Impact Assessment of DOST-SEI Undergraduate Scholarship Program from 2005 to 2014 using Analytic Hierarchy Process (AHP) and Decision Hierarchy Table

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Abstract

Education through Science and Technology (S&T), is an important factor in the development of a country. By investing in higher education, the country generates more researchers and scientists to help solve scientific and economic problems. In support of generating more S&T skilled workforce in the country, DOST-SEI provides scholarship programs to deserving students giving them an opportunity to pursue their studies and contribute to the development of the country. Scholar graduates provided relevant information to improve the scholarship administration of DOST-SEI using the tracer studies. This paper explores the impact of the tracer study data using AHP and Decision Hierarchy Table to support the decision-making process and policy recommendations. The study seeks to determine indicators that will be most appropriate to assess the success of the scholars in three different levels of development. It is hoped that this study will provide information about the individual, institutional and societal impact of the scholar-graduates.

Keywords

1. Introduction

Higher education is important to every Filipino family that is why parents will do everything just to make sure that they can send their children in school to become college graduates. Education is one of the means of the Filipino family's key to success to escape or alleviate poverty.In a survey based on the Annual Poverty Indicators Survey (APIS) conducted by the Philippine Statistics Authority in 2017, 9 percent of the estimated 39.2 million Filipinos 6 to 24 years of age were out of school children and youth (OSCY). One of the most common reasons for not attending school was the high cost of education or financial concern (17.9%). About half of OSCY belong to families whose income falls under 30% based on their income per capita (Bersales, 2018).

Investment in the human capital is beneficial for the sustainable development of the economy. Using education attainment related to Science, Technology, Education and Mathematics (STEM) can be considered as a measure for assessing and stimulating economic growth as these courses are critical for innovation. This can be supported with professionals and skilled technicians' individual salary is significantly higher than with trade workers and service / sales workers (Average daily basic pay of wage and salary workers, PSA 2018).

The main facilitators of economic growth are Science, Technology, and Innovation (STI). As the world is now heavily influenced by technology, support for more scientists and engineers are needed for the Philippines to remain relevant. In a data gathered by UNESCO Researchers in Research and Development (R&D) per million people in the Philippines was reported at 186.9 in 2013 and 105 in 2015. Researchers per million in the Philippines pales in comparison compared to Finland which has the highest number of researchers in R&D globally at 7,206.5 per million population in 2013 and in Singapore researchers which has 6,605.6 per million population which is the highest in Asia (UIS Statistics, UNESCO n.d.). It is becoming clearer that in order to fill the widening manpower gap of researchers, support and investment in science and technology is needed.

The Department of Science and Technology (DOST) through the Science and Education Institute (SEI), mandated through the Executive Order No. 128 and by virtue of the Scholarship Act of 1994. SEI undertake efforts on accelerating the production of the country's science and technology manpower capability. In line with economic development in the areas of research and innovation, SEI provides grants-in-aid to deserving STEM students to pursue higher education or training in areas of science and technology. To monitor the impact of the scholarship program, DOST-SEI has conducted (Tracking of Actual Career Experience Report (TRACER) to seek and assess the effectiveness of the scholarship program being implemented. The TRACER study aims to determine the current situation and career movements of DOST scholarship grantees and document their contributions at the national and international levels. This paper focuses on measuring DOST-SEI scholar graduates' individual accomplishments and achievements and its impact in the contribution of economic development of the country.

2. Literature Review

Tracer Handbook Study

Schomburg (2003) mentioned that graduate surveys are the most effective for evaluating the relationship between higher education and employment. Graduate surveys give a lookout on labour market issues and situations. The surveys provide quantitative-structural data on employment and career. These data provide key labour market information to broaden perspectives among students and administrators. However, surveys on graduate's information should not be narrow. Surveys can also inquire the type of job activities, relationships between research and work, professional standards and job satisfaction. When formulating a graduate survey tracer study there are several key elements mentioned that must be considered. Sample size must be equally distributed between regions to get the accurate results between the gaps in employment conditions, provisions of institutions and study conditions of the graduates. Fields of study must be selected and the type of degrees to be included. Mixture of several degrees (B.S., M.A or higher) will be problematic to handle. Questionnaires should be customized for each degree. Age and cohorts of the graduates also affects the interpretation of the results. Deciding case by case on which graduation years should be included in the survey study. Schomburg (2003) recommends that when selecting the target population of the graduate survey, one to five-year graduates must be included since older graduate's response rate are typically lower and much more difficult to trace than the younger ones. Furthermore, the regular tracer survey's response rate is 50% and sometimes even lower than 25%. Schomburg also recommends regular repeated surveys.

Local Tracer Studies

In a tracer study conducted by Gines (2014) of the Philippine Normal University (PNU), graduates from 13 different programs were evaluated. 710 (41% from the total of 1444) respondents from 3 different batches of the year 2009 up to 2011 are included in their sample size. On the profile of the graduates, there are more females 76% than male 24%. Since the PNU is a teacher specialized university, teaching profession is heavily favored among females. Almost 97% of the respondents are full time and self-employed employees. Technical, knowledge, communication, leadership, problem-solving skills and competencies were important factors observed to be most useful in their current employment. 95.07% of the graduates agreed that the trainings and courses they have received from the university claimed to relate to the tasks in their current employment. In relation to this, 83.8% of the graduates found work after graduate, while 12.11% started working in less than a year. Furthermore, the tracer study also included the graduate's degree of satisfaction with the following services, facilities and learning environments of the university. Rodie and Klein (2000) concluded that if an institution has important educational facilities with effective teaching and training staff, the student would likely be more motivated, loyal and successful at the academic level. The study recommends to also include employers of the graduates as respondents.

A tracer study was conducted at the Leyte Normal University to evaluate the employability status of the Information Technology graduates (Verecio et al., 2017). The tracer study consisted of 106 graduates from the B.S. Information Technology program batch 2010 up to 2013. The study included interviews with the graduates as their method of data collection. Based from the general profile, most graduates were single (94.64%). Being single means that an individual opts to be more versatile, is much more willing to travel, has lower health benefits but a higher degree of dedication that is more appropriate for the company (Nadler & Stockdale, 2012). The study confirms that the graduates did not have difficulties in finding jobs with majority of the graduates (48.1%) found work within 0-4 months after graduating. Job satisfaction including health benefits is also an important factor mentioned in the tracer study since it is generally perceived to be linked to productivity.

The Pangasinan State University (PSU) conducted a tracer study in the School of Advanced Studies (SAS). (Gonzales, Bautista, & Gelido, 2019). The study focuses on the advanced graduates of PSU-SAS rather than undergraduate

alumni. The respondents involved are the 89 graduates of Master's in Education, Doctor of Philosophy and Doctor of Education programs from the academic year 2013-2017. As of the civil status 60% of the graduates were married this means that having a stable job may influence an individual to start a family. Comparing the study in the PNU (Gines, 2014), female graduates are 60% more dominant among the males which is at 39%. This result proves that teaching is a female-dominated profession. The Salary grade of the graduate is considered in the study, the promotion status and waiting time are included in the analysis. The average waiting for the graduate to be promoted is around 2-3 years. The extent of the adequacy of skills learned by the graduates evaluated in the tracer studies are knowledge and technical skills, research skills, leadership skills, human relation skills and communication skills. These skills were mostly "highly adequate". In terms of the graduate's degree of satisfaction on general services and facilities, they were on average "satisfied". However, the degree of satisfaction regarding the learning environment, graduates are "highly satisfied".

Foreign Tracer Studies

Recently, Malta has seen a rise in stakeholders' involvement in graduate monitoring and their employability. A tracer study was conducted to analyze the graduate's performance on the labour market (Cosser, 2003). Respondents were the graduates of all academic and vocational licensed further studies and higher education institutions in the years 2013 to 2014 and was tasked to complete an online survey. Out of the total 1480 responses from the online survey, only 781 (52.77%) are considered valid. Key findings in the study are focused on the graduate's educational background, mobility and the transition into the labour market. Better job opportunities are the factors most commonly selected by students to pursue their studies (62.2 %). With regards to the employment situation of the graduates, 472 (60.4%) were currently employed and more than half of the employed graduates were found to be in managerial or professional occupations. 47% of those employed graduates found work within 12 months after graduation. Graduates were also asked for the difficulty in finding employment and 65.7% of the graduates mentioned that lack of experience was the reason. Comparing the sector in which the graduates are currently working, 66.2% of graduates are in the private sector. However, there are differences in the sector of employment depending on the field of study. Education and Health & Welfare had the most shares in the public sector and there are also more females than males. Of all those graduates who continued their studies after completing their qualification in 2013 and 2014, 8.9 percent are currently studying abroad. Those graduates who study abroad frequently pursues a Masters or a Doctorate degree. This means that graduates with a higher education backgrounds pursues further studies abroad. Moreover, graduates without higher education are on average older and might have already their own families and responsibilities in Malta which makes it difficult to travel abroad to study. The research study recommends the continuation of studies after graduation is important in promoting interest and accomplishment in further and higher education in Malta. It is relevant both in terms of encouraging future progress and economic growth opportunities and in terms of reducing socio-economic disparities.

The World Bank Scholarships program provides mid-career professionals and researchers fund sources for graduate studies in development-related fields. The graduate tracer studies focus on the graduates of the Joint Japan / World Bank Graduate Scholarship Program (JJ / WBGSP). The graduates are from developed countries who are applying for a development-related master's degree program. The study respondents are 783 graduates out of the 3,355 contacted through e-mail from the years 1987 to 2015. The study explained that based from the survey, there is a "fatigue-factor" among the graduates who are in the advanced stages in their career and are less likely to answer the tracer survey. The study used several indicators that helped track and measure the impact of the scholarship specifically on each development level. The individual level or the scholar level indicators discussed the employment status of the graduates. 90% of the graduates are employed full time and 5% were working part time. Of the remaining graduates, 3% are pursuing studies at the PhD level. Employment status was also analyzed by gender and what types of organization are they working on. 92% of the male population are working full-time as compared to females at 85%. The study claims that men tend to be more engaged than females in the workforce. Working in the organization, 43% of the graduates are employed in the government. Some are also employed in non-government organizations at 17%, 12% are working in universities and research institutes. In the private sector only 11% of the graduates are employed. Career advancement is also one of the measured indicators, the survey showed that graduates in the managerial position increased significantly from 36% to 72% after completing the scholarship program. Acquired skills, increased income and achievements of professional recognition are also important indicators in the individual level. 88% of the graduates reported that they have received salary increase after completing their masters degree scholarship program. At the institutional level, the increase in roles and responsibilities, improvements to the institution, application of skills acquired and contribution to the institution are important indicators. The study reveals that increase and knowledge and skills equipped the graduates to be able to contribute to policy, strategic or structural changes at their institution.

At country level, indicators measure the impact of the scholarship program are graduates returning home to work and contribute for the improvement and develop for their home country. Study reveals that 74% of graduates are currently working for their home country. Other indicators are the sharing of skills and knowledge acquired, participation or facilitating association activities and volunteer work as part of the contribution to the society. 65% of the graduates imparted gained knowledge through lectures, training, publications and informal talks. The study also suggests that graduates that started a new business or a non-government organization can also be a measured indicator in a country level. 22% of the graduates have started their own businesses that can provide the local community rewarding careers that also can boost and improve their contributions to the sustainable development in their countries (Yazigi, n.d.).

3. Methodology

This paper will use AHP in ranking the indicators to be used for the Impact Assessment study. The weights were identified by the DOST-SEI Deputy Director and Officer-In-Charge of the Scholarship Division. The data to be used is from the DOST-SEI tracer study.

DOST-SEI SCHOLAR GRADUATES TRACER
(Tracking Actual Career Experience Report)

General Directions: Please read each item carefully and answer as accurately as you can. Write answers in block letters and please do not leave any item unanswered. Mark check ( ) appropriately in the box provided. Your answers will be valuable inputs towards the improvement of the DOST-SEI Scholarship Programs. Kindly mail this form to tracerdostsei@gmail.com or submit it at the Research Unit of Science Education Institute office, Science Heritage Bldg., DOST Compound, Bicutan, Taguig City. You may fax this also at (02)-8371925 or sign up/update online at **www.sei.dost.gov.ph/tracer**

I. PERSONAL INFORMATION

NAME: _____ **SEX:** Male Female
(LAST NAME) (FIRST NAME) (MIDDLE NAME OR MAIDEN NAME) (SUFFIX NAME)

PRESENT ADDRESS: _____ **DATE OF BIRTH:** ___/___/_
(HOUSE NO. OR LOCATION, STREET, PUROK/SUBDIVISION NAME, BARANGAY, MUNICIPALITY, CITY/PROVINCE, REGION) (MM) (DD) (YYYY)

EMAIL:_____ **CELLPHONE NUMBER:**_____ **TELEPHONE NUMBER:**_____ **CIVIL STATUS:** _____

II. DOST SCHOLARSHIP INFORMATION

LEVEL / COURSE COMPLETED	PROGRAM TYPE	SCHOOL	YEAR AWARDED	YEAR GRADUATED	AWARDS RECEIVED
Technical / Technician: (Course Taken) _____	PROGRAM A: RA 7687 RA 10612 PROGRAM B: MERIT OTHERS: _____ JLAP / JLSS SCHOLARSHIP PROGRAM IN BSE PHYSICS COOPERATIVE PRE-SERVICED ED. FOR SCIENCE AND MATH TEACHERS				
Bachelor's Degree: (Course Taken) _____	PROGRAM A: RA 7687 RA 10612 PROGRAM B: MERIT OTHERS: _____ JLAP / JLSS SCHOLARSHIP PROGRAM IN BSE PHYSICS COOPERATIVE PRE-SERVICED ED. FOR SCIENCE AND MATH TEACHERS				
Masters Degree: (Course Taken) _____	ASTHRDP OTHERS: _____ ERDTP DOST-HRDP (OFF CAMPUS / REGULAR)				
Doctoral Degree: (Course Taken) _____	ASTHRDP OTHERS: _____ ERDTP DOST-HRDP (OFF CAMPUS / REGULAR)				

III. CURRENT EMPLOYMENT INFORMATION

EMPLOYMENT TYPE: Employed, Locally Employed, Abroad Self-Employed Unemployed **SINCE:**_____

FOR THOSE WHO ARE CURRENTLY EMPLOYED / SELF EMPLOYED (LOCALLY & ABROAD):

Occupation: S&T Non-S&T (Please Specify): _____

If **S&T** Occupation choose one category below:

Engineering & Technology Agricultural and Veterenary Science IT / ICT
Life Sciences Medical and Health Sciences Mathematicians, Actuaries and Statisticians
Physical and Earth Sciences Science / Mathematics Teaching
Others (Please Specify): _____

Sector: Government
Private NGO/Foundation Academe Others (Please Specify): _____

Status of Employment: Permanent Temporary Contractual Part-Time
Job Order Others (Please Specify): _____ **Current Position / Designation:** _____
_____ **Name of Company:** _____
_____ **Address of Company:** _____
_____

FOR THOSE WHO ARE CURRENTLY UNEMPLOYED:

Reason(s) for Unemployment:

Pursuing Graduate Studies Family / Personal Matters End of contract and now looking for a job
Recently Resigned and still looking for a job Preparing for licensure exam
Recently graduated and looking for a job Planning / Preparing to work abroad
Others (Please Specify): _____

IV. SIGNIFICANT ACCOMPLISHMENTS / CONTRIBUTIONS TO S&T DEVELOPMENT
(e.g., Publications / Research / Patents / Inventions / Awards / Recognitions, etc.)

_____
_____
_____

Accomplished by:_____ **Date Accomplished:** _____
Signature *(mm/dd/yyyy)*

Keep your DOST-SEI Family INFORMED. Thank you very much!

---TRACER Form (Revised 2019)---

Figure 1. The DOST-SEI Tracer Form for Scholar Graduates

The figure above shows the tracer form used by DOST-SEI. The form is given to scholars who had completed the scholarship duration. Scholars may manually fill up the tracer form or use the online tracer available at the DOST-SEI website, http://www.sei.dost.gov.ph/tracer. It mainly consists of four parts namely (1) Personal Information, (2) Scholarship Information, (3) Current Employment Information, and (4) Significant accomplishments or contributions to S&T development. Using significant fields from this form, we identified the following indicators with their corresponding metrics and values.

Table 1. Impact Assessment Indicators

Level of Development	Indicators	Metrics	Values
Individual or Scholar Level	Undergraduate Course	Current completion status	Completed earlier, completed on-time or Completed with extension
	Graduate Course	Current completion status	Completed or Ongoing
	Service Obligation	Current service obligation Status, no. of years started working after graduation	Completed or Ongoing: Started working 0-2 year,3-4 years, more than 4 years after graduation
	Awards / Recognition	Type, No. of awards/recognition	Academic Distinction or Other exemplary awards: > 6, 5-6, 3-4, 1-2 awards
Institutional or Work Level	Work Status	Current status of employment, No. of years employed per status	Permanent: > 5, 3-5, 0-2 years or Non-Permanent: >5, 3-5, 0-2 years
	Work Position	Current work position status, No. of years per work position status	Top Management: > 5, 3-5, 0-2 years, Middle Management: > 5, 3-5, 0-2 years, or Frontline Management: > 5, 3-5, 0-2 years
	Trainings	Type of Training, No. of hours	International: > 100, 51-100, 1-50 hours or Local: > 100, 51-100, 1-50 hours
Society or Country Level	S&T Field Related	Current S&T relevance of work/study	S&T related or non-S&T related
	Business Ownership	No. of employees	> 100, 51-100, 11-50 or 1-10 employees
	Publications/Researches	Type, No. of publications/researches	International: > 7, 5-6, 3-4, 1-2 pub/res or
			Local: > 7, 5-6, 3-4, 1-2 pub/res
	Membership in organizations	Type, No. of membership	International: > 7, 5-6, 3-4, 1-2 org or
			Local: > 7, 5-6, 3-4, 1-2 org

The table above shows the impact assessment indicators with its respective metrics and values. It is divided by level of development namely: (1) Individual or Scholar Level which corresponds to the scholars' accomplishment of completing the course and service obligation, (2) Institutional or work level corresponds to the accomplishment of the scholar from his/her work, and (3) Society or the country level corresponds to the achievements that have an impact to the S&T community as well as other people's life. Complete description of the indicators is listed in appendix A.

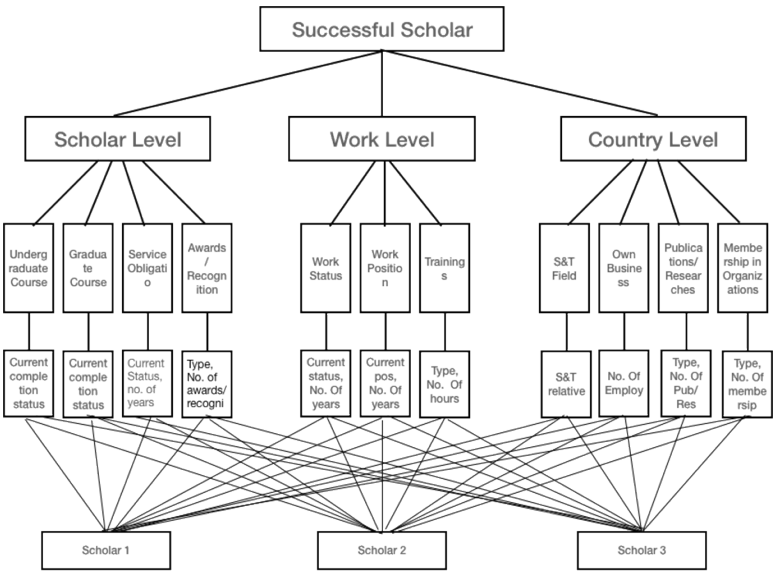
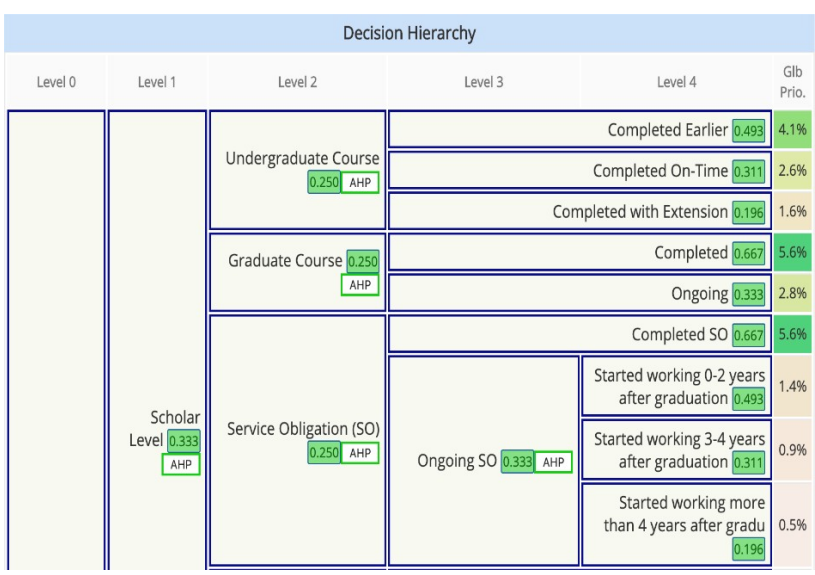
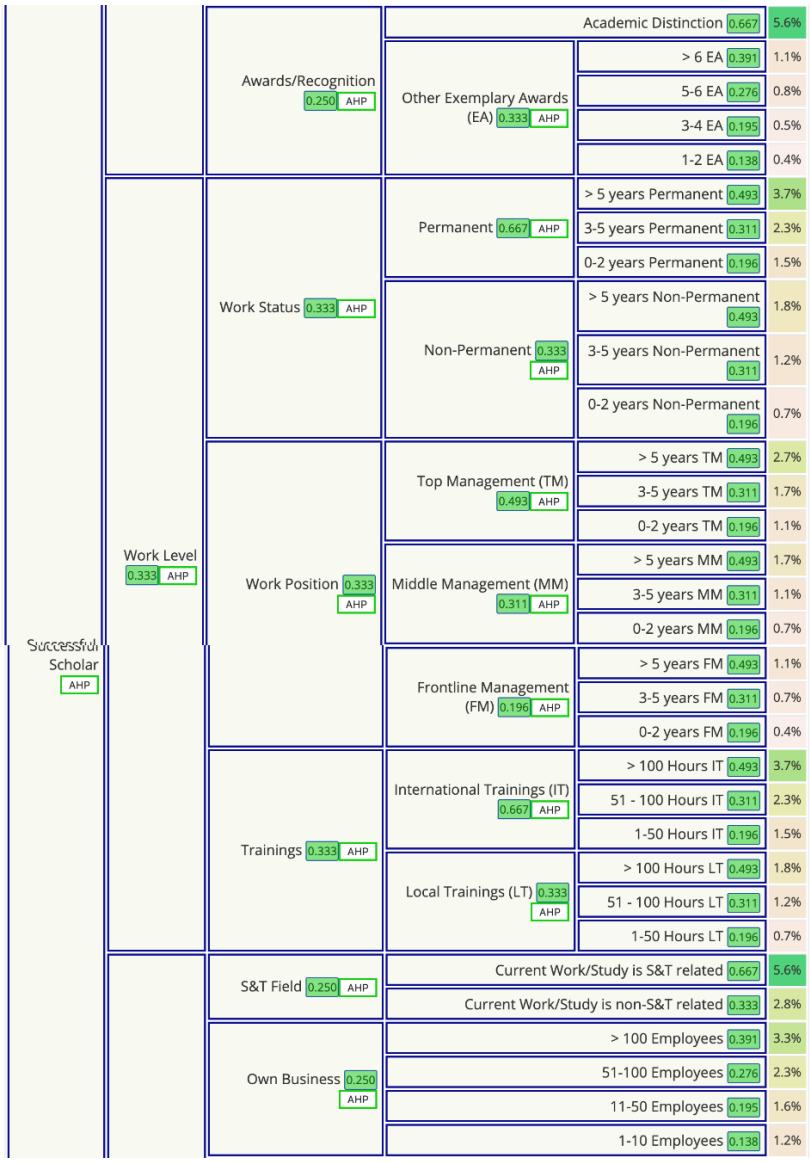


Figure 2. The AHP Model

The AHP Model as shown in figure 2 represents all the indicators and their criteria in different levels. The top level or level 0 is the goal wherein the indicators are bound to define if what is a successful scholar. Level 1 are the main criteria that refers to the three levels of development of a scholar namely scholar level, work level and country level. Level 2 refers to the sub-criteria wherein specific indicators are presented for each level of development. For the Scholar level, the indicators are Undergraduate course, graduate course, service obligation and awards/recognition. For the Work level, the indicators are Work status, Work position and Trainings. While for the Country level, the indicators are S&T Field relationship, Business ownership, Publications/Researches and Membership in Organization. Level 3 of the AHP is more on defining the metrics to be used by the specific indicators such as completion status for the undergraduate and graduate course, completion of service obligation, type and number of awards/recognitions, type and number of years in work status, type and number of years in work position, type and number of training hours, relativeness of current work/study to S&T fields, number of employees in a business, type and number of publications/recognition, and type and number of membership in organizations. The last level is about the alternatives, the scholars.





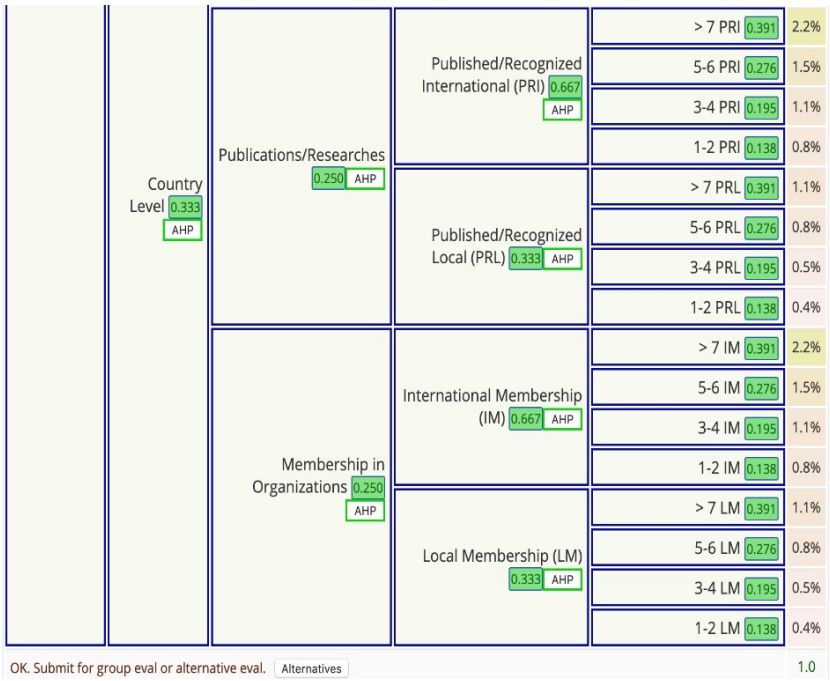


Figure 3. Decision Hierarchy Table using AHP-OS

As per consultation and agreement with the Deputy Director and Officer-In-Charge of the Scholarship Division of SEI, proper weights were given to the indicators. We use AHP online software named AHP-OS from https://bpmsg.com to properly compute for the weights using pairwise comparison and creating the Decision Hierarchy Table. The level 1 & 2 indicators are listed in appendix B as examples on how the AHP-OS computes for the ranking. The complete ranking of all the indicators are presented in the Decision Hierarchy Table above.

The Decision Hierarchy Table shows the specific weights for all the criteria and sub criteria. The total score is equivalent to 1.0. The indicators with high scores are represented in green color while the low scores are represented on more light colors. Based on the table, the indicators with the highest score (> 4) are early completion of undergraduate course (4.1), completion of graduate course (5.6), completion of service obligation (5.6), academic distinction awards/recognitions (5.6), relativeness of current work/study to S&T fields (5.6). Followed by indicators with average scores (>=2, <=4) namely on-time completion of undergraduate course (2.6), ongoing completion of graduate course (2.8), having a permanent work for 3-5 years (2.3) or more than 5 years (3.7), being part of top management for more than 5 years (2.7), international trainings for 51-100 hours (2.3) or more than 100 hours (3.7), business ownership with 51-100 employees (2.3), more than 7 publications/researches in international level (2.2), and more that 7 memberships in organizations with international level (2.2). The remaining indicators are scored below 2.

4. Results and Discussion

The Tracer Database

Year of Award	Scholarship Period														Assessment		
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
2005															33	0	33
2006															34	2	36
2007															86	2	88
2008															81	0	81
2009															104	3	107
2010															36	5	41
2011															33	0	33
2012															144	20	164
2013															238	17	255
2014															446	78	524
														Total	1235	127	1362

Table 1. The survey size from the tracer database

The table above shows the survey size for the impact assessment. Those who have filled up or submit the tracer forms from 2019-2020 who had been awarded with scholarships starting from year 2005 up to 2014 are part of the study. Also, it can be observed that the survey population given that an undergraduate scholarship program has a maximum duration of five (5) years are already graduates at the time of the assessment.

Indicator	Criteria	Year of Award										Total
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Gender	Male	21	18	52	43	36	23	14	74	99	207	587
	Female	12	18	36	38	71	18	19	90	156	317	775
Total		33	36	88	81	107	41	33	164	255	524	1362
Degree	Undergraduate	33	36	86	80	104	37	30	161	246	512	1325
	Graduate	0	0	2	1	3	4	3	3	9	12	37
Total		33	36	88	81	107	41	33	164	255	524	1362
Work Status	Permanent	19	25	67	64	78	34	24	86	120	149	666
	Non-Permanent	14	11	21	17	29	7	9	78	135	375	696
Total		33	36	88	81	107	41	33	164	255	524	1362
Work Sector	Academe	1	2	5	2	7	0	3	11	11	28	70
	Government	3	4	17	18	19	10	14	28	76	69	258
	Other Sector	29	30	66	61	81	31	16	125	168	427	1034
Total		33	36	88	81	107	41	33	164	255	524	1362

Table 2. The tracer database basic statistics

The table discusses the distribution of scholars from 2005 to 2014 with the following indicators and criteria. There is an increasing trend in the population of individuals who participated in the tracer study over the years. Only 33 were awarded in 2005 whereas on 2014 which is at 524. Based from gender, we can observe that females are more dominant than their male counterparts. In terms of the degree of education, there is a significant difference between the number of undergraduates and the number of graduate scholars awarded. On the employment work status of the scholars, we can observe that from the year 2005 up to 2012 there are more permanent employees than non-permanent. However, on the latest years of 2013 and 201, the non-permanent graduates outnumbered the permanent employees. With regards in which sector the scholars are currently working in, 1034 scholars are working on other sectors. Scholars working on government agencies numbered at 258 followed by scholars working in the academe at 70.

Impact Assessment Results

Indicator	Criteria	N	Levels of Development			Total
			Scholar Level	Work Level	Country Level	
Gender	Male	587	0.115	0.077	0.048	0.241
	Female	775	0.114	0.076	0.047	0.237
Average			0.115	0.077	0.048	0.239
Degree	Undergraduate	1325	0.112	0.076	0.047	0.236
	Graduate	37	0.191	0.084	0.056	0.330
Average			0.152	0.080	0.051	0.283
Work Status	Permanent	666	0.127	0.094	0.052	0.273
	Non-Permanent	696	0.103	0.059	0.044	0.206
Average			0.115	0.077	0.048	0.239
Work Sector	Academe	70	0.124	0.064	0.055	0.243
	Government	258	0.130	0.078	0.053	0.261
	Other Sector	1034	0.110	0.077	0.046	0.233
Average			0.121	0.073	0.051	0.246
OVERALL		1362	0.114	0.077	0.048	0.239

Table 3. Results of the Impact Assessment

Based on the results table, it is observed that there is a higher score for male scholars (0.241) compared to female scholars (0.237). The sample size for male scholars is smaller than female and higher in scores in all development levels. Those who have completed graduate degree (0.330) is expected to have higher score compared to those who have complete undergraduate degree (0.236) only. They also have higher scores in all levels. Those with permanent

work (0.273) have higher scores than with the non-permanent (0.206). Moreover, scholars working in the Government sector (0.261) has the highest score among all work sectors, followed by those who are working in the academe (0.243) and with other sectors (0.233). Scores with red marking are scores above the overall scores or average score.

The scores were relatively low because of the existing Tracer Database does not include records of some of the indicators such as year that started working for the service obligation for the scholar level, number of training hours for work level, number of employees for those who have established business, type and number of publications/researches and membership in organizations.

5. Conclusion

This study concludes that the use of AHP and Decision Hierarchy Tables is applicable in ranking and validating the indicators in the impact assessment of the DOST-SEI undergraduate scholarship programs. The results are valid and supported by previous studies locally and internationally. Moreover, the researchers also found the model be effective in assessing specific group or other scholarship programs of DOST-SEI for decision-making process and policy recommendations. More recommendations, based from the results of the study are detailed below:

a. Scholarship program for Straight BS-MS, MS-PhD and BS-MS-PhD Degree

The completion of a graduate degree program is an indicator of economic growth as per UNESCO, based on the assessment there is a low number of scholars that participates in the graduate degree programs. The increase in number of scholars for graduate studies will significantly increase the assessment of the scholarship program.

b. Capacity building for government and private tertiary schools.

Aside from scholarship programs, the availability and the location of schools offering graduate courses can also be a deterrent for scholars to take masters or doctoral degree. Scholars located outside central administrative areas may not have access to schools that offer graduate studies. School in these areas may be considered to undergo capacity building for them to be qualified to offer graduate studies.

c. Partnership with Government, Academe, Private and other sectors creating Jobs for scholar graduates.

A partnership with different sectors is recommended so that the scholar-graduates can have significant jobs after graduation. As per results of the study only few of the scholars are working with academe and government. Government departments and other groups may partner with DOST-SEI in hiring scholars to be skilled employees for their organization.

d. Job hunting seminars and other post-graduate activities for scholar graduates.

There is a significant percentage of scholars that represents those who are working but not under permanent position. Seminars and other post-graduate activities may capacitate scholars for jobs that offer permanent position. Moreover, activities for incubating or creating their own business can also improve the impact assessment scores. Updating of Tracer System or alternative programs for gathering data for tracer studies.

Some important field that act as indicators is not properly recorded in the tracer database. A more detailed record is recommended for better assessment of the scholarships program. The location, years of work, number of researches are some of the fields lacking from the current tracer database.

e. Use of the model for predictive analytics.

The model from this study, considering modifications based on further studies may be used by a data warehouse for predictive analytics. DOST-SEI administrators may use this to further assess and create more effective and efficient programs in real-time.

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