of the International Labour Organization (Table 5). Furthermore, 95.92% of the graduates were initially employed locally since only two out of 49 graduates got their first employment abroad. This study also relates to the study of Rica et al. (2015) where they found that a great majority of forestry graduates expressed no intention of taking a job abroad. However, the low number of graduates employed abroad was seen by Cuadra et al. (2019) as an indicator of the university to start working on producing globally competitive graduates.

Table 5: Distribution of employed graduates based on selected initial employment characteristics (n=49)

Employment Characteristics	Frequency	Percentage
Occupational Classification		
Managers	1	2.04%
Professionals	23	46.94%
Technicians and Associate Professionals	16	32.65%
Clerical Support Workers	3	6.12%
Service and Sales Workers	6	12.24%
Place of Work		
Local	47	95.92%
Abroad	2	4.08%
Employment Status		
Regular or Permanent	5	10.20%
Temporary	3	6.12%
Contractual	41	83.67%
Job Level Position		
Managerial or Executive	1	2.04%
Professional, Technical, or Supervisory	39	79.59%
Rank or Clerical / Domestic Job	9	18.37%
Major Line of Business of the Company		
Agriculture, Hunting, and Forestry	31	63.27%
Public Administration	7	14.29%
Mining and Quarrying	3	6.12%
Hotels and Restaurants	3	6.12%
Private Households with Employed Persons	2	4.08%
Education	1	2.04%
Wholesale and Retail Trade	1	2.04%
Other Community, Social and Personal Services	1	2.04%
Initial Gross Monthly Earnings in First Job		
P 5,000.00 to less than P 10,000.00	15	30.61%
P 10,000.00 to less than P 15,000.00	17	34.69%
P 15,000.00 to less than P 20,000.00	12	24.49%
P 20,000.00 to less than P 25,000.00	2	4.08%
P 25,000.00 to less than P 30,000.00	2	4.08%
P 40,000.00 and above	1	2.04%

The forestry graduates also mentioned various reasons for accepting their first job. Among these are the following: salaries and benefits (61.22%); career challenge (53.06%); related to course or program of study (53.06%); related to special skills (42.86%); proximity to residence (18.37%); family influence (18.37%); to gain experience (8.16%); and peer influence (6.12%). Salaries and benefits were also the top reason for most graduates of agriculture-related programs in a state college in Sorsogon, Philippines, on why they decided to accept their job (Ebuenga et al., 2023). Furthermore, the graduates were able to find their first job through the recommendation of someone (40.82%), as walk-

in applicants (28.57%), through information from friends (24.49%), on a job fair or through the Public Employment Service Office (4.08%), and as arranged by their school's job placement officer (2.04%). The tracer study conducted by Cuadra et al. (2019) also found that most of the graduates have acquired a job through the recommendation of someone.

In terms of the time it took them to land their first job, almost all the employed graduates (91.84%) were able to secure their first job within one year after graduation (Figure 2). More specifically, 10.20% of graduates responded that they got employed in less than a month, 77.55% were accepted at their first job within one to six months, and 4.08% were employed after more than six months to 1 year after graduation. The rest were employed after one year to less than three years after graduation. The waiting time for forestry graduates in Indonesia to get a job was less than six months (Tajidan et al., 2020). This is the same for most of the graduates of agriculture-related programs in Sorsogon, Philippines (Ebuenga et al., 2023). However, only five of the graduates were employed under a regular or permanent status, three on temporary status, while most were hired as contractual employees. This finding also relates to the study of Rica et al. (2015), where they found that most employed graduates in AFNR in selected areas of Visayas, Philippines were on a contractual or temporary status.

Figure 2: Histogram of Lead Time to First Employment of BS Forestry Graduates SY 2015-2022 (n=49)

On the other hand, 79.59% of graduates classified their initial job level position as professional, technical, or supervisory. As expected, agriculture, hunting, and forestry were listed as the major lines of business of the company/organization where the BSF graduates were first employed. In terms of monthly earnings, most of the graduates reported receiving less than PhP 20,000.00 as gross monthly income during their first employment. Based on the grouped data, the estimated average gross monthly income of BSF graduates on their first job is PhP 13,826.53, while the median income is PhP 15,000.46. This also follows the trend of the initial gross monthly income of the graduates of agriculture-related programs in Sorsogon and graduates of various non-agriculture-related programs in Rizal, Philippines (Ebuenga et al., 2023; Ramirez et al., 2014).

Meanwhile, 38 out of 49 graduates agreed that their first job was related to the course they took in college and that their college curriculum was relevant to their first job. This reflects the claim of Ahmad

et al. (2012) that a robust curriculum of a program is frequently necessary for graduates to be competitive in the job market. It goes beyond stating that the curriculum must be relevant in light of the demands of the industry (Albina & Sumagaysay, 2020). Specifically, 15 believed that their curriculum was highly relevant to their first job, while another 15 rated their curriculum high in relevance to their first job. Eleven graduates mentioned it was moderately relevant, and seven rated it low. In contrast, one rated the curriculum that they had to be very low in terms of its relevance to their first job.

There were also various competencies that the graduates learned in college that they believed to be useful in their first job (Figure 3). The top skills were critical thinking skills, followed by communication skills, and forestry extension skills which are skills commonly used by foresters in their field works and when dealing with various stakeholders, especially in communities within or adjacent to forest areas. The GTSs conducted by Ramirez et al. (2014) and Sanchez and Diamante (2017) also found critical thinking skills as one of the most useful competencies in employment that graduates learned in college. While communication skills were regarded as the foremost employment competency that Filipino IT graduates, teacher education graduates, business and entrepreneurial technology graduates, arts and sciences graduates, and nursing graduates learned in college that they find useful in their job (Albina & Sumagaysay, 2020; Cornillez, Jr. et al., 2021; Ramirez et al., 2014; Sanchez & Diamante, 2017).

Behavioral skills, such as communication, problem-solving, leadership, and proactivity, have been underscored as significant for new forest engineering graduates in Brazil (Hakamada et al., 2023). However, they noted a deficiency of these soft skills among recent graduates. Kelly and Brown (2019) also identified effective communication as paramount among professional proficiencies preferred by forestry employers and students in California. Previous research evaluating forestry education in the United States also consistently highlighted the importance accorded by employers to human-centric and social competencies, including effective communication within the workplace and with stakeholders (Sample et al., 2015). Once students choose to pursue forestry or a cognate discipline within the natural resources field, their competencies as graduates must inevitably align with the requisites of potential employers (Connaughton, 2015). Ratnasingam et al. (2013) articulated the evolving roles of forests, transitioning from mere commercial exploitation to environmentally and socially focused paradigms. Park et al. (2019) accentuated the growing need for forest education to embrace practical and socially-oriented skills in response to evolving professional landscapes.
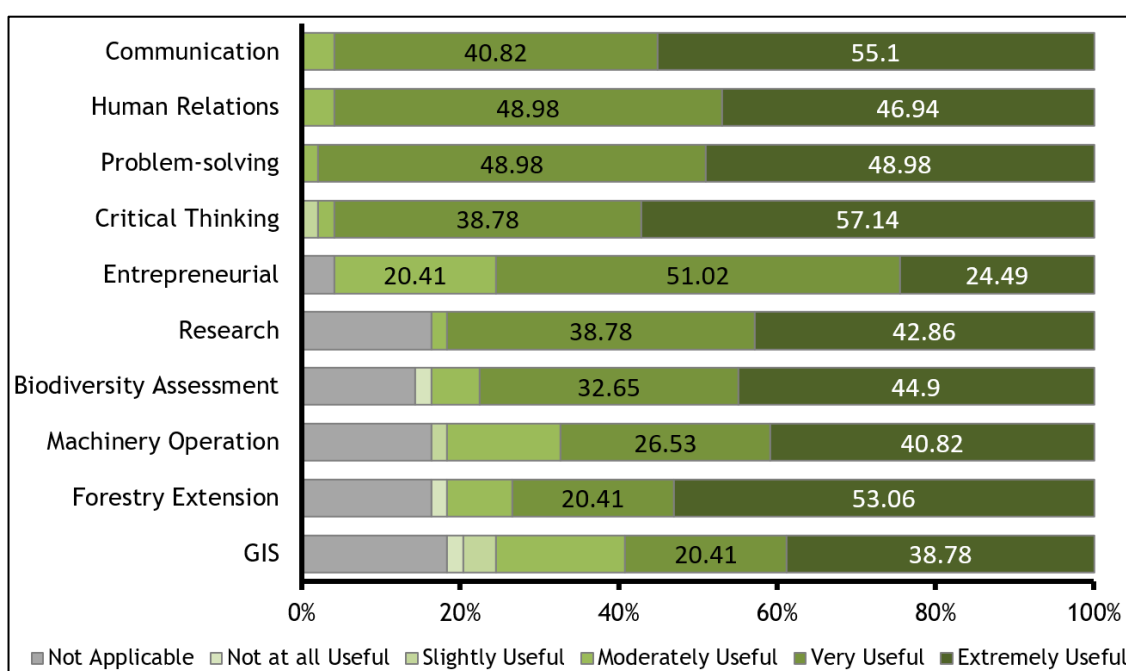

Figure 3: Competencies learned in college and their usefulness to the first job of the BSF graduates (n=49)

Entrepreneurial skills were ranked at the bottom, which was also observed in the findings of Cornillez, Jr. et al. (2021). However, Medina (2015) argued that the incorporation of enterprise skills in the curriculum of the BSF program should also be intensified. This will encourage graduates to explore the business side of the profession. In a GTS conducted by Tajidan et al. (2020), they found that most graduates who are engaged in entrepreneurship are forestry graduates, compared to graduates in agribusiness, agroecotechnology, and aquaculture programs.

Adequacy of School Support Services for Career and Job Placement

A great majority of forestry graduates were satisfied with various school support services that they have received in relation to their employment after college (Fig. 4). These include active linkages of the school with the industry and networking with other schools, communities, and alums; provision of informative materials on career and job opportunities and skills development programs; conduct of career and job placement seminars; and conduct of follow-up and monitoring activities of graduates. On the other hand, about 21% to 28% of the graduates remained neutral in their level of satisfaction with the various school support services mentioned. Six of the graduates, at most, responded that they were either somewhat dissatisfied or very dissatisfied regarding the school's effort to provide these support services.
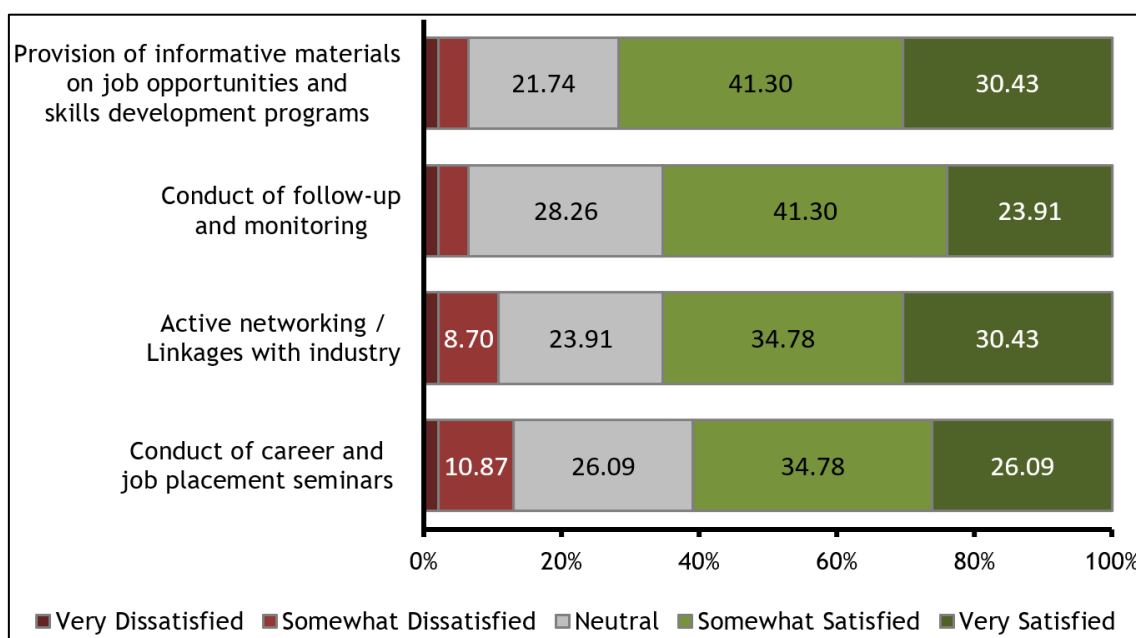
Figure 4: Satisfaction level on school support services received by graduates in relation to their employment after college (n=46)

Other School Support Services that the Graduates Wish to Receive in Relation to Employment

There were also other school support services that the graduates desired to receive in relation to their employment, as follows. Referral to the employment of job vacancies to companies and agencies is suggested by the graduates to be practiced by the university. Furthermore, strengthening the Alumni Association of the university is relevant to keep graduates connected with the school. Establishing linkages and enjoying the benefits from these partnerships should also be felt more and enjoyed by graduates through the provision of additional employment opportunities and a more comfortable process of job application, as the graduates mentioned. According to Medina (2015), the college should serve as a medium by establishing connections with employers who can provide graduates with related jobs. This has led to the establishment of a College Employment Service Center in a university in Mindanao, Philippines, as a formal approach to institutionalizing such effort (Medina, 2015). Furthermore, Tutor et al. (2021) have also recommended in their study that the CHED needs to

encourage HEIs and the industry to strategically collaborate to ensure effective responses on graduates' employability.

The graduates also saw the establishment of a Forestry Board Review Center to be beneficial in preparing the graduates to take the Forester's Licensure Examination, which is a critical factor in their employment. Establishing review centres for board programs was also one of the recommendations of Cuadra et al. (2019) to produce highly trained and employable graduates. Furthermore, offerings of knowledge enrichment training and seminars on continuing forestry professional education may also be considered by the university, as these activities may help graduates keep on track with the latest developments in the field and may develop additional skills relevant to the graduates and their present or target employment. Ferguson et al. (2012) underscored the pronounced necessity for training in new or advanced technologies within the domain of Australian forestry. Most employed graduates in agriculture-related programs in Sorsogon, Philippines viewed the lack of exposure to or attendance at pertinent training and workshops as their biggest issue (Ebuenga et al., 2023).

Graduates' Suggestions to Improve the Course Curriculum

Regular updating of the curriculum and instruction to catch up with the advancement of the program collectively remains as the major suggestion of graduates to improve the curriculum. Curricular development and change in relation to the demands of the line of work is a technique that could guarantee that forestry education efficiently fulfils its capability-building function (Rebugio & Camacho, 2005). However, it was observed by Ratnasingam et al. (2013) that traditional forestry education schemes are already inadequate for training professional foresters to manage forest resources in a dynamic world. Further, the changing role of the forest sector necessitates revisions in higher education programs and curricula in forestry (Jong et al., 2021).

Waeber et al. (2023) emphasize that without robust forest education, forests and trees are unlikely to fulfil their potential contributions to global development goals. Conversely, a resurgence in forest education can facilitate sustainable forest management and acknowledge the full value of forest goods and services. Therefore, a critical review of the forestry education curriculum is imperative to develop a program that meets the standards and needs of various forestry sectors. Moreover, urgent restructuring is essential to incorporate greater flexibility, enabling graduates to adeptly respond to evolving work environments and market demands (Park et al., 2019; Ratnasingam et al., 2013). This suggestion of graduates corroborates with the report of Onyema et al. (2021) which highlighted that constant assessments of the forestry curriculum are necessary where managers and planners of the forestry profession and discipline need to take part. Kelly and Brown (2019) suggested incremental adjustments to curricula rather than a complete overhaul due to the dynamic nature of the forestry field. They suggested that assessments should be conducted periodically and across various geographic contexts.

The importance of integrating specialized skills into forestry curricula to equip graduates for non-traditional roles played by forests is essential and must be acknowledged. Forestry education programs of this nature will enhance their relevance, viability, and visibility within both the forestry sector and society as a whole (Ratnasingam et al., 2013). This may be the reason why many of the graduates (28%) also pointed out that the curriculum should put high regard to Forest Surveying and Geographic Information System (GIS) courses, citing that sufficient knowledge and skill in this aspect is one of the primary qualifications employers seek most from applicants applying for forestry-related jobs. Hakamada et al. (2023) also found that knowledge of GIS is an important skill for the new graduates of forest engineering programs in Brazil. Park et al. (2019) also revealed that GIS or forest information system is one of the most important subjects in the forestry curriculum in Laos. This is applied to quantify the nation's carbon emissions from deforestation and forest degradation in developing countries for implementing REDD+ projects, which are pivotal initiatives to halt land-use-related emissions and establish incentives for developing countries to manage and protect their forest resources (Corbera & Schroeder, 2011).

According to the graduates, forestry students should also be immersed in institutions highly related to their program during their on-the-job training. This relates to the recommendation of Albina and Sumagaysay (2020), where they emphasized that students should have access to a highly relevant on-the-job station to truly give them many opportunities to experience and analyse the abilities needed in the workplace. Hakamada et al. (2023) also recommended increasing the workload of internships and the creation of summer programs focused on practical activities that encourage forest engineering students in Brazil to practice problem-solving skills outside the academic world. The on-the-job training of students has the potential to increase the employability of graduates as it provides them the suitable preparation that is relevant for employment (Cornillez, Jr. et al., 2021).

The graduates also believed that the research and extension engagement of students should be given additional attention in the curriculum. Cuadra et al. (2019) believed that students should be exposed to research, and they should be encouraged to present their work and publish papers at local and international conferences that could increase their employability. Further, the graduates observed that the university still lacks the capability of providing quality laboratory tools and equipment which causes limitations to the education of students. Hence, they suggested that up-to-date and functional equipment and facilities should be readily available for students. This observation is also reflected in the study of Onyema et al. (2021), where a deficit in modern infrastructural building in forestry education in Africa was evident. Park et al. (2019) underscored the imperative role of teaching resources such as lecture materials and equipment in enhancing the quality of higher education in forestry at a university in Laos. The physical resources required for implementing the forestry education system will also need to be improved in line with the upgrading of human resources. According to Cruz et al. (2013), this would necessitate investing in modern equipment and technologies, as well as the modernisation of laboratories and research facilities.

The graduates also encouraged the university to examine the concept and method of skill reinforcement in the forestry program. Recently, the policies, standards, and guidelines for the BSF in the Philippines were formulated under the CHED Memorandum Order No. 06, series of 2019, which strictly implements the shift to learning competency-based standards/outcomes-based education (OBE). OBE places less emphasis on teachers' teaching and content and more on students' capacities to apply what they know and have learned (Cruz et al., 2013). The expectations of forestry graduates after completing their degree in forestry should be addressed by effective teaching approaches and styles.

Moreover, other graduates also mentioned that the competency of faculty members and staff should be higher for the forestry program. It should therefore be reflected in hiring faculty and staff possessing high qualifications. In the GTS conducted by Cuadra et al. (2019), the graduates mentioned that having quality professors could help improve the education curriculum of the university. Therefore, they suggested that faculty retraining to improve their skills must be instituted. O'Hara and Salwasser (2015) noted that to adequately address the swiftly evolving nature of contemporary forestry, forest science education should encompass a broader spectrum of faculty expertise required for comprehensive instruction. A sustained, concerted university effort to develop and improve its faculty can be a vital factor in achieving the objectives of the forestry program.

Furthermore, internationalizing students and faculty exchange may also be worth exploring to engage them in international learning and perspectives. The international dimensions of forestry education are becoming increasingly important. They matter to students, teachers, employers, and professionals in the forestry field, and for the contribution of foresters and forestry for achieving forest-related goals and sustainable development worldwide (Kanowski, 2015).

Likelihood of Gaining Employment after Graduation

Many unlicensed foresters are still able to find jobs (Table 6). A chi-square test of independence confirmed that based on the data gathered, there is no statistically significant association between forestry licensure and employment ($X^2(1)=0.930$, p=0.335). This further supports that there is high employment opportunity for BSF graduates regardless of their professional forester license status.

According to Brack (2019), most forestry graduates are quickly employed and tend to have relatively high starting salaries. It is also noteworthy that among the 33 licensed foresters, only five are yet to find their jobs. Further, the five unemployed respondents belong to the graduating class of 2022, and two out of them were not actively looking for a job during the survey period.

Professional forestry graduates are in high demand due to their unique skill set, which allows them to understand and address the complexities of forest systems, including environmental and social aspects. With increasing global awareness and interest in environmental issues, there is a growing range of employment opportunities for forestry graduates (Connaughton, 2015). Moreover, there is a rising demand for professionals with expertise in forest management to address issues such as climate change mitigation and biodiversity conservation at both domestic and global levels (Park et al., 2019).

Table 6: Frequency and percentage distribution of BS Forestry Graduates SY 2015-2022 according to Employment and Forester Licensure Status (N=61)

Employment Status	Forester License Status				Total	
	Unlicensed		Licensed			
	n	%	n	%	N	%
Unemployed	7	25.00	5	15.15	12	19.67
Employed	21	75.00	28	84.85	49	80.33
Total	28	100.00	33	100.00	61	100.00

The binary logistic regression revealed good data fit for likelihood of employment within six months after graduation ($X^2(8)=30.986$, p<0.001) with overall classification accuracy of 85.25%, likelihood of employment within one year after graduation ($X^2(8)=26.765$, p=0.001) with overall classification accuracy of 83.61%, and general likelihood of employment after graduation ($X^2(8)=34.563$, p<0.001) with overall classification accuracy of 91.80%.

Further, out of the eight independent variables considered, only school support services were found to be statistically significant (Wald(X^2)={12.339, 14.043, 14.043}, p<0.001) for all three generated logistic models which means that it is a significant predictor for the likelihood of gaining employment of BSF graduates. The odds ratio further revealed that, in general, the odds of gaining employment after graduation are estimated to be about 97.50 times higher for graduates who received school support services in relation to employment compared to those who have not. Correspondingly, the odds of gaining employment within six months after graduation are 59.85 times higher for graduates who received school support, and the odds of gaining employment within one year after graduation are 36.82 times higher for graduates who received school support as compared to those who have not.

Universities and colleges provide society with higher educational services and one of their primary goals is to prepare students for employment (Park et al., 2019). HEIs can even position its students to meet the needs of their potential employers. Connaughton (2015) also mentioned that the status of the job market for beginner-level employees should be an important consideration for forestry educators. Thus, providing school support services in relation to employment is a significant step for universities to increase the employability of their graduates.

Employability index of the BSF graduates

The overall employability index score ranged from 26 to 94, with an average of 50.47±10.64. The distribution of overall employability index score also shows that a great majority of the employed forestry graduates (65%) obtained lower than average employability index scores (Figure 5). The lowest employability rating was obtained by a graduate who was initially employed more than six months to less than one year after graduation as an Office Aide with contractual status and an initial gross monthly income anywhere from PhP 5,000.00 to less than PhP 10,000.00. Said graduate stated that the curriculum has very low relevance to her first job. In contrast, the highest employability index

score was obtained by a graduate who was employed as a Municipal Environment and Natural Resources Officer with a regular or permanent status in less than a month after graduation. This graduate reported an initial gross monthly income of at least PhP 40,000.00 and stated that the college curriculum is highly relevant to her first job.
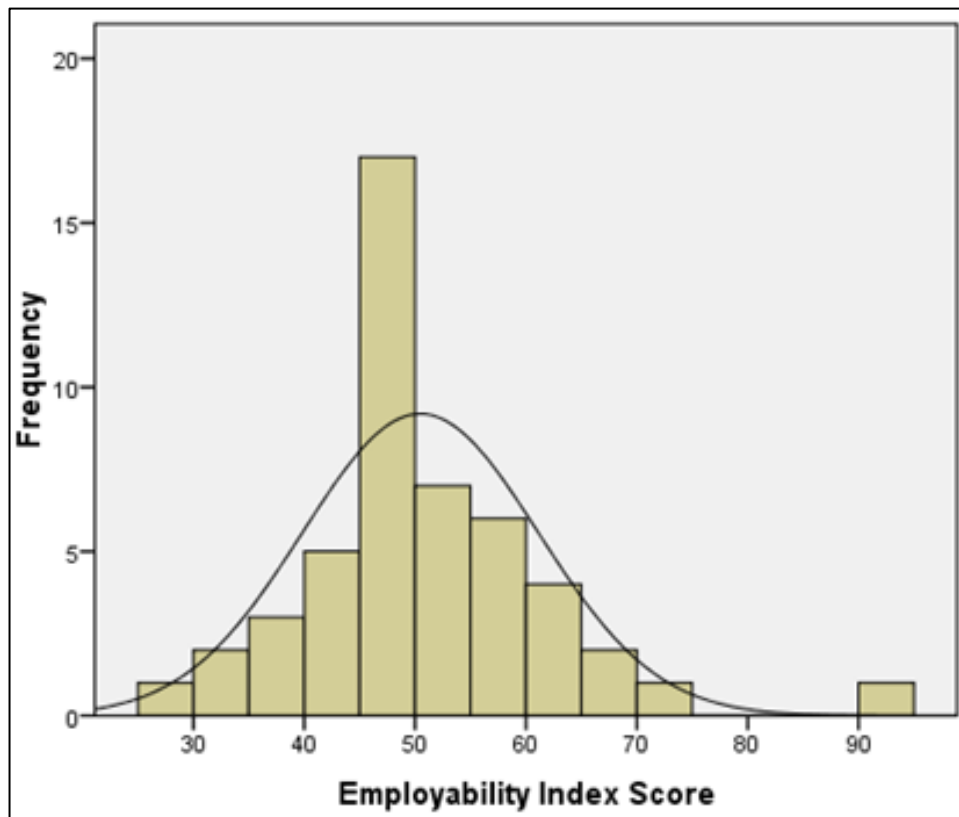
Figure 5: Histogram of Overall Employability Index Score of Employed BS Forestry Graduates (n=49)

Significant Factor Contributing to the Employability of Graduates

Based on the multiple linear regression analysis, results show that the regression model is highly significant ($F_{(8,40)}=3.097$, $p=0.007$), with an R-squared value of 0.383 suggesting that approximately 38.2% of the variance in the dependent variable can be explained by the independent variables included in the model. Accounting for model complexity in terms of the number of independent variables in the regression model, the adjusted R-squared is at 0.259. Regression diagnostics, however, revealed non-normal residuals, heteroscedasticity, and the presence of an influential point in the data. Thus, another multiple regression analysis was performed using logarithmic transformation of the employability index score as the dependent variable. The resulting model was likewise found to be highly significant ($F_{(8,40)}=3.126$, $p=0.008$), with a slightly higher adjusted R-squared value of 0.262.

Results revealed that honours/awards in college, region of origin, forestry professional license, and school support services for employment and career placement were found to contribute most to employability, however only honours/awards in college was found to be statistically significant ($t=2.588$, $p=0.013$) at $\alpha=0.05$ (Table 7). The unstandardized coefficient also implies that for BSF graduates who had honours/awards during college, the overall employability index score increases by a factor of $e^{0.197} = 1.2177$ or a 21.77% increase.

Table 7: Summary of Regression Analysis for Factors affecting log-transformed Employability Index Score

Model	Estimate	SE	t	p-value
Constant	3.625	0.410	8.841	0.000
Sex[a]	0.039	0.055	0.712	0.481
Region of origin (Ilocos)	-0.143	0.111	-1.295	0.203
Region of origin (CAR)	-0.347	0.183	-1.893	0.066
Household income[b]	-0.071	0.077	-0.922	0.362
Age graduated	0.009	0.017	0.556	0.581
Honours/Awards in College[c]	0.197	0.076	2.588	0.013*
Forestry Professional License[d]	0.086	0.061	1.400	0.169
School Support Services[e]	0.132	0.097	1.368	0.179

Notes: R^2_{adj} = 0.262 (N=49, p=0.008). [a]0=Female, 1=Male; [b]0=Below PhP 20,000, 1=PhP 20,000 and above; [c]0=Without honours/awards, 1=With honours/awards; [d]0=Not Licensed Forester, 1=Licensed Forester; [e]0=Did not receive school support services in relation to employment, 1=Received school support services in relation to employment.

According to Medina (2015), employers have long regarded academic achievement favourably. As a result, it is reasonable to infer that graduates with better grades, like scholars, are thought to be more appealing to employers. Furthermore, Thompson et al. (2013) also mentioned in their study that students who were given awards in college for their extracurricular activities enhance their experiences and contribute to life-wide learning that has value in terms of their employability or future careers that keep them stand out from others.

Conclusions

The study traced the BSF graduates in a state university in the Philippines from the year 2015 to 2022 as to their employment. The study provides insights into the demographics and motivations of forestry graduates. It indicates a diverse group of graduates, including those from economically disadvantaged backgrounds, and highlights the importance of family influence and career prospects in choosing forestry as their undergraduate program. Majority have been awarded college scholarships; some graduated with honours and awards. 54.09% were licensed foresters. The graduates have been successful in finding employment in their field and are motivated by financial considerations when it comes to job acceptance. The results of the study suggest that the education and support services provided by the university were successful in preparing them for careers in forestry-related jobs, and the graduates were generally satisfied with their educational experience. The findings support that there is a high employment opportunity for forestry graduates regardless of their professional forester license status. Most graduates found forestry-related employment within six months after graduation. However, very few were given permanent positions, right away. In addition, the gross monthly income for a great majority of the initial forestry-related jobs reported by the graduates was less than PhP 15,000. This reflects and corresponds to the lower-than-average employability index rating obtained by the majority of forestry graduates. The provision of school support services for career and job placement was found to significantly increase the likelihood of gaining employment after graduation. While the graduates' awards and achievements in college were seen to be a significant factor contributing to higher employability.

Recommendations

Increasing students' competency to encourage achieving awards in college is recommended, which may further improve their employability. Strengthening the skills of the students in critical thinking, communication, and forestry extension that graduates find relevant to their jobs is also recommended. Furthermore, efforts to increase the employability of graduates through enhancement

of the curriculum and school support services in consideration of the suggestions of graduates may be worth exploring. In addition, a consistent graduate tracer may be considered to monitor the performance of graduates as to their employment, thereby providing adjustments to the BS Forestry program, as deemed necessary. Lastly, studies exploring the possibility of establishing a University Employment Service Center are also recommended to assess whether this effort will significantly benefit its graduates, the university, and the various employers or external institutions.

References

Ahmad, K., Zainal, N. F. A., Idris, S. & Rahmat, M. (2012). Relationship between employability and program outcomes achievement. *Procedia - Social and Behavioral Sciences*, *59*, 254 – 263. https://doi.org/10.1016/j.sbspro.2012.09.273

Albina, A. C., & Sumagaysay L. P. (2020). Employability tracer study of Information Technology Education graduates from a state university in the Philippines. *Social Sciences & Humanities Open*, *2*(1). https://doi.org/10.1016/j.ssaho.2020.100055

Badiru, E. O., & Wahome M. (2016). Conducting graduate tracer studies for quality assurance in East African Universities: A focus on graduate students voices on quality culture. *Journal of Education and Practice*, *7*(6). https://files.eric.ed.gov/fulltext/EJ1092473.pdf

Brack, C. L. (2019). Forestry education that goes beyond the standard and unoriginal. *Australian Forestry*, *82*(4), 163-165. https://doi.org/10.1080/00049158.2019.1681067

Bullard, S. H. (2015). Forestry curricula for the 21st Century—Maintaining rigor, communicating relevance, building relationships. *Journal of Forestry, 113*(6), 552–556. https://doi.org/10.5849/jof.15-021

Corbera, E., & Schroeder, H. (2011). Governing and implementing REDD+. *Environmental Science & Policy*, *14*(2), 89-99. https://doi.org/10.1016/j.envsci.2010.11.002

Cornillez Jr., E. E. C., Caminoc S. R. T., Basas B. R., Militante Jr., B. T., & Paler, R. R. (2021). Tracer study of teacher education graduates of the Eastern Visayas State University-Tanauan Campus, Philippines. *European Journal of Education and Pedagogy, 2*(3). https://doi.org/10.24018/ejedu.2021.2.3.143

Connaughton, K. (2015). Forestry employment trends. *Journal of Forestry, 113*(6), 571–573. https://doi.org/10.5849/jof.15-036

Cruz, R. V. O., Bantayan, R. B., Landicho, L. D., & Bantayan, N. C. (2013). Reformulating agriculture and forestry education in the Philippines: Issues and concerns. *Journal of Developments in Sustainable Agriculture, 8*(1), 49-62. https://doi.org/10.11178/jdsa.8.49

Cuadra, L. J., Aure, M. R. K. L., & Gonzaga, G. L. (2019). The use of tracer study in improving undergraduate programs in the university. *Asia Pacific Higher Education Research Journal, 6*(1). https://po.pnuresearchportal.org/ejournal/index.php/apherj/article/view/1315/409

Ebuenga, M. N., Aragon, R. N., Honasan, A. G., & Fortin, P. D. (2023). Employment status of Sorsogon State College Castilla Campus graduates from year 2013-2017. *East Asian Journal of Multidisciplinary Research, 2*(3), 953-968. https://doi.org/10.55927/eajmr.v2i3.3272

Ferguson, I. (2012). Future forestry employment and education. *Australian Forestry*, *75*(3), 192-199. https://doi.org/10.1080/00049158.2012.10676401

Forest Management Bureau. (2019). *Philippine forestry statistics*. Philippine Government. https://drive.google.com/file/d/1_t_YG32RjVn90sdXOm0UVbTPpc_2Kclx/view?pli=1

Gines, A. C. (2014). Tracer study of PNU graduates. *American International Journal of Contemporary Research, 4*(3). https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=b370db616c8ebcc1d7008b970651caa06f1c3c78

Hakamada, R., de Barros Ferraz, S. F., & Sulbaran-Rangel, B. (2023). Trends in Brazil's forestry education—Part 2: Mismatch between training and forest sector demands. *Forests*, *14*(9). https://doi.org/10.3390/f14091805

Jong, W. D., Huang, K., Zhuo, Y., Kleine, M., Wang, G., Liu, W., & Xu, G. (2021). A comparison of forestry continuing education academic degree programs. *Forests, 12*(7). https://doi.org/10.3390/f12070824

Kanowski, P. J. (2015). Internationalizing forestry education. Journal of Forestry, *113*(6), 574–578. https://doi.org/10.5849/jof.15-024

Kelly, E. C., & Brown, G. (2019). who are we educating and what should they know? An assessment of forestry education in California. *Journal of Forestry*, *117*(2), 95–103. https://doi.org/10.1093/jofore/fvy079

Medina, M. A. P. (2015). Gender and educational influences of job mismatch: The case of forestry and environmental science graduates of a Philippine state university. *Journal of Environmental and Occupational Science, 4*(1). https://tinyurl.com/5erw7bxn

O'Hara, K. L., & Salwasser, H. (2015). Forest science education in research universities. *Journal of Forestry*, *113*(6), 581–584. https://doi.org/10.5849/jof.15-018

Onyema, M. C., Gideon, I. K., Okereke-Ejiogu, N. E., Okeke, A. N., Igwe, N. C., & John, R. E. (2021). Forestry education in Africa: A review of the teaching and learning styles for sustainable forest management. *International Journal of Educational Benchmark, 18*(1). https://www.researchgate.net/profile/Angela-Okeke/publication/353752127_Benchmark_Journals_Forestry_Education_in_Africa_A_Review_of_the_Teaching_and_Learning_Styles_for_Sustainable_Forest_Management/links/65c393fc79007454976a6745/Benchmark-Journals-Forestry-Education-in-Africa-A-Review-of-the-Teaching-and-Learning-Styles-for-Sustainable-Forest-Management.pdf

Park, M. S., Sojin, Y., Yeo-Chang, Y., Donsavanh, B., & Phetlumphan, B. (2019). Needs assessment of forestry education in Laos: the case of Souphanouvong University. *Journal of Forest Research, 24*(4). https://doi.org/10.1080/13416979.2019.1622627

Philippine Statistics Authority. (2022a, August 15). *Highlights of the Preliminary Results of the 2021 Annual Family Income and Expenditure Survey*. Philippine Government. https://psa.gov.ph/content/highlights-preliminary-results-2021-annual-family-income-and-expenditure-survey

Philippine Statistics Authority. (2022b, August 15). *Proportion of Poor Filipinos was Recorded at 18.1 Percent in 2021*. Philippine Government. https://psa.gov.ph/poverty-press-releases/nid/167972

Ramirez, T. L., Cruz, L. T., & Alcantara, N. V. (2014). Tracer study of RTU graduates: An analysis. *International Refereed Research Journal*, *5*(1). https://tinyurl.com/3yf9f89r

Ratnasingam, J., Ioras, F., Vacalie, C. C., & Wenming, L. (2013). The future of professional forestry education: Trends and challenges from the Malaysian perspective. *Not Bot Horti Agrobo*, *41*(1), 12-20. https://doi.org/10.15835/nbha4119139

Rebugio, L. L., & Camacho, L. D. (2005). Reorienting Forestry Education to Sustainable Forest Management: The case of the university of the Philippines Los Banos college of forestry and natural resources. *Forest Science and Technology, 1*(2). https://doi.org/10.1080/21580103.2005.9656287

Rica, R. L. V., Delan, G. G., Tan, E. V., & Monte, I. A. (2015). Status of agriculture, forestry, fisheries and natural resources human resource in Cebu and Bohol, Central Philippines. *Tropical Technology Journal*, *19*(1). https://link.springer.com/article/10.7603/s40934-015-0011-3

Sample, V. A., Bixler, R. P., McDonough, M. H., Bullard, S. H., & Snieckus, M. M. (2015). The Promise and Performance of Forestry Education in the United States: Results of a Survey of Forestry Employers, Graduates, and Educators. *Journal of Forestry*, *113*(6), 528–537. https://doi.org/10.5849/jof.14-122

Sanchez, M. P. R., & Diamante V. A. M. (2017). Graduate tracer study of the College of Nursing. *The Malaysian Journal of Nursing*, *8*(3), 41-47. https://ejournal.lucp.net/index.php/mjn/article/view/470

Tajidan, T., Sutresna, Halil, & Syaputra, M. (2020). Tracer study for alumni and graduated users of Agricultural Faculty Mataram University. *International Journal of Creative Research Thoughts, 8*(10). https://www.ijcrt.org/papers/IJCRT2010292.pdf

Thompson, L. J., Clark, G., Walker, M., & Whyatt, J. D. (2013). 'It's just like an extra string to your bow': Exploring higher education students' perceptions and experiences of extracurricular activity and employability. *Active Learning in Higher Education*, *14*(2), 135-147. https://doi.org/10.1177/1469787413481129

Tutor, M. V., Orbeta Jr, A. C., & Miraflor, J. M. B. (2021). The 4th Philippine graduate tracer study: Examining higher education as a pathway to employment, citizenship, and life satisfaction from the learner's perspective. *Philippine Institute for Development Studies*. https://www.pids.gov.ph/publication/research-paper-series/the-4th-philippine-graduate-tracer-study-examining-higher-education-as-a-pathway-to-employment-citizenship-and-life-satisfaction-from-the-learner-s-perspective

Waeber, P. O., Melnykovych, M., Riegel, E., Chongong, L. V., Lloren, R., Raher, J., Reiber, T., Zaheen, M., Soshenskyi, O., & Garcia, C. A. (2023). Fostering innovation, transition, and the reconstruction of forestry: Critical thinking and transdisciplinarity in forest education with strategy games. *Forests*, *14*(8). https://doi.org/10.3390/f14081646