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EDITOR'S NOTE

Amidst adversities, the Cagayan State University at Aparri continuously engaged in the generation of new science-based knowledge, innovations in fisheries and aquatic sciences, as well as community-oriented researches.

The funded project of the team led by Dr. Molina was able to document existence and level of heavy metal content and other contaminants in freshwater clam caught from the wild and organically-cultured clams. The significance of the project greatly impacts food security and sufficiency in the area. Meanwhile, the team of Prof Del Rosario provided us robust insights and relevant findings on glass eel gathering at Gonzaga Cagayan. They concluded that glass eel gathering is both a livelihood opportunity and a threat to biodiversity, leaving recommendations for policy implementations. Processing procedure has been presented in the product development of fish powder by Dr. Molina based on locally produced flying fish. Still on product development, Dr. Velasco formulated an aramang-based spread and documented consumer acceptability in the paper. Dr. Javier revealed in his paper management practices, issues, and concerns relating to management of Aramang fisheries as basis for designing and developing IT solutions. Another product development project headed by Dean Battung has formulated aramang-based baked products with malunggay. The team headed by Dr. Javier presented an analysis of the assessments made in the study InFORMS – an IEC initiative to Knowledge-sharing and utilization. In support to food security, Dr. Malana ventured in her paper DNA barcoding of marine bivalve Meretrix Karibuyo in Northern Cagayan. Dr. Mata documented in her paper factors of sexual and non-sexual risk-taking behaviours of College students.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

TABLE OF CONTENTS

Post-harvest Technology for Tilapia

Lenimfa P. Molina,PhD., Simeon R. Rabanal, Jr., PhD., Eunice S. Daluddung & Rowella A. Racilles
Cagayan State University-Aparri

ABSTRACT: Fish provides a good source of high-quality protein and contains many vitamins and minerals which is vital for the healthy functioning of the human body. Tilapia flesh is white, and it has been a good substitute for the declining supply of other white fish. This study generally aimed to formulate Ready-to-Cook frozen tilapia fillet, to determine the sensory qualities of frozen vacuum-packed tilapia fillet and to determine the microbial load of the frozen vacuum-packed tilapia fillet, and its shelf life based from the sensory and microbiological evaluation, and determine the nutritional facts of the different formulated products, as well as to determine its Return of Investment (ROI). The general processing steps included washing the raw material, filleting, preparing the brine solution and mixing the marinating ingredients. The study made use of Three variants: Variant A (Spicy Pickled) was composed of 1kg tilapia fillet, 10% brine solution by mixing 100 grams salt in 1,000 mL water. 22.25 grams white sugar, 500 ml white vinegar, 4 grams cayenne pepper, 7.8 grams garlic powder, 9 grams black pepper, 16.5 grams hot sauce, and 6 grams paprika to make a marinating solution. Variant B (Hamonado) was composed of 1kg tilapia fillet, 10% brine solution by mixing 100 grams salt in 1,000 mL water and 300 grams brown sugar, 2.0 grams ground bay leaves, 5.0 grams nutmeg, 5 grams black pepper, 50.0 grams Prague powder, 5.0 grams paprika to make a marinating solution. Variant C (Classic) was composed of 1kg tilapia fillet, 10% brine solution by mixing 100 grams salt in 1,000 mL water The products went through sensory evaluation tests with the participation of 10 Laboratory panelists. Product characteristics i.e. odor, color, taste and general acceptability were evaluated. The data was analyzed using Analysis of Variance (ANOVA). The result showed that Variant A (Spicy Pickled) was characterized as the most preferred product in terms of its odor, color and taste. Variant A (Spicy pickled) possessed the following sensory characteristics “moderately fishy odor with desired sour and spicy odor”, “slightly white color”, “moderately blend of sour and spicy taste” and for its general acceptability it was described as “like extremely”. Based on sensory and microbial test results, the product’s shelf-life was 12 weeks. According to Hossain et. al (2005), he explained that the quality of the fish will not improve in freezing but it only allows the fish to extend the shelf life of fish or fishery product. Additionally, the loss of quality can occur in both before and after freezing. These are during the handling and processing of the fish. In addition, (Agustini, 2002) reported that the higher the storage temperature, the faster the change in freshness of the fish. The proximate analysis in the Spicy Pickled tilapia fillet; crude protein (71.60%), crude fiber (0.50%). Crude fat (8.71%), moisture (9.22%), and ash (9.40%), Hamonado tilapia fillet; crude protein (66.28%), crude fiber (0.50%). Crude fat (4.89%), moisture (9.22%), and ash (12.26%), and Classic tilapia fillet; crude protein (64.59%), crude fiber (0.60%). Crude fat (6.93%), moisture (18.95%), and ash (9.47%) Result revealed that Spicy Pickled tilapia fillet have the highest crude protein compared to the other two formulated products. Generally, all the products are good to our health because it has a high level of protein which is necessary in making muscle tissue. The Three Variants had computed ROI of 55% (Spicy Pickled), 64% (Hamonado) and 74% (Classic), indicative of profitability.

Keywords: *Frozen Tilapia Fillet, Technology, Profitability, Sensory Evaluation*

INTRODUCTION

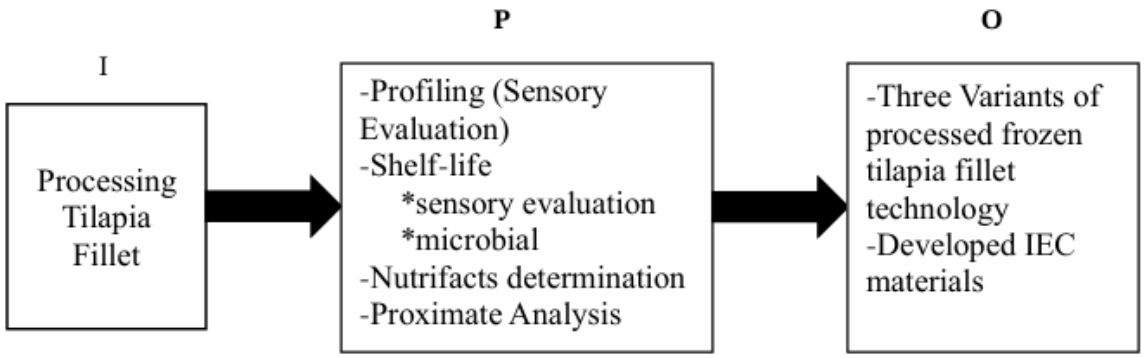
Fish is an important fishery resource for human worldwide. It is primarily used as food. Tilapia is the oldest farm-raised fish in the world. It has progressively grown popularity since 2002 when it first entered top 10 lists of the most frequently consumed seafood product in the United States. It is currently the 4th most popular type of fish behind tuna, salmon and Alaska Pollock and the 3rd most popular aquaculture or farm-raised seafood product behind shrimps and salmon (Seafood Health Facts, 2011). Tilapia has risen in importance in recent years, and now represents the 5th most popular and consumed fish in America. It is mild white fish that is easy to farm, affordable to buy and doesn’t have the unattractive “fishy” taste that many people dislike about seafood. Experts predict that tilapia will remain popular selection due to its mild flavor and taste, versatility in preparation and competitive prices. Nile tilapia (O. niloticus) is a tropical climate fish of considerable rusticity for cultivation, with a deliberate flavor (Medri et al., 2009). Oreochromis and other fish has been one of the main foods for humans for many centuries and still constitutes an important part of the diet in many countries because it contains high level of proteins, water, fat or lipid, and other nitrogenous compounds, as well as mineral components (obemeata,2011). In addition to this, it is very valuable fish due to its delicious and prolific nature and high market demand (omojowo,2010). Oreochromis sp. rapidly expanding and tilapia including all

species are second most widely farmed in the world annual production exceeding 2 million tons in 2005. Today an important component of the growing tilapia industry is the Taiwan province of China, nut the USA market preferred fillet, which initially supplying Jamaica Columbia and Costa Rica as fresh product. Today, fresh fillet is available in different sizes and packages, as skin-on, skin-off, deep-skinned, individually quick frozen, smoked, [or] sashimi forms and treated by CO or Ozone dipped (Odoli O, 2009). Microbial activity is responsible for spoilage of most fresh fish products. The shelf life of fish products, therefore, is markedly extended when products are stored at low temperature. However, in the temperature range of 0-25*C, microbial activities are greatly influenced by temperature. However, in the industrialized countries, it is common practice to store fresh fish in ice at 0*C (Liu et al., 2009). They found that enzymatic and microbial activities activity is relatively more important, and temperature changes have greater impact on microbial activity is relatively more important, and temperature changes have greater impact on microbial growth than the enzymatic activity. This is because many bacteria are unable to grow at temperatures below 10*C and even psychotropic organisms grow very slowly when temperature approaches 0*C (Obemeata et al., 2011). Quality deterioration of fresh fish is cause by lipid oxidation and microbial spoilage. The advantages of fish as to food are its easy digestible and high nutritional protein value. The present paper reports the sensory as well as the microbial evaluation of the frozen tilapia fillet stored in the freezer. Economic growth is coupled with high-demand for “ready-to-cook” or (ready-to-eat” food products which are sold nowadays in grocery stores. The improvement of peoples living standards, the situation that majority of mothers in the households need to work to augment the needs of the family and the busy schedules of office workers increased the popularity of convenient food products. The food people need during the time of calamities could also be in the form of convenience food products which are ready-to-eat”. It is believed that the emerging category of value-added meal supports the development of the safe and ready-to- eat clam products. This scenario motivated the researchers to develop “convenience products” to meet the needs of the people. There have been value adding researches undertaken by the Bureau of Fisheries and Aquatic Resources (BFAR) on tilapia where it was utilized in making longanisa, nuggets, tocino, tilapia rolls, baked tilapia, breaded tilapia, stuffed tilapia and tortilla crusted. However, in the province of Cagayan, we could not find frozen fillets sold in the grocery stores and other food establishments, Thus, Cagayan State University-Aparri Campus proposed a research study on the product development from tilapia under the DOST-PDTC. As a result of their initiatives, three variant of tilapia fillets were developed such as Spicy Pickled, Hamonado and Classic tilapia fillet variant. However, the study on the sensory qualities, microbial and acceptability of the formulated Frozen Tilapia Fillet Variants has not been conducted, hence, this study was conceived.

Objectives

Generally, the research project aimed to determine the sensory qualities, shelf-life, nutritional facts, general acceptability and ROI of ready-to-cook (RTC) Frozen Tilapia Fillets. Specifically, this research project aimed to: 1. Determine the sensory qualities of the different variants of frozen tilapia fillet. 2. Determine the shelf-life of the different formulated products. 3. Determine the nutritional facts of the different formulated products. 4. Determine the ROI of the different formulated products.

Conceptual Framework



Methodology

Raw material

Tilapia are very important in world fisheries, and are the second most important group of food in the world (El-zaeem., et al, 2012). The importance of the growing tilapia industry is the proliferation of various product forms (FAO, 2006c). Today, fresh frozen tilapia fillets are available in different size and packages, as skin off, skin on, deep skinned, individually quick frozen, smoked, or sashimi and pre-treated by carbon monoxide or ozone dipped (FAO, 2007).

Products were formulated accordingly. The whole fish was utilized to formulate products such as frozen fillet in three (3) variants namely: Spicy Pickled, Hamonado and Classic (Molina, 2017 unpublished).

Processing of the Frozen Tilapia Fillet

Spicy Pickled Tilapia fillet

Spicy Pickled tilapia fillet had the following basic general processing steps which included: treatment of the raw material (washing, heading and gutting); deboned tilapia to produce fillets; marinating (10% brine solution with marinating ingredients and 45minutes soaking time); dewatering; vacuum packing and freezing.

Hamonado Tilapia fillet

Hamonado tilapia fillet production had the following basic general processing steps which included: treatment of the raw material (washing, heading and gutting); deboned tilapia to produce fillets; marinating (10% brine solution with marinating ingredients and 45minutes soaking time); dewatering; vacuum packing and freezing.

Classic Tilapia fillet

Salted tilapia fillet had the following basic general processing steps which included: treatment of the raw material (washing, heading and gutting); deboned tilapia to produce fillets; soaking (10% brine solution and 45minutes soaking time); dewatering; vacuum packing and freezing.

Sensory evaluation

The developed products were subjected and sensory evaluation. Members of the panelists were selected from the post-harvest staff of the campus. They are semi trained laboratory panelists who evaluated the sensory qualities of the developed products. Sensory evaluation was conducted to determine the sensory attributes of the developed products using the descriptive sensory evaluation for color, odor, taste. Each of the panelist were given score sheets and samples were presented for them to evaluate. The score sheets used is comprised of the 1-7 scale, where in the highest score is 7 and 1 is the lowest. General acceptability was also conducted to determine the acceptability of the products. The panelists were given a 1-7 hedonic scale score sheet.

Proximate Analysis

The processed Spicy pickled, Hamonado and Classic were subjected to proximate analysis. Samples were brought to DA Region 2 laboratory for the said analysis.

Microbial analysis

Samples for microbial analysis were submitted at Department of Science and Technology (DOST) Tuguegarao City.

Nutritional Fact analysis

Samples of the formulated products were submitted to the Department of Agriculture (DA) Laboratory for the Nutrifacts analysis.

ROI Determination

The study used ROI to calculate the money gain/ money lost or cost of investment.
The ROI formula used was

$$\textbf{ROI (\%)} = \frac{\textbf{Gain from investment – cost of investment (100)}}{\textbf{Cost of investment}}$$

Statistical tools

The gathered data were collated and tabulated accordingly. The project made use of weighted mean and ANNOVA to interpret the results of the study. The level of significance was tested at 5% level.

RESULTS AND DISCUSSION

The formulation of Spicy Pickled, Hamonado, and Classic tilapia fillet would provide new variety of fish product in the market that can provide a nutritionally balanced food item for human consumption. The huge

demand for frozen fillets and frozen value-added products drove much of that increase. The result of the sensory evaluation on the formulated products is presented in the following sections.

Quality Attributes of Vacuum-packed Tilapia Fillet

The sensory qualities of vacuum-packed tilapia fillet (odor, color, taste and general acceptability) were assessed using sensory evaluation. Each of the variants was evaluated by ten (10) semi-trained panelists. In order to get the most preferred product among the three variants, the statistical tool ANOVA was used and Tukey B method to determine the variance among samples. The result showed that there is a significant difference for taste of variant B and A while the other attributes have no significant differences. General acceptability was tested, Variant A was found to be the best variant among the three variants. On microbial load, Variant C was determined as the variant with the slowest microbial growth compared to the two variants.

Sensory qualities

The sensory qualities of 3 variants of Vacuum-packed Tilapia fillet were evaluated by 10 semi trained laboratory panelists using the score sheet for sensory evaluation. Quality attributes evaluated included odor, color, taste and general acceptability.

General Acceptability test

The Three different variants were subjected for evaluation on its general acceptability to determine the most acceptable product based on the panelist's assessment. Acceptability of the product was based on the panelist's reactions in terms of their liking or disliking the given product. Using the Hedonic Scale, score sheets (see Appendix A, B and C) were given to the panelist for them to check the appropriate scale based on their evaluation of the product.

Table 1. Average mean of all the trials per variant of Vacuum-packed tilapia fillet.

Variant A	**Odor**	**Color**	**Taste**	**General Acceptability**
Trial 1	3.2	3.3	3.1	4.1
Trial 2	3.7	3.5	3.9	4
Trail 3	3.8	3.5	3.5	3.9
Average mean	**3.6**	**3.4**	**3.5**	**4**
Variant B				
Trial 1	3.4	3.2	3.1	3.3
Trail 2	3.5	3.7	3.4	3.9
Trial 3	3.5	3.7	3.8	3.5
Average mean	**3.5**	**3.5**	**3.4**	**3.6**
Variant C				
Trial 1	3.3	3.3	3.1	3.4
Trial 2	3.4	3.6	3.7	3.9
Trial 3	3.3	3.5	3.3	3.5
Average mean	**3.3**	**3.5**	**3.4**	**3.6**

Table 1 shows the average mean score in color, odor, taste and general acceptability conducted every sampling per trial. Variant A obtained a mean score 3.6 for odor characterized as "moderately fishy odor with desired sour spicy odor",3.4 for color characterized as "slightly white color",3.5 for taste characterized as "moderately blend of sour and spicy taste", 4 for general acceptability as characterized as "like slightly". Variant B obtained a mean score 3.5 for odor characterized as "slightly fishy odor",3.5 for color characterized as "moderately white color",3.4 for taste characterized as "moderately blend of salty",3.6 for general acceptability characterized as "like moderately", Variant C obtained a mean score 3.3 for odor characterized as "moderately fishy odor with desired sweetness and salty odor", 3.5 for color characterized as "moderately white color", 3.4 for taste characterized as "moderately blend of sweetness and salty taste", and 3.6 for general acceptability characterized as "like very much".

Table 2. ANOVA table showing the Evaluation on the Sensory Quality of Odor, Color, Taste and General Acceptability of Tilapia fillet.

Attributes		Sum of Squares	Df	Mean Square	F	Sig.	Statistic reference
Color	Between Groups	1.750	2	.875	.763	.467	S
	Within Groups	684.890	597	1.147			
	Total	686.640	599				
Odor	Between Groups	.310	2	.155	.113	.893	NS
	Within Groups	817.690	597	1.370			
	Total	818.000	599				
Taste	Between Groups	11.373	2	5.687	4.421	.012	S
	Within Groups	767.900	597	1.286			
	Total	779.273	599				
GA	Between Groups	1.843	2	.922	.720	.487	S
	Within Groups	764.115	597	1.280			
	Total	765.958	599				

Table 2 reveals that there are no significant differences that exist among Variant A, Variant B and Variant C for odor. However, Variant A, Variant B and Variant C are significantly different for color, taste and general acceptability. This coincides with the work of National Historic Chemical landmark wherein they found that when frozen fish were later thawed, cooked and eaten, their taste was remarkably similar to the original fresh food. (NHCL, 2002).

Table 3. Result of the Proximate Analysis of frozen tilapia fillet.

Sample Description	**Crude Protein, %**	**Crude Fiber, %**	**Crude Fat, %**	**Moisture, %**	**Ash, %**
Hamonado tilapia fillet	66.28	0.50	4.89	9.22	12.26
Spicy Pickled tilapia fillet	71.60	0.50	8.71	9.22	9.40
Classic tilapia fillet	64.59	0.60	6.93	18.95	9.47

Table 3 shows the result of the Proximate Analysis of frozen tilapia fillet (Spicy Pickled, Hamonado and Classic) as presented in Tables. The following nutrient found in the Spicy Pickled tilapia fillet were; crude protein (71.60%), crude fiber (0.50%), crude fat (8.71%), moisture (9.22%), and ash (9.40%). For Hamonado tilapia fillet; crude protein (66.28%), crude fiber (0.50%). Crude fat (4.89%), moisture (9.22%), and ash (12.26%) and for Classic tilapia fillet; crude protein (64.59%), crude fiber (0.60%), crude fat (6.93%), moisture (18.95%), and ash (9.47%) it was found out that Spicy pickled tilapia fillet has the highest crude protein compared to other variants.

Cost profitability of the three variants of Vacuum-packed tilapia fillet.

The cost of production was computed where the raw materials and other labor cost were included. Expenses incurred and the number of piece's product produced was considered.

Financial Statement for Vacuum-packed tilapia fillet Production

Table 4. Cost and Return Analysis for Spicy Pickled Tilapia

Component	**Quantity**	**Total Cost**
Fresh tilapia	3 kls	360.00
Water	1 L	15.00
Salt	100 g	15.00
White sugar	22.25 g	13.00
White vinegar	500 ml	12.00
Cayenne	4 g	10.00
Garlic powder	7.8 g	5.00

Ground pepper	9 g	10.00
Hot sauce	16.5 g	20.00
Paprika	6 g	12.00
Electricity	1 hr	15.00
Labor	3 hrs	150.00
P.E bag		40.40
TOTAL COST PRODUCTION		**₱ 677.40**

Number of packs produced – 23 packs at ₱ 45.00/ pack

Total sales **- ₱ 1,035.00**

Net Profit **- ₱ 1,035.00 - ₱ 677.40 = ₱ 357.60**

ROI = $\frac{\text{Net Profit}}{\text{Investment}}$ X 100

ROI = $\frac{357.60}{677.40}$ X 100

= 52.79 %

A total of 3 kilos of raw material was used in the production of the Spicy pickled tilapia fillet. From this, 23 packs were made and it is sold at P 45.00 per pack. The total sales were ₱ 1,035.00. The return on investment (ROI) computed is shown below.

The ROI of 52.79 % indicates that engaging in this kind of entrepreneurial activity is promising.

The production of the Spicy Pickled tilapia fillet was found profitable for business as evidenced by the ROI, return on investment, of 52.79 %.

Table 5. Cost and Return Analysis for Hamonado tilapia fillet

Component	**Quantity**	**Total Cost**
Fresh tilapia	3 kls	360.00
Water	1 L	15.00
Salt	100 g	15.00
Brown sugar	300 g	13.00
Bay leaves	2 g	10.00
Nutmeg	5 g	10.00
Ground black pepper		10.00
Prague powder		10.00
Paprika	5 g	12.00
Electricity	1 hr (15/KWH)	15.00
Labor	3 hrs (50/hr)	150.00
P.E bag		40.40
TOTAL COST PRODUCTION		**₱ 660.40**

Number of packs produced – 24 packs at ₱ 45.00/ pack

Total sales **- ₱ 1,080.00**

Net Profit **- ₱ 1,080.00 - ₱ 660.40 = ₱ 419.60**

ROI = $\frac{\text{Net Profit}}{\text{Investment}}$ X 100

ROI = $\frac{419.60}{660.40}$ X 100

= 63.54 %

The production of the Hamonado tilapia fillet was found profitable for business as evidenced by the ROI, return on investment, of 63.54%.

Table 6. Cost and Return Analysis for Classic Tilapia Fillet

Component	**Quantity**	**Total Cost**
Fresh tilapia	3 kls	360.00
Water	1 L	15.00
Salt	100 g	15.00
Electricity	1 hr (15/KWH)	15.00
Labor	3 hrs (50/hr)	150.00
P.E bag		40.40
TOTAL COST PRODUCTION		**₱ 595.40**

Number of packs produced – 23 packs at ₱ 45.00/ pack

Total sales **- ₱ 1,035.00**

Net Profit **- ₱ 1,035.00 - ₱ 595.40 = ₱ 439.60**

ROI = $\frac{\text{Net Profit}}{\text{Investment}}$ X 100

ROI = $\frac{439.60}{595.40}$ X 100

= 73.83 %

The ROI of 73.83 % indicates that engaging in this kind of entrepreneurial activity is promising.

SUMMARY AND CONCLUSION

1. Variant A (Spicy pickled) possessed the following sensory characteristics: “moderately fishy odor with desired sour spicy odor”, with “slightly white color”, and it have “moderate blend of sour and spicy taste”. The product was “like extremely” by the panelists
2. The product’s shelf-life was 12 weeks based on sensory results.
3. Proximate analysis results revealed it was found out that Spicy Pickled tilapia fillet have the highest crude protein compared to the other variants. Nutritional Facts proved that all the products are good for our health because it has a high level of protein which is necessary in making muscle tissue.
4. The Three Variants had computed ROI of 55% (Spicy Pickled), 64% (Hamonado) and 74% (Classic) respectively which is indicative of profitability.

RECOMMENDATIONS

1. Soaking time for the three variants of frozen tilapia fillet is 45 minutes to obtained the desired flavor of the products.
2. Other species of fish should also be tested.
3. Use of thicker packaging material is recommended.

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VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
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School-Workplace Matching of Hospitality Industry Competencies

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ABSTRACT: This study aimed to find out whether competencies developed by the faculty among graduates' match with the needed competencies in the workplace. It specifically looked into the profile of the workplaces of the graduate respondents, the extent of the development of the skills developed by the faculty along general HIM competencies, basic skills, thinking skills and personal qualities, as well as the competencies possessed by the graduates as needed by the workplace along the same aspects. It also compared the difference between the competencies developed in school as perceived by the graduates, faculty and the workplace. Based on the findings of the study in terms of graduates' competency development, the competencies on information, interpersonal, basic, thinking and personal qualities are already developed in school as perceived by the faculty, graduates and the workplace.

Keywords: *School-workplace; matching of competencies; hospitality industry*

INTRODUCTION

Industry professionals often claim that what educators teach in the classroom is outdated (Gould, 2005). Technology, the workforce, hospitality and tourism products, and customers are constantly changing. As a result, relevant competencies will also evolve. Therefore, university faculty and industry professionals must work together to ensure that graduates will possess the necessary skills to enter the workforce successfully. Hence, classroom's transition to the workforce can be difficult. One transitional complication for college graduates is not being prepared to cope with the demands of industry. Graduates anticipate the industry will resemble the same structure experienced at institutions preparing them for their careers, and when it does not, the challenges of their employment create issues with their happiness and satisfaction. A greater reason for graduates not making a smooth transition into the workplace is because they are not equipped with the proper knowledge and skills needed for industry success (Peddle, 2012). With this dilemma, there is a need to look into the role of the school/university in preparing the HIM students into the workplace, most especially that a number of schools have opened up degree and non-degree programs in Hospitality Management, Hotel and Restaurant Management, and Tourism Management courses. The interaction then between employers and universities must be taken into consideration in any attempt to understand the way in which school/university are responding to the wider needs of Hospitality and Tourism Management Education courses.

While studies revealed that there is really a great supply than the demand, what other factors may contribute to the mismatch? Can it be that HIM graduates cannot meet the minimum requirements of the jobs they are applying for? Can it be that they lack the necessary skills required by their employers? On the other hand, how does an employer choose the right person from hundred applicants with the same class of degree? And while these students are in schools, what are the skills and knowledge their teachers are imparting unto them? It is therefore obvious that the skills HIM students develop while in school as well as the experience they gain are all contributory factors in order for them to cope with and prepare themselves to become globally competitive in the world of hospitality and tourism industry?

Certainly, there is a need for the Cagayan State University to set such parameter in order to know the appropriate competencies and skills that need to be developed among the BSHIM students. This is for the graduates to have an edge and be able to compete with the other graduates of big schools. The CHIM faculty of the Cagayan State University must have ways of knowing the right skills needed in the workplace to help mold and prepare students in performing their responsibilities and be competitive in the workplace.

This study was conducted to provide such necessary information needed by the University. Through this study, the Cagayan State University abled to know the different competencies required and needed in the industry workplace and with the information that was gained from this study, CHIM faculty of the University was able to prepare better and competent BSHIM students to be successfully and gainfully employed in the workplace. This study also provide the University necessary information that are much needed in guiding the students and trying its best to figure out what are the required and necessary skills to be applied in the different competencies needed by the industry for the students to become globally competent

STATEMENT OF THE PROBLEM/OBJECTIVES:

This study aimed to find out whether the competencies developed by the HIM faculty members among HIM graduates match with the needed competencies in the industry. Specifically, it sought to answer the following.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

1. What is the profile of the industry in terms of:

   a. Location
   b. Size
   c. Number of Years in Operation
   d. Nature of Workplace

2. To what extent do the following competencies developed by the faculty members as assessed by the faculty and graduates themselves and possessed by the graduates as assessed by the industry?

   1. General Hospitality Industry Competencies

      1.1 Housekeeping Management Competencies
      1.2 Food and Beverage Services Competencies
      1.3 Front Office Management Competencies

   2. Resource Competencies
   3. Information Competencies
   4. Interpersonal Competencies
   5. Basic Competencies
   6. Thinking Skills
   7. Personal Qualities

3. To what extent do the industry require the following competencies from the graduates:

   1. General Hospitality Industry Competencies

      1.1 Housekeeping Management Competencies
      1.2 Food and Beverage Services Competencies
      1.3 Front Office Management Competencies

   2. Resource Competencies
   3. Information Competencies
   4. Interpersonal Competencies
   5. Basic Competencies
   6. Thinking Skills
   7. Personal Qualities

4. Is there a difference on the extent of development of the graduates' competencies as assessed by the Hospitality Industry Management faculty members, Industry and the graduates themselves?
5. Is there a difference on the competencies of the HIM graduates as developed by the HIM faculty and as needed by the industry?
6. Is there a difference on the competencies possessed by the HIM graduates and as needed by the industry?
7. Is there a difference on the extent of development of competencies of HIM graduates when grouped according to:
   - Year Graduated
8. Is there a difference between the competencies of the HIM graduates as required by the industry when grouped according to the characteristics of the industry?
9. What competencies were identified by the HIM graduates and the industry to be needed in the next 5 years in order to achieve global competence?

MATERIALS AND METHODS

The study employed descriptive – correlational survey method. In order to determine whether the competencies developed among graduate's match with the needed competencies in the industry, an adapted questionnaire was be used from Secretary's Commission on Achieving Necessary Skill (SCANS) and is revised to suit the need of the graduates, faculty members and the industry and will be administered personally by the researchers to the respective respondents. There are three groups of respondents in this study: 1st group is the HIM faculty members of Cagayan State University –Aparri; 2nd is the HIM graduates from 2015-2017 who are working in the hospitality industry and the 3rd group is the immediate supervisors or employers of the graduates. The study used total enumeration for HIM faculty. For the graduates, purposive sampling is used because after listing all HIM graduates from 2015-2017, only those who are employed in the hospitality industry were considered. For the industry, total enumeration will be employed. Informal Interview was also conducted to substantiate data.

Frequency and percentage were used to treat the data specifically on the industry's profile and recommended competencies for global competence. Weighted mean is used to determine the extent of competency development among HIM graduates as assessed by the faculty members and the graduates themselves and the competencies possessed by the graduates and needed by the industry. T-test is used to determine the difference in the

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

competencies possessed by the graduates and needed by the workplace and the difference on the extent of development on the competencies of graduates according to course and year.

ANOVA is also used to determine the difference among the extent of competency development of the graduates as assessed by the faculty and the graduates and the competencies possessed by the graduates as assessed by the industry.

RESULTS AND DISCUSSION

This chapter presents the findings of the study in terms of tabular and textual presentation. The tables are arranged according to the variables under study.

Profile of the Workplace

Tables 1 to 4 show the characteristics of the workplace in terms of location, size, years of operation and classification.

Workplace Location

As gleaned in the table, majority of the 81 HIM graduate respondents' workplace are located in Cagayan with 55.60 %. On the other hand, 20 % are in Manila and only 6 % in Isabela. This implies that Cagayan Valley can provide HIM graduates with jobs within the region as revealed in the table and an aggregate percent of 38.2 are outside Cagayan that could provide HIM graduates with jobs. This also means that majority of HIM graduate respondents are working within the province.

The table further reveals that most of the respondents' workplace were located in the Philippines which further strengthen the idea that the country can provide jobs for the HIM graduates while there are two whose workplace are in abroad.

Table 1. Profile of the Workplace in terms of Location.

Location	**Frequency**	**Percent (%)**
Cagayan	45	55.60
Laguna	2	2.50
Isabela	5	6.20
Manila	16	19.80
Baguio	3	3.70
Ilocos	3	3.70
Makati	3	3.70
La Union	1	1.20
Boracay	1	1.20
Abroad	2	1.20
Total	**81**	**100**

Workplace Size

The size of the workplace is determined in terms of the number of full-time and part- time faculty. As shown in table 2, most HIM graduate respondents are employed in a medium enterprise having an employee range from 50 to 249 with a frequency count of 43 or 53.08%. 29.63% of the respondents were employed in small enterprise, 9.88% are working in large enterprise while the remaining 7.41% are working in a micro enterprise. It was noted that these respondents working in micro enterprises are those graduates who are working in hotels, inn and apartel located locally.

Table 2. Profile of the Workplace in terms of Size

Size	**Frequency**	**Percent**
10 below	6	7.41
11-49	24	29.63
50-249	43	53.08
250 above	8	9.88
Total	**81**	**100**

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Number of Years of Operation of the Workplace

Table 3 shows that majority of the respondents are working in a highly established workplace with a frequency count of 36 or 44.44%. This is supported having a year of 21 years and above of operation as gleaned in the table. 21 or 25.93% of the respondents worked in a growing establishment with 6-10 years of operation while 24 or 29.63% of the respondents are working in a maturing establishment with 11 to 20 years of operation. Furthermore, the table shows that none of the respondents is working in a workplace having 5 years below of operation or the start-up phase.

Table 3. Profile of the Workplace in terms of Number of years of Operation

Number of Operations	**Frequency**	**Percent**
5 below	-	-
6-10	21	25.93
11-20	24	29.63
21 above	36	44.44
Total	**81**	**100**

Workplace Classification

Hospitality and tourism industry are classified according to nature of workplace. As shown in the table, the HIM graduate respondents are employed in almost of the lodging establishment such as hotel, motel, inn, and hostels with a frequency count of 14 or 17. percent. 13 or 1 percent of the respondents work in food and beverage establishment wile 10 or 12.3 percent of them work in beach resorts. with 24 respondents or 29.63%. This food and beverage establishment includes restaurant, café, bars and pubs, bistros and catering services. 6.17% of the respondents are working in travel and tours like cruise ships, airlines and travel agencies.

While 11 or 13.58% of the respondents are working in leisure and recreation establishment which include theme parks, resorts and casinos.

Table 4. Profile of the Workplace in terms of Classification

Workplace Classification	**Frequency**	**Percent**
Hotels, Inns and Motels	14	17.3
Fast Food Chains	13	16.0
Casual Dining Restaurants	4	4.9
Aviation Industry		
Beach Resorts	10	12.3
Travel Agencies		
Tourism Offices		
Casinos	7	8.6
Spa and Wellness Centers	3	3.7
Recreation Centers	2	2.5
Theme Parks	3	3.7
Fine Dining Restaurants	5	6.2
Food Courts, Stalls and Carts	8	9.9
Souvenir Shops	7	8.6
Tour Guiding Services		
Cruise Industry	4	4.9
Others – Please specify, Academe/Tourism- Hospitality Courses	1	1.2
Total	**81**	**100**

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Competencies Development of the HIM Graduates as Assessed by the Faculty, Workplace and Graduates Themselves

Table 5-17 shows the development of competencies of the graduates as assessed by the faculty, workplace and graduates themselves together with the difference among the three groups of respondents on the said competencies.

Table 5 depicts that the general competencies of the general HIM Competencies of the graduates are developed to a great extent as perceived by the faculty. However, the graduates perceived that the same competencies were developed by the faculty to some extent only. This implies that the students were not able to acquire greatly the competencies the way which their teacher believed to have equipped them with.

This finding is validated with how the work place evaluated the competencies possessed by the graduates. As revealed in the table, the workplace respondents find these competencies among the graduates to some extent only as possessed by the HIM graduates.

The data also reveal that among the 14 general HIM competencies, only the competency on housekeeping service appears to have been developed by the faculty as perceived by the faculty, workplace and graduates themselves to a great extent. This could be due to the reason that the said skill is the most basic skill and had been usually practiced at home. This skill then is dominantly practiced at home and well absorbed by the students when in school. As such, there is already mastery of these skills by the graduates.

Further, the table also shows that of the 14 general HIM competencies, 4 competencies namely: POS operation, valet & butler service, advance culinary skills and foreign language fluency are developed to some extent only by the faculty. This could be attributed to the fact that these are rarely exposure of the students and faculty as well, hence can be developed in the actual workplace.

Table 5. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on General HIM Competencies

Competencies	Extent of Development as Perceived by				Extent of Competency as Assessed by the Workplace	
	Graduates		Faculty			
	WM	DV	WM	DV	WM	DV
1. Fundamentals of Industry Operation	2.27	to some extent	2.63	to great extent	2.22	to some extent
2. Food and Beverage Service	2.17	to some extent	2.50	to great extent	2.17	to some extent
3. Housekeeping Service	2.69	to great extent	2.89	to great extent	2.69	to great extent
4. Events Planning	2.11	to some extent	2.56	to great extent	2.21	to some extent
5. Kitchen Operation	2.43	to some extent	2.50	to great extent	2.49	to some extent
6. Front Office Operation	2.30	to some extent	2.78	to great extent	2.14	to some extent
7. POS Operation	2.04	to some extent	2.44	to some extent	2.04	to some extent
8. Risk Reduction Management	2.35	to some extent	2.78	to great extent	2.27	to some extent
9. Valet & Butler Service	2.33	to some extent	2.13	to some extent	2.31	to some extent
10. Advance Culinary Skills	2.27	to some extent	2.25	to some extent	2.26	to some extent
11. Bartending & Barista Service	2.30	to some extent	2.75	to great extent	2.20	to some extent
12. Tourism Promotion and Services	2.22	to some extent	2.50	to great extent	2.32	to some extent
13. Product Marketing	2.35	to some extent	2.63	to great extent	2.37	to some extent
14. Foreign Language Fluency	2.30	to some extent	2.25	to some extent	2.27	to some extent

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Average	**2.28**	**to some extent**	**2.55**	**to great extent**	**2.29**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

Since the computed value of .048 is less than the probability value of .05 the null hypothesis that there is no difference on the extent of development of the graduates general HIM competencies as perceived by the faculty, workplace, and graduates themselves is rejected. Using pos hoc test, there is a mismatch between the assessment of the faculty and the graduates themselves on the extent of development of the graduates general HIM competencies. The workplace's assessment on the HIM competencies as possessed by the graduates also differ with how the faculty developed these particular competencies.

The difference on the extent of development of the general HIM competencies of the graduates by the faculty and graduates can be attributed to the fact that the standards/expectations of the student change once they are already exposed to the real world of work. They see new things, acquire new learning experiences and in the process, they tend to compare what they have with what is available and what should be.

Table 6. Difference among the three groups of respondents on the General HIM Competencies of the Graduates

Variable	Groups	N	Means	f-value	Sig	Decision
General HIM Competencies	Faculty	9	2.6667	3.101	.048	Reject Ho
	Graduates	81	2.2716			
	Employer	81	2.27.16			

Table 7 shows that the resource competencies of the HIM graduates are developed by the faculty to a great extent as perceived by the faculty and to some extent as perceived by the graduates themselves. These competencies are possessed by the graduates to some extent as perceived by the workplace respondents.

Of the 4 resource competencies, the company allocating time is developed to a great extent by the faculty as perceived by the faculty and graduates themselves. This implies that in school, the graduates were trained to allocate time to activities, and were taught to understand, prepare and follow schedule. However, when in the workplace, the workplace respondents perceived the said competency to have been possessed by the graduates to some extent only.

Table 7. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on Resource Competencies

Competencies	**Extent of Development as Perceived by**				**Extent of Competency as Assessed by the Workplace**	
	Graduates		**Faculty**			
	WM	**DV**	**WM**	**DV**	**WM**	**DV**
1. Allocating time	2.53	To great extent	2.89	to great extent	2.41	to some extent
2. Allocating money	2.32	to some extent	2.78	to great extent	2.22	to some extent
3. Allocating material and facility resources	2.32	to great extent	2.67	to great extent	2.22	to great extent
4. Allocating human resources	2.42	to some extent	2.78	to great extent	2.35	to some extent
Average	**2.38**	**to some extent**	**2.80**	**to great extent**	**2.29**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

Table 8 shows that the computed value is less than the probability value of .05. Therefore, the hypothesis that there is no difference on the extent of development of the graduates' resource competencies as perceived by the faculty, workplace and graduates themselves is rejected. This means that there is a variation on the resource competencies of graduates as assessed by the faculty and the workplace. This clearly shows that the faculty is confident that they were able to train HIM graduates with enough resource competencies based on the mean of 2.77 but is negated by the workplace as revealed by the mean response of 2.34. The workplace perceived that the graduates possess resource competencies but the extent of competency acquisition is not as high as the evaluation made by the faculty.

Table 8. Difference among the three groups of respondents on the Resource Competencies of the Graduates

Variable	Groups	N	Means	f-value	Sig	Decision
Resource Competencies	Faculty	9	2.7778	4.185	.017	Reject Ho
	Graduates	81	2.5062			
	Employer	81	2.3457			

On information competencies of the graduates, the extent of development as perceived both the faculty and graduates are to a great extent, while the workplace respondents perceived that such competencies are possessed by the graduates to some extent.

Of the 4 competencies, only the competency on using computers is developed by the faculty and possessed by the graduate to a great extent as perceived by the faculty, workplace respondents and graduates themselves. This implies that graduates have mastered the skill of employing computers to acquire, organized, analyzed and communicate information

Table 9. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on Information Competencies

Competencies	Extent of Development as Perceived by				Extent of Competency as Assessed by the Workplace	
	Graduates		Faculty			
	WM	DV	WM	DV	WM	DV
1. Acquiring and evaluating information	2.49	to some extent	2.89	to great extent	2.43	to some extent
2. Organizing and maintaining information	2.49	to some extent	2.67	to great extent	2.35	to some extent
3. Interpreting and communicating information	2.60	to great extent	2.78	to great extent	2.35	to great extent
4. Using computers to process information	2.63	to great extent	2.78	to great extent	2.52	to great extent
Average	**2.55**	**to great extent**	**2.8**	**to great extent**	**2.37**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

The table reveals that the computed value of .061 is greater than the probability value of .05, which means the hypothesis that there is no difference on the extent of development of the graduates' information competencies as perceived by the faculty, workplace and graduates themselves is accepted. With this, there is no difference on the assessment made by the graduates themselves, faculty and workplace respondents on the information competencies developed and possessed by the graduates. This clearly shows that the school equipped HIM graduates with information competencies and which were also recognized by the workplace respondents to have been displayed by the graduates in the workplace.

Table 10. Difference among the three groups of respondents on the Information Competencies of the Graduates

Variable	Groups	N	Means	f-value	Sig	Decision
Information Competencies	Faculty	9	2.8889	2.839	.061	Accept Ho
	Graduates	81	2.6296			
	Employer	81	2.4691			

On graduates' interpersonal competencies, the extent of development as perceived by the faculty and graduates themselves is to a great extent, while the workplace respondents perceived that these skills are possessed by the graduates to some extent. This implies that in school, the graduates have learned the necessary skills to relate with others and with any situation both as leader and as a member.

The table also reveals that there are three skills developed and possessed by graduate to a great extent as perceived by the faculty, workplace respondents and graduate themselves. These are participating as member of a team, teaching others and serving clients/customers. This could be due to the reason that in school, the students are exposed to different kinds of teaching strategies, such as group work and role playing, and school/organizational

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

activities such as peer tutoring, where they learn to take a lead role or just a team player. With these activities then, their skills of being able to work and mingle with others are honed.

Table 11. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on Interpersonal Competencies

Competencies	**Extent of Development as Perceived by**				**Extent of Competency as**	
	Graduates		**Faculty**		**Assessed by the Workplace**	
	WM	**DV**	**WM**	**DV**	**WM**	**DV**
1. Participating as a member of a team	2.70	to great extent	2.89	to great extent	2.63	to great extent
2. Teaching others	2.57	to great extent	2.78	to great extent	2.64	to great extent
3. Serving clients/customers	2.63	to great extent	2.78	to great extent	2.63	to great extent
4. Exercising leadership	2.52	to great extent	2.67	to great extent	2.43	to some extent
5. Negotiating to arrive at a decision	2.47	to some extent	2.67	to great extent	2.32	to some extent
6. Working with cultural diversity	2.51	to great extent	2.78	to great extent	2.46	to some extent
7. Understanding systems	2.46	to some extent	2.78	to some extent	2.43	to great extent
8. Monitoring and correcting performance	2.38	to some extent	2.78	to great extent	2.36	to some extent
9. Improving and designing systems	2.32	to some extent	2.78	to some extent	2.35	to some extent
Average	**2.51**	**to great extent**	**2.79**	**to great extent**	**2.45**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

Since the computed value is greater than the probability value of .05, the hypothesis of there is no difference on the extent of development of the graduates' interpersonal skills as perceived by the faculty, workplace and graduates themselves is accepted. This manifests that the graduates have mastered the interpersonal competencies equipped by the faculty and even applied these same competencies in the workplace. This finding is noteworthy because interpersonal competencies also spell the success or failure of a graduate in the workplace. A graduate with a positive and effective interpersonal skills stay longer in the workplace.

Table 12. Difference among the three groups of respondents on the Interpersonal Competencies of the Graduates

Variable	**Groups**	**N**	**Means**	**f-value**	**Sig**	**Decision**
Interpersonal Competencies	Faculty	9	2.7778	1.699	.186	Accept Ho
	Graduates	81	2.5062			
	Employer	81	2.4568			

Table 13 shows that the graduates' basic skills were developed and possessed by them to a great extent as perceived by the faculty, workplace respondents and graduates themselves. This connotes that the school did not fail in equipping the very basic skills of locating, understanding and interpreting written information in prose and documents, communicating thoughts, ideas, information and messages both in written and in oral form, performing basic computations, receiving, attending, interpreting and responding to verbal messages and other cues such as body language. This could also be attributed to the fact that these are the foremost things taught in school as early as preparatory years, which implies that this has long been mastered by the students oh HIM. Mastery of the basic

skill is prerequisite to higher HIM competencies and are indicators of success of the HIM program since these are considered the foundation course.

Table 13. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on Basic Skills

Competencies	**Extent of Development as Perceived by**				**Extent of Competency as Assessed by the Workplace**	
	Graduates		**Faculty**			
	WM	**DV**	**WM**	**DV**	**WM**	**DV**
1. Reading	2.64	to great extent	2.78	to great extent	2.62	to great extent
2. Writing	2.53	to great extent	2.67	to great extent	2.58	to great extent
3. Arithmetic	2.57	to great extent	2.67	to great extent	2.59	to great extent
4. Listening	2.69	to great extent	2.78	to great extent	2.59	to great extent
5. Speaking	2.52	to great extent	2.78	to great extent	2.52	to great extent
Average	**2.58**	**to great extent**	**2.79**	**to great extent**	**2.58**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

The table reveals that the computed value of .909 is greater than the probability value of .05, which means the hypothesis that there is no difference on the extent of development of the graduates' basic skills as perceived by the faculty, workplace and graduates themselves is accepted. There is then a match on the assessment of graduates' faculty and the workplace on graduates' basic skills. This connotes that the basic skills developed among the students in the university are possessed by the graduates as evaluated by their immediate supervisors.

Table 14. Difference among the three groups of respondents on the Basic Skills of the Graduates

Variable	**Groups**	**N**	**Means**	**f-value**	**Sig**	**Decision**
Basic Skills	Faculty	9	2.6667	.096	.909	Accept Ho
	Graduates	81	2.5926			
	Employer	81	2.5926			

Table 15 shows that the extent of development of the graduates' thinking skills is to great extent by the faculty and to some extent by the graduates themselves. These same skills are possessed to some extent by the graduates as assessed by the workplace respondents. The faculty rating of to a great extent on these skills could be due to the reason that they don't content themselves to purely lectures, instead employ varied strategies such as case analysis, program logic formulation exercises and a lot more to let the students be engaged in problem solving and decision making. This idea is supported by the finding of Graham, Vitale and Schenk (1991) and Gregson (1992) which hold that in classes effectively teach employability skills, instructors assume the role of facilitators and coaches rather than lectures and order givers, requiring students to take much of the responsibility for their own learning.

The table also reveals that of the 7 thinking skills, there is just one skill which was developed in school to a great extent as perceived by the faculty and graduates themselves, and this is the skill of knowing how to learn. This implies that the students have learned how to be able to learn new skills.

Table 15. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on Thinking Skills

Competencies	**Extent of Development as Perceived by**				**Extent of Competency as Assessed by the Workplace**	
	Graduates		**Faculty**			
	WM	**DV**	**WM**	**DV**	**WM**	**DV**

1. Second language	2.38	To some extent	2.67	to great extent	2.38	To some extent
2. Creative thinking	2.43	To some extent	2.78	to great extent	2.36	To some extent
3. Decision making	2.47	To some extent	2.67	to great extent	2.41	To some extent
4. Problem solving	2.41	To some extent	2.78	to great extent	2.40	To some extent
5. Seeing things in mind's eye	2.37	To some extent	2.67	to great extent	2.38	To some extent
6. Knowing how to learn	2.64	to great extent	2.78	to great extent	2.46	To some extent
7. Reasoning	2.43	To some extent	2.67	to great extent	2.44	To some extent
Average	**2.44**	**to some extent**	**2.74**	**to great extent**	**2.41**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

Since the computed value is greater than the probability value of .05, the hypothesis of there is no difference on the extent of development of the graduates' thinking skills as perceived by the faculty, workplace and graduates themselves is accepted. This means that the extent of development on the thinking skills of the graduates is the same as the extent of competency displayed by the graduates in the workplace.

Table 16. Difference among the three groups of respondents on the Thinking Skills of the Graduates

Variable	Groups	N	Means	f-value	Sig	Decision
Thinking Skills	Faculty	9	2.6667	1.414	.246	Accept Ho
	Graduates	81	2.4691			
	Employer	81	2.3827			

Table 18 shows that the personal qualities of the graduates are developed and possessed them to a great extent as perceived by the faculty, workplace respondents and graduate themselves. This could be attributed to the fact that values integration is part of the teaching strategy of any faculty in the University, and this helps the student hone his personal quality. This could be supported by the research finding of Graham. Vitale and Schenk (1991) and Lankard (1990) that employability skills are best learned when they are included among instructional goals and explicitly taught.

Table 17. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on Personal Qualities

Competencies	**Extent of Development as Perceived by**				**Extent of Competency as Assessed by the Workplace**	
	Graduates		**Faculty**			
	WM	**DV**	**WM**	**DV**	**WM**	**DV**
1. Responsibility	2.84	to great extent	2.89	to great extent	2.78	to great extent
2. Self-Esteem	2.67	to great extent	2.78	to great extent	2.68	to great extent
3. Social	2.79	to great extent	2.78	to great extent	2.69	to great extent
4. Self-Management	2.59	to great extent	2.78	to great extent	2.70	to great extent
5. Integrity/Honesty	2.86	to great extent	2.78	to great extent	2.83	to great extent

Average	**2.76**	**to great extent**	**2.82**	**to great extent**	**2.88**	**to great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

There is no variation on the personal qualities of the graduates as perceived by the faculty, workplace and the graduates themselves. This means that the personal qualities possessed by the graduates as developed by the faculty are also the same qualities manifested in the workplace.

Table 18. Difference among the three groups of respondents on the Personal Qualities of the Graduates

Variable	Groups	N	Means	f-value	Sig	Decision
Personal Qualities	Faculty	9	2.7778	.434	.249	Accept Ho
	Graduates	81	2.8025			
	Employer	81	2.7407			

Competencies Needed by the Workplace

Tables 19-32 shows the weighted mean distribution of graduates and faculty responses on the extent of development of the different competencies and the extent of the need for these competencies in the workplace and the difference among these groups of respondents.

Table 19 shows that the general HIM competencies of the graduates are developed to a great extent as perceived by the faculty and to some extent by the graduates themselves. On the other hand, the workplace respondents perceived that these skills needed in the workplace to a great extent.

Almost of the 14 competencies, especially those related to advanced culinary skills and foreign language fluency are needed by the workplace to a great extent. This could be attributed to the fact that most of the workplace respondents are industry that maintain a network environment as such specific-skilled employees are needed.

On the other hand, the competencies related to tourism promotion and barista services are needed by the workplace to some extent only since very few of the respondents' workplace are cafes and resorts.

Table 19. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on General HIM Competencies

Competencies	**Extent of Development as Perceived by**				**Extent of Competency as Assessed by the Workplace**	
	Graduates		**Faculty**			
	WM	**DV**	**WM**	**DV**	**WM**	**DV**
1. Fundamentals of Industry Operation	2.27	to some extent	2.63	to great extent	2.51	to great extent
2. Food and beverage service	2.17	to some extent	2.50	to great extent	2.52	to great extent
3. Housekeeping service	2.69	to great extent	2.89	to great extent	2.58	to great extent
4. Events planning	2.11	to some extent	2.56	to great extent	2.56	to great extent
5. Kitchen operation	2.43	to some extent	2.50	to great extent	2.51	to great extent
6. Front office operation	2.30	to some extent	2.78	to great extent	2.50	to great extent
7. POS operation	2.04	to some extent	2.44	to some extent	2.50	to great extent
8. Risk reduction management	2.35	to some extent	2.78	to great extent	2.62	to great extent
9. Valet & Butler service	2.33	to some extent	2.13	to some extent	2.51	to great extent

10. Advance culinary skills	2.27	to some extent	2.25	to some extent	2.65	to great extent
11. Bartending & Barista service	2.30	to some extent	2.75	to great extent	2.28	to some extent
12. Tourism promotion and services	2.22	to some extent	2.50	to great extent	2.30	to some extent
13. Product marketing	2.35	to some extent	2.63	to great extent	2.50	to great extent
14. Foreign language fluency	2.30	to some extent	2.25	to some extent	2.70	to great extent
Average	**2.28**	**to some extent**	**2.55**	**to great extent**	**2.5**	**to great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

The null hypothesis is there is no significant difference on the of development graduates on HIM competencies as assessed by themselves, the faculty and competencies as required by the workplace as rejected since the probability value of .012 is less than .05. This implies that there is variation on the extent of development of general HIM competencies as perceived by the three groups of respondents. Using post hoc test, the extent of development of graduates' general HIM competencies as perceived by the graduates differ from the assessment of the workplace on the need for these competencies. This suggest that the competencies needed by the workplace do not match with the perception of the graduates in terms of the extent of development of this competencies.

Table 20. Difference among the Three Groups of Respondents on the General HIM Competencies as Developed by the Faculty as Needed in the Workplace

Variable	Groups	N	Means	f-value	Sig	Decision
General HIM Competencies	Faculty	9	2.6667	4.544	.012	Reject Ho
	Graduates	81	2.2716			
	Employer	81	2.4815			

Table 21 shows that the resource competencies of the HIM graduates are developed to a great extent as perceived by the faculty and to some extent as perceived by the graduates themselves. These same skills are needed in the workplace to a great extent as perceived by the workplace respondents. This implies that the school is developing the right skills on resource competencies which are needed in the workplace.

Table 21. Weighted mean Distribution of Graduates and Faculty Responses on the Extent of Development and as Needed by the workplace on Resources Competencies

Competencies	Extent of Development as Perceived by				Extent of Competency as Assessed by the Workplace	
	Graduates		Faculty			
	WM	DV	WM	DV	WM	DV
1. Allocating time	2.53	to great extent	2.89	to great extent	2.73	to great extent
2. Allocating money	2.32	to some extent	2.78	to great extent	2.39	to some extent
3. Allocating material and facility resources	2.32	to some extent	2.78	to great extent	2.43	to some extent
4. Allocating human resources	2.42	to some extent	2.78	to great extent	2.55	to great extent
Average	**2.37**	**To some extent**	**2.80**	**To great extent**	**2.52**	**To great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

As to resources competencies, there is no variation on the perception among the graduates, faculty and the workplace. This means that the resource competencies required by the workplace are developed among the graduates as assessed by themselves and HIM faculty.

Table 22. Difference among the Three Groups of Respondents on the Resource Competencies as Developed by the Faculty and as Needed in the Workplace

Variable	Groups	N	Means	f-value	Sig	Decision
Resource Competencies	Faculty	9	2.7778	1.243	.291	Accept Ho
	Graduates	81	2.5062			
	Employer	81	2.5556			

The extent of development of the graduates' information competencies as perceived by both the faculty and graduates is to a great extent. These skills are also needed in the workplace to a great extent as perceived by the workplace respondents.

Table 23. Weighted mean Distribution of Graduates and Faculty Responses on the extent of Development and as Needed by the workplace by the workplace on Information Competencies

Competencies	Extent of Development as Perceived by				Extent of Competency as Assessed by the Workplace	
	Graduates		Faculty			
	WM	DV	WM	DV	WM	DV
1. Acquiring and evaluating information	2.49	to some extent	2.89	to great extent	2.58	to great extent
2. Organizing and maintaining information	2.49	to some extent	2.78	to great extent	2.61	to great extent
3. Interpreting and communicating information	2.60	to great extent	2.78	to great extent	2.53	to great extent
4. Using computers to process information	2.63	to great extent	2.78	to great extent	2.81	to great extent
Average	**3**	**To great extent**	**3**	**To great extent**	**3**	**To great extent**

Legend: ***1-1.49 not at all*** ***1.5-2.49- to some extent*** ***2.5-3- to a great extent***

There is no difference on the assessment made by the graduates themselves and faculty on the information competencies and the need for these competencies by the workplace. This clearly shows that the school equipped HIM graduates with information competencies which are needed in the workplace.

Table 24. Difference among the Three Groups of Respondents on the Information Competencies as Developed by the Faculty and as Needed in the Workplace

Variable	Groups	N	Means	f-value	Sig	Decision
Information Competencies	Faculty	9	2.8889	.821	.442	Accept Ho
	Graduates	81	2.6296			
	Employer	81	2.6296			

On graduates' interpersonal competencies, the extent of development as perceived by the faculty and graduates themselves is to a great extent, and these skills are also needed in the workplace to a great extent as perceived by the workplace respondents.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Table 25. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development on Interpersonal Competencies

Competencies	Extent of Development as Perceived by				Extent of Competency as Assessed by the Workplace	
	Graduates		Faculty			
	WM	DV	WM	DV	WM	DV
1. Participating as a member of a team	2.70	to great extent	2.89	to great extent	2.84	to great extent
2. Teaching others	2.57	to great extent	2.78	to great extent	2.84	to great extent
3. Serving clients/customers	2.63	to great extent	2.78	to great extent	2.86	to great extent
4. Exercising leadership	2.52	to great extent	2.67	to great extent	2.70	to great extent
5. Negotiating to arrive at a decision	2.47	to some extent	2.67	to great extent	2.53	to great extent
6. Working with cultural diversity	2.51	to great extent	2.78	to great extent	2.68	to great extent
7. Understanding system	2.46	to some extent	2.78	to some extent	2.68	to great extent
8. Monitoring and correcting performance	2.38	to some extent	2.78	to great extent	2.65	to great extent
9. Improving and Designing system	2.32	to some extent	2.78	to some extent	2.55	to great extent
Average	**2.51**	**to great extent**	**2.79**	**to great extent**	**2.71**	**to great extent**

Legend: ***1-1.49 not at all*** ***1.5-2.49- to some extent*** ***2.5-3- to a great extent***

There is a variation on the interpersonal competencies of HIM graduates across the three groups of respondents. Using the post hoc test, the variation was caused between the different perception of the graduates on their interpersonal competencies and the requirements of the workplace on interpersonal competencies.

Table 26. Difference among the Three Groups of Respondents on the Interpersonal Competencies as Developed by the Faculty and as Needed in the Workplace

Variable	Groups	N	Means	f-value	Sig	Decision
Interpersonal Competencies	Faculty	9	2.7778	3.984	.02	Accept Ho
	Graduates	81	2.5062			
	Employer	81	2.7037			

Table 27 shows that the graduates' basic skills were developed and possessed by them to a great extent as perceived by the faculty and graduates themselves, and these skills are needed in the workplace to a great extent.

Table 27. Weighted Mean Distribution of Graduates, Faculty and Workplace Responses on the Extent of Development and as Needed by the Workplace on Basic Skills

Competencies	Extent of Development as Perceived by				Extent of Competency as Assessed by the Workplace	
	Graduates		Faculty			
	WM	DV	WM	DV	WM	DV
1. Reading	2.64	to great extent	2.78	to great extent	2.70	to great extent
2. Writing	2.53	to great extent	2.67	to great extent	2.68	to great extent

3. Arithmetic	2.57	to great extent	2.67	to great extent	2.68	to great extent
4. Listening	2.69	to great extent	2.78	to great extent	2.78	to great extent
5. Speaking	2.52	to great extent	2.78	to great extent	2.79	to great extent
Average	**2.58**	**to great extent**	**2.72**	**to great extent**	**2.74**	**to great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

The null hypothesis was accepted on the assessment of graduates and faculty on graduates' basic skills. This means that there is no variation on the basic skill of graduates across the three groups of respondents. It means that the basic skills as developed by the school's match with the required basic skills of the workplace.

Table 28. Difference among the Three Groups of Respondents on the Basic Skills as Developed by the Faculty as Needed in the Workplace

Variable	Groups	N	Means	f-value	Sig	Decision
Basic skills	Faculty	9	2.6667	1.67	.191	Accept Ho
	Graduates	81	2.5926			
	Employer	81	2.7284			

Table 29 shows that the graduates' basic skills were developed and possessed by them to a great extent as perceived by the faculty and graduates themselves, and these skills are needed in the workplace to a great extent.

Table 29. Weighted mean Distribution of Graduates and Faculty Responses on the Extent of Development and as Needed by the Workplace on Basic Skills

Competencies	Extent of Development as Perceived by				Extent of Need by the Workplace	
	Graduates		Faculty			
	WM	DV	WM	DV	WM	DV
1. Reading	2.64	to a great extent	2.78	to a great extent	2.70	to a great extent
2. Writing	2.53	to a great extent	2.67	to a great extent	2.68	to a great extent
3. Arithmetic	2.57	to a great extent	2.67	to a great extent	2.68	to a great extent
4. Listening	2.69	to a great extent	2.78	to a great extent	2.78	to a great extent
5. Speaking	2.52	to a great extent	2.78	to a great extent	2.79	to a great extent
Average	**2.58**	**to a great extent**	**2.76**	**to a great extent**	**2.74**	**to a great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

The null hypothesis was accepted on the assessment of graduates and faculty on graduates' basic skills. This means that there is no variation on the basic skills of graduates across the three groups of respondents. It means that basic skills as developed by the schools' match with the required basic skills of the workplace.

Table 30. Difference among Three Groups of Respondents on the Basic Skills as Developed by the Faculty and as Needed in the Workplace

Variable	Groups	N	Mean	F-value	Sig	Decision
Basic Skills	Faculty	9	2.6667	1.67	.191	Accept Ho
	Graduates	81	2.5926			
	Employer	81	2.7284			

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Table 31 shows that the extent of development of the graduates' thinking skills is to a great extent by the faculty and to some extent by the graduates themselves. On the other hand, these skills are needed in the workplace to a great extent.

Table 31. Weighted mean Distribution of Graduates and Faculty Responses on the Extent of Development and as Needed by the Workplace on Thinking Skills

Competencies	**Extent of Development as Perceived by**				**Extent of Need by the Workplace**	
	Graduates		**Faculty**			
	WM	**DV**	**WM**	**DV**	**WM**	**DV**
1. Second language	2.38	to some extent	2.67	to a great extent	2.70	to a great extent
2. Creative thinking	2.43	to some extent	2.78	to a great extent	2.73	to a great extent
3. Decision making	2.47	to some extent	2.67	to a great extent	2.75	to a great extent
4. Problem	2.41	to some extent	2.78	to a great extent	2.73	to a great extent
5. Seeing things in the mind	2.37	to some extent	2.67	to a great extent	2.51	to a great extent
6. Knowing how to learn	2.64	to a great extent	2.78	to a great extent	2.78	to a great extent
7. Reasoning	2.43	to some extent	2.67	to a great extent	2.76	to a great extent
Average	**2.44**	**to some extent**	**2.74**	**to a great extent**	**2.71**	**to a great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

There is a variation on the making skills of graduates as perceived across the three groups of respondents. The variation is caused by the mismatch of the assessment of the graduates on the extent of development of their thinking skills and as required by the workplace.

Table 32. Difference among the Three Groups of Respondents on the Thinking Skills as Developed by the Faculty and as Needed in the Workplace

Variable	**Groups**	**N**	**Mean**	**F-value**	**Sig**	**Decision**
Thinking Skills	Faculty	9	2.6667	4.181	.017	Reject Ho
	Graduates	81	2.4691			
	Employer	81	2.6914			

Table 33 shows that the personal qualities of the graduates are developed and possessed by them to a great extent as perceived by the faculty and the graduates themselves. These qualities are also needed in the workplace to a great extent.

Table 33. Weighted mean Distribution of Graduates and Faculty Responses on the Extent of Development and as Needed by the Workplace on Personal Qualities

Competencies	**Extent of Development as Perceived by**				**Extent of Need by the Workplace**	
	Graduates		**Faculty**			
	WM	**DV**	**WM**	**DV**	**WM**	**DV**
1. Responsibility	2.84	to a great extent	2.89	to a great extent	2.89	to a great extent
2. Self-esteem	2.67	to a great extent	2.78	to a great extent	2.91	to a great extent
3. Social	2.79	to a great extent	2.78	to a great extent	2.89	to a great extent

4. Self-management	2.59	to a great extent	2.78	to a great extent	2.84	to a great extent
5. Integrity/honesty	2.86	to a great extent	2.78	to a great extent	2.93	to a great extent
Average	**2.44**	**to a great extent**	**2.82**	**to a great extent**	**2.88**	**to a great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

The perception of the graduates on the development of their personal qualities match with the assessment of their teachers and with the skills needed by the workplace. This means that the extent of development of the personal qualities of the students is in the same manner as the workplace needed the said skills.

Table 34. Difference among the Three Groups of Respondents on the Personal Qualities as Developed by the Faculty and as Needed in the Workplace

Variable	Groups	N	Mean	F-value	Sig	Decision
Personal Qualities	Faculty	9	2.7778	1.718	.183	Accept Ho
	Graduates	81	2.8025			
	Employer	81	2.9012			

Competencies Needed and Possessed by the Graduates in the Workplace

Tables 35 to 48 show the competencies as needed and as possessed by the graduates in the workplace together with the difference on the workplace responses on the competencies needed by the workplace and as possessed by the graduates.

Table 34 shows that the general Hospitality Management are needed to a great extent by the workplace and the same competencies are possessed by the graduates to some extent. It could also be noted that of the 14 competencies, only housekeeping services is the competency possessed by the graduates to a great extent. This means that the graduate mastered the skill in housekeeping as needed in the workplace.

Table 35. Weighted mean Distribution of Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on General Hospitality Management Competencies

Competencies	As Needed by the Workplace		As Possessed by the Graduates	
	WM	DV	WM	DV
1. Fundamentals of Industry Operation	2.49	to some extent	2.22	to some extent
2. Food and Beverage Services	2.30	to some extent	2.17	to some extent
3. Housekeeping Services	2.68	to a great extent	2.69	to a great extent
4. Events Planning	2.30	to some extent	2.21	to some extent
5. Kitchen Operation	2.51	to a great extent	2.49	to some extent
6. Front Office Operation	2.40	to some extent	2.14	to some extent
7. POS Operation	2.30	to some extent	2.04	to some extent
8. Risk Reduction Management	2.39	to some extent	2.27	to some extent
9. Valet and Butler Services	2.61	to a great extent	2.31	to some extent

10. Advanced Culinary Skills	2.65	to a great extent	2.26	to some extent
11. Bartending and Barista Services	2.29	to some extent	2.20	to some extent
12. Tourism Promotion and Services	2.74	to a great extent	2.32	to some extent
13. Product Marketing	2.64	to a great extent	2.37	to some extent
14. Foreign Language Fluency	2.74	to a great extent	2.27	to some extent
Average	**2.5**	**to a great extent**	**2.82**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

There is a difference on the workplace responses on the competencies needed by them and as possessed by HIM graduates on general HIM Competencies based on the means, the workplace required these competencies to a great extent and the graduates only possess these competencies to some extent. This difference may be caused by the nature of work and responsibilities of the graduates in the workplace since some of the graduate respondents are employed in areas of the hotel, they are not excelling which may limit them from displaying their actual competencies. Hence, the employers may have not been able to see these skills which are actually possessed by the graduates. Moreover, the difference also implies that the skills of the graduates are inadequate for the workplace. But despite the inadequacy of their skills as required by the workplace, the graduates were still able to obtain employment, which means that their lack of skills in General HIM has nothing or little to do with their employment.

Table 36. Difference on the Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on General HIM Competencies

Groups	N	Mean	T-value	Sig	Decision
As Needed	81	2.4815	2.599	.010	Reject Ho
As Possessed	81	2.2716			

As gleaned in the table, the workplace requires resource competencies from the graduates to a great extent and the graduates possess these skills to some extent. Of the 4 competencies, allocating time and allocating material and facility resources are both needed by the workplace to some extent only. This could be attributed to the fact that there are employees other than BSHIM graduates who deal with these tasks of allocating money, material and facility.

Table 37. Weighted mean Distribution of Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Resource Competencies

Competencies	**As Needed by the Workplace**		**As Possessed by the Graduates**	
	WM	**DV**	**WM**	**DV**
1. Allocating Time	2.73	to a great extent	2.41	to some extent
2. Allocating Money	2.39	to some extent	2.22	to some extent
3. Allocating Material and Facility Resources	2.43	to a great extent	2.22	to a great extent
4. Allocating Human Resources	2.55	to a great extent	2.35	to a great extent
Average	**2.52**	**to a great extent**	**2.27**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

There is a variation on the resource competencies required by the workplace and as possessed by the graduates. The variation connotes that the resource competencies required by the workplace are not possessed by the graduates.

Table 38. Difference on Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Resource Competencies

Groups	N	Mean	T-value	Sig	Decision
As Needed	81	2.5556	2.661	.009	Reject Ho
As Possessed	81	2.3457			

As revealed in the table, the information competencies are needed to a great extent by the workplace and the graduates possess these competencies to some extent. Only the competency of using computers to process information is possessed by the graduates to a great extent, which means that the graduates mastered this skill needed by the workplace.

Table 39. Weighted mean Distribution of Workplace Responses on the Competencies Needed by the Workplace and possessed by the Graduates on Information Competencies

Competencies	As Needed by the Workplace		As Possessed by the Graduates	
	WM	DV	WM	DV
1. Acquiring and Evaluating Information	2.58	to a great extent	2.43	to some extent
2. Organizing and maintaining information	2.61	to a great extent	2.35	to some extent
3. Interpreting and communicating information	2.53	to a great extent	2.35	to a great extent
4. Using computers to process information	2.81	to a great extent	2.52	to a great extent
Average	**2.62**	**to a great extent**	**2.37**	**to some extent**

1 – 1.49 – not at all ***1.5 – 2.49 – to some extent*** ***2.5 – 3 – to a great extent***

The null hypothesis was rejected as gleaned in table 40 which means that there is a difference on the workplace responses with respect to the Information Competencies as needed by them and as possessed by the graduates. This means that there is mismatch of the requirement of the workplace and the competencies as possessed by the graduates. The graduates lack the information competencies required by the workplace.

Table 40. Difference on the Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Information Competencies

Groups	N	Mean	T-value	Sig	Decision
As Needed	81	2.6296	2.067	.040	Reject Ho
As Possessed	81	2.4691			

Table 41 shows that interpersonal competencies are needed by the workplace to a great extent and are possessed by the graduates to some extent. Of the 9 competencies, there are three skills possessed by the graduates to a great extent. These are: participating as a member of a team, teaching others and serving clients/customers. These skills of being able to work and mingle with others mastered by the graduates are very much needed in the workplace. The need of these competencies by the workplace could be attributed to the reason that these employees work together either directly or indirectly for the goof of the workplace. As revealed in the study on Employee Characteristics and Skills Valued by Northern Virginia Employers, employers expect their employees to be able to interact effectively with others and respect others. Many employers also placed interpersonal skills as a major part of an employee's job description. Moreover, many employers deemed interpersonal skills to be very important to good work environment and thus to productivity. This just shows that interpersonal competencies in the workplace is of vital importance.

Table 41. Weighted mean Distribution of Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Interpersonal Competencies

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Competencies	As Needed by the Workplace		As Possessed by the Graduates	
	WM	DV	WM	DV
1. Participating as a member of a team	2.84	to a great extent	2.63	to a great extent
2. Teaching others	2.84	to a great extent	2.64	to a great extent
3. Serving clients/customers	2.86	to a great extent	2.63	to a great extent
4. Exercising leadership	2.70	to a great extent	2.43	to some extent
5. Negotiating to arrive at a decision	2.53	to a great extent	2.32	to some extent
6. Working with cultural diversity	2.68	to a great extent	2.46	to some extent
7. Understanding systems	2.68	to a great extent	2.43	to some extent
8. Monitoring and correcting performance	2.65	to a great extent	2.36	to some extent
9. Improving and designing systems	2.55	to a great extent	2.35	to some extent
Average	**2.71**	**to a great extent**	**2.45**	**to some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

With respect to impersonal competencies, the workplace needed these competencies to a great extent while the extent of competency as possessed by the graduates is only to some extent. The graduates lack some competencies needed in the workplace, which means that the skills developed among the them in school are not enough to satisfy the need of the workplace.

Table 42. Difference on the Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Interpersonal Competencies

Groups	N	Mean	T-value	Sig	Decision
As Needed	81	2.7037	3.268	.040	Reject Ho
As Possessed	81	2.4568			

Table 42 shows that the basic skills are needed by the workplace possessed by the graduates to a great extent. This means that graduates possess a solid foundation of these skills that are required in the workplace.

Table 43. Weighted mean Distribution of Workplace Responses on the Competencies needed by the Workplace and as Possessed by the Graduates on Basic Skills

Competencies	As Needed by the Workplace		As Possessed by the Graduates	
	WM	DV	WM	DV
1. Reading	2.70	To a great extent	2.62	To a great extent
2. Writing	2.68	To a great extent	2.58	To a great extent
3. Arithmetic	2.68	To a great extent	2.59	To a great extent
4. Listening	2.78	To a great extent	2.59	To a great extent
5. Speaking	2.79	To a great extent	2.52	To a great extent
Average	**2.74**	**To a great extent**	**2.58**	**To a great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

The basic skills of graduates as assessed by the workplace do not vary in terms of what is needed by the workplace and the skills the graduates possess. This means that BSHIM graduates developed enough basic skills which match with what is required by the workplace.

Table 44. Difference on the Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Basic Skills

Groups	N	Mean	T-value	Sig	Decision
As Needed	81	2.7284	1.83	.069	Accept Ho
As Possessed	81	2.5926			

Table 45 shows that the thinking skills are needed by the workplace to a great extent and possessed by the graduates to some extent. The extent to which these skills are needed in the workplace could be caused by the rapid effect of technology at the workplace wherein the nature of work or responsibilities of the employee must be capable to learn.

Table 45. Weighted mean Distribution of Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Thinking Skills

Competencies	As Needed by the Workplace		As Possessed by the Graduates	
	WM	DV	WM	DV
1. Second Language	2.70	To a great extent	2.38	To some extent
2. Creative Thinking	2.73	To a great extent	2.36	To some extent
3. Decision Making	2.75	To a great extent	2.41	To some extent
4. Problem Solving	2.73	To a great extent	2.40	To some extent
5. Seeing things in the mind's eye	2.51	To a great extent	2.38	To some extent
6. Knowing how to learn	2.78	To a great extent	2.46	To some extent
7. Reasoning	2.76	To a great extent	2.44	To some extent
Average	**2.71**	**To a great extent**	**2.41**	**To some extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

As reflected in the table, the thinking skills of graduates as required by the workplace vary with what they possess based on the responses of the workplace respondents. This suggests the BSHM graduates lack some thinking skills since what they possess is short compared to what is required by the workplace. The difference may have been caused by the nature of work of the graduates. Most of the graduates' work required technical skills, and as such, they are not exposed to the dynamic or variety of tasks, and as such, they don't have the chance to do making or problem solving. This may have affected the statistical result.

Table 46. Difference on the Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Basic Skills

Groups	N	Mean	T-value	Sig	Decision
As Needed	81	2.6914	3.908	.000	Reject Ho
As Possessed	81	2.3827			

Table 47 shows that the personal qualities of the graduates are needed by the workplace and possessed by the graduates to a great extent. The extent of the need for these qualities could be attributed to the fact that the work attitude and productivity of the employee depends on the character traits.

Table 47. Weighted Mean Distribution of Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Personalities Qualities

Competencies	As Needed by the Workplace		As Possessed by the Graduates	
	WM	DV	WM	DV
1. Responsibility	2.89	To a great extent	2.78	To a great extent
2. Self Esteem	2.91	To a great extent	2.68	To a great extent
3. Social	2.89	To a great extent	2.69	To a great extent

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

4. Self-Management	2.84	To a great extent	2.70	To a great extent
5. Integrity/Honesty	2.93	To a great extent	2.83	To a great extent
Average	**2.88**	**To a great extent**	**2.74**	**To a great extent**

1 – 1.49 – not at all 1.5 – 2.49 – to some extent 2.5 – 3 – to a great extent

As gleaned in the table, the null hypothesis was rejected since the probability value is less than .05 which means that there is a difference on the workplace's responses on the personal qualities needed by the workplace and as possessed by the possessed by the graduates. While it is true that the graduates possessed the personal qualities to a great extent, the extent of having these skills is not the same as the extent of the need of the workplace, which means that the workplace need more than what the graduate have.

Table 48. Difference on the Workplace Responses on the Competencies Needed by the Workplace and as Possessed by the Graduates on Personal Qualities

Groups	N	Mean	T-value	Sig	Decision
As Needed	81	2.9012	2.708	.008	Reject Ho
As Possessed	81	2.7407			

Difference on the Extent of Development of Competencies of Graduates when Grouped According to Graduates' Profile

Year graduation of the graduates does not also influence the competencies developed by the graduates. Since there were no significant curriculum changes that took place from School year 2015-2017 which might explain why the competencies across year graduated do not vary.

Table 49. Difference on the Extent of Development of Competencies among Graduates according to year of graduation

Year Graduated	N	Mean	T-value	Sig	Decision
2015	13	2.3077	-0.846	.400	Accept Ho
2016	41	2.4878			
2017	27	2.4815			

Difference on the Competence Needed in the Workplace when Grouped according To Characteristics of the workplace

In the terms of the locations of the workplace, the table indicates that those workplace outside Cagayan required the same competencies as to workplace within the locality. This implies that the competencies are not influenced by the location of the workplace. This further suggests that CSU graduates could be employed anywhere, both in and out of the country if the same competencies are needed.

Table 50. Difference on the Competencies needed by the Workplace when Grouped According to Workplace Location

Location	N	Mean	T-value	Sig	Decision
Cagayan	45	2.7556	.640	0.759	Accept Ho
Laguna	2	3.0000			
Isabela	5	2.6000			
Manila	16	2.5625			
Baguio	3	2.6667			
Ilocos	3	2.6667			
Makati	3	3.0000			
La Union	1	2.0000			
Boracay	1	3.0000			
Abroad	2	3.0000			

The table indicates that the competencies required by company with more than 50 employees and company with less than 6 employees are the same. The size of the company does not influence the extent of HIM Competencies needed.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Table 51. Difference on the Competencies needed by the Workplace when Grouped According to Workplace Location

Size	N	Mean	T-value	Sig	Decision
Less than 6	18	2.7222	.682	0.607	Accept Ho
6-20	12	2.6667			
21-50	7	2.7143			
51-99	7	2.4286			
100 or more	37	2.7838			

There is no difference on the extent of competencies required by the workplaces when grouped according to number of years of operation. This connotes that the workplace needs for HIM graduates do not depend on the length of operation. This further suggests that the same competencies are required by from HIM graduates by the company which existed for more than 5 years and a company who existed for a couple of year.

Table 52. Difference on the Competencies Needed by the Workplace when Grouped According to Number of Years in Operation

Number of years in Operation	N	Mean	T-value	Sig	Decision
Less than 5	24	2.7500	0.377	0.825	Accept Ho
5-10	16	2.7500			
11-15	19	2.6316			
16-20	4	2.5000			
20 or more	18	2.7778			

The null hypothesis which states that there is no difference on the competencies acquired from the workplace when grouped according to classification is rejected. This means that there is a variation on the competencies required by the different workplaces. Recreation Centers, Theme Parks, Fine Dining Restaurants, Cruise Industry and Beach Resorts need to the great extent the different competencies from HIM graduates while Spa and Wellness Centers to some need the said competencies from HIM graduates to some extent.

Table 53. Difference on the Competencies Required by the Workplace when Grouped According to Workplace Classification

Classification	N	Mean	T-value	Sig	Decision
Hotels, Inns and Motels	14	2.5714	0.377	.825	Accept Ho
Fast Food Chains	13	2.7692			
Casual Dining Restaurants	4	2.7500			
Aviation Industry					
Beach Resorts	10	2.8000			
Travel Agencies					
Tourism Offices					
Casinos	7	2.4286			
Spa and Wellness Centers	3	2.3333			
Recreation Centers	2	3.0000			
Theme Parks	3	3.0000			
Fine Dining Restaurants	5	3.0000			
Food Courts, Stalls and Carts	8	2.5000			
Souvenir Shops	7	2.5000			
Tour Guiding Services					
Cruise Industry	4	2.8571			
Others – Please specify, Academe/Tourism-Hospitality Courses	1	2.5000			

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Competencies Needed in the Curriculum

Table 54 shows the competencies suggested by the graduates and workplaces to be added in the curriculum in the next five years to achieve global competence. The categories for the competencies are HIM Technical Competencies, Practical Skills, and Communication Skills, Leadership Qualities, Personal Qualities and Problem-Solving Skills.

The table reveals that an aggregate percent of 27.1 of the graduate respondents recommend practical skills to be included in the curriculum. They suggest that concepts should be well balanced with hands-on, or if not, there should be more hands – on or practical applications. Students should also be exposed to the industries. In the form of immersion or on- the-job-training.

The table also shows that 20% of the graduate responses want that advanced hospitality management technology and computer applications. This includes hotel room reservation technology and other the latest Technology used in the big hotels in the industry. This recommendation implies that graduates want that the skills being taught in the classroom should be at par with those being used and needed in the industry, which seems difficult for the University since technology easily comes and goes and costly.

Moreover, 14.8 % and 13.6 % of the graduate respondents suggest skills on marketing development and problem skills respectively. The respondents spelled out that other marketing advanced skills must be taught in school. The problem-solving skills are also much needed since these are needed in developing programs and systems, combined with highest mathematics subjects.

There is also a need for communication skills, personal qualities and leadership skills, Graduates recommend that there should be English proficiency and that communication skills be honed. They also suggest that student learn to be adaptive to technology, be innovative, flexible and should have sense to lead.

On the other hand, of all the Hospitality Management skills, the most recommended skill to be included in the curriculum is marketing development and analysis. This may be due to the reason that hospitality industry applicant competition is now getting tighter, and considering the fast-changing demand of the market. This is needed to gain competitive advantage.

Workplace also emphasize the value of communication skills and personal qualities. They suggest that graduate should master the communication skills and that they should be more professional, be adaptive and should also value time.

Like the graduate respondents, the workplace respondents also suggest practice experience to be included in the curriculum, that exposure to the real world of work is necessary.

These recommendations imply that having all of these would prepare a graduate to achieve global competence.

Table 54. Competencies to be Added in the Curriculum in the Next Five Years to Achieve Global Competence as Suggested by the Graduates and the Workplace

Competenciess	**Graduates**		**Workplace**	
	Frequency	**Percent**	**Frequency**	**Percent**
HIM Competencies				
1. Advanced Hospitality Management Technology and Computer Applications	15	18.5	3	3.7
2. Data Communications and Networking in Hospitality Industry	6	7.4	2	2.5
3. Advanced Hospitality Management	6	7.4	3	3.7
4. Human Resource Development	2	2.5		
5. Advanced Facility Planning and Design	8	9.9		
6. Hospitality Industry Operating System	2	2.5	2	2.5
7. Marketing Development and Analysis	12	14.8	5	6.1
8. Business Strategy and Innovation	2	2.5		
Practical Skills				

Hospitality Industry Technology and Process- flow Exposure	10	12.3	6	3.7
Hands-on	12	14.8	1	1.2
Communication Skills	6	7.4	5	6.1
Leadership Skills	2	2.5	1	1.2
Personal Qualities	5	6.1	5	6.1
Problem Solving skills	11	13.6	3	3.7

SUMMARY, CONCLUSION AND RECCOMENDATIONS

This chapter presents the summary of the results of the findings on the profile of the workplace, competency development as perceived by the faculty, workplace and graduates themselves, the competencies needed by the workplace and the matching of these competencies between among variables under study.

The conclusions are based on the matching of competencies developed and possessed by the graduates and the competencies needed in the workplace. The recommendations are based on the weaknesses of the university in equipping the students the skills needed in the workplace.
Summary

Profile of the workplace

Majority or 55.60 % of the workplace where the graduate respondents are located are in Cagayan, 19.80 % are in Manila and only 6.20 % is in Isabela. Of the 10 workplaces, there are 2 workplaces abroad and 79 are employed in workplaces in the Philippines.

The workplace where majority of the HIM graduate respondents are employed is with 100 or more employees and has been in operation for more than 5 years.

The HIM graduate respondents are employed in almost all classification of workplace and majority of them are employed in accommodation establishments such as hotels, inns and motels, fast food chains and beach resorts.

COMPETENCY DEVELOPMENT OF THE HIM GRADUATES AS ASSESSED BY THE FACULTY WORKPLACE AND GRADUATES THEMSELVES

On General Hospitality Management Competencies

The General HIM competencies of the graduates are developed to a great extent by the faculty. However, the graduates perceived that the same competencies were developed by the faculty to some extent only. The workplace finds these competencies among graduates to some extent only as possessed by the HIM graduates.
Of the 14 general HIM competencies, only the competency on Housekeeping Services appears to have been developed by the faculty as perceived by the faculty and graduates themselves and possessed by the graduates to a great extent.]

There is a mismatch between the assessment of the faculty and the graduates themselves on the extent of development of the graduates' general HIM competencies. The workplace's assessment on the HIM competencies as possessed by graduates also differ with how the faculty developed these particular competencies.

On Resource Competencies

Resources competencies of the HIM graduates are developed by the faculty to a great extent as perceived by the faculty and to some extent as perceived by the graduates themselves. These competencies are possessed by the graduates to some extent as perceived by the workplace respondents.

Of the 4 competencies, the competency on allocating time is developed to a great extent by the faculty as perceived by the faculty and graduates themselves.

There is a difference on the resource competencies of graduates as assessed by the faculty and the workplace. The workplace perceived that the graduates possessed resources competencies but the extent of the competency is not as high as the evaluation made by the faculty.

On Information Competencies

The extent of development as perceived by both the faculty and graduates is to a great extent, while the workplace respondents perceived that such competencies are possessed by the graduates to some extent.

Of the 4 competencies, only the competency on using computers is developed by the faculty and possessed by the graduates to a great extent as perceived by the faculty workplace respondents and graduates themselves.

There is no difference on the assessment made by the graduates themselves, faculty and workplace respondents on the information competencies developed among and possessed by the graduates.

On Interpersonal Competencies

The extent of development on the graduates' Interpersonal Competencies as perceived by the faculty and graduates themselves is to a great extent, while the workplace respondents perceived that these skills are possessed by the graduates to some extent. There are three skills developed and possessed by the graduates to a great extent as perceived by the faculty, workplace respondents and graduates themselves. These are participating as a member of a team, teaching others and serving clients/ customers.

The interpersonal competencies developed by the graduates as assessed by themselves and the faculty are possessed by the graduates as evaluated by the workplace.

On Basic Skills

The graduates' basic skills were developed and possessed by them to a great extent as perceived by the faculty, workplace respondents and graduates themselves.

There is no difference on the extent of development of the graduates' basic skills as perceived by the faculty, workplace and graduates themselves.

On Thinking Skills

The extent of development of the graduates' thinking skills is to great extent as perceived by the faculty and to some extent as perceived by and graduates themselves. These same skills are possessed to some extent by the graduates as assessed by the workplace respondents.

The extent of development on the thinking skills of the graduates is the same as the extent of competency displayed by the graduates in the workplace.

On Personal Qualities

The personal qualities of the graduates are developed and possessed by them to a great extent as perceived by the faculty, workplace respondents and graduates themselves.

The personal qualities possessed by the graduates as developed by the faculty are also the same qualities manifested by them in the workplace.

COMPETENCY DEVELOPMENT AND COMPETENCIES NEEDED BY THE WORKPLACE

On General HIM Competencies

Generally, the workplace respondents perceived that general HIM competencies are needed in the workplace to some extent. Moreover, of the 14 competencies, those related to food and beverage service, events planning, kitchen operation and others are needed by the workplace to some extent and the competencies related to housekeeping services is needed by the workplace to a great extent.

The extent of development of the graduates' general HIM competencies as perceived by the graduates differ from the assessment of the workplace on the seed for these competencies.

On Resource Competencies

The resource competencies of the HIM graduates are developed to a great extent as perceived by the faculty and to some extent as perceived by the graduates themselves. These same skills are needed in the workplace to a great extent as perceived by the workplace respondents.

The resource competencies required by the workplace are developed among the graduates as assessed by themselves and HIM faculty.

On Information Competencies

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

The extent of development of the graduates' information competencies as perceived by both the faculty and graduates is to a great extent. These skills are also needed in the workplace to great extent as perceived by the workplace respondents.

There is no difference on the assessment made by the graduates themselves and faculty on the information competencies and the need for these competencies by the workplace.

On Interpersonal Competencies

The extent of development on the graduates' interpersonal competencies as perceived by the faculty and graduates themselves is to a great extent, and these skills are also needed in the workplace to a great extent as perceived by the workplace respondents.

The variation on the interpersonal competencies of HIM graduates across the three groups of respondents is caused by the difference between the perception of the graduates on their interpersonal competencies and the requirement of the workplace on the same competencies.

On Basic Skills

The graduates; Basic Skills were developed and possessed by them to a great extent as perceived by the faculty and graduates themselves and these skills are needed in the workplace to a great extent.

The basic skills as developed by the schools matched with the required basic skills of the workplace.

On Thinking Skills

The extent of development of the graduates' thinking skills is to a great extent by the faculty and to some extent by the graduates themselves. On the other hand, these skills are needed in the workplace to a great extent.

The variation on the thinking skills of graduates as perceived across the three groups of respondents is caused by the mismatch of the assessment of graduates on the extent of development of their thinking skills and as required by the workplace.

On Personal Qualities

The personal qualities of the graduates are developed and possessed by them to a great extent as perceived by the faculty and themselves. These qualities are also needed in the workplace to a great extent.

The extent of development of the personal qualities of the graduates is in the same manner as the workplace needed the said skills.

COMPETENCIES NEEDED AND POSSESSED BY THE GRADUATES IN THE WORKPLACE

On General HIM Competencies

The graduates' general HIM competencies are needed to a great extent by the workplace and the same competencies are possessed by the graduate to some extent.

There is a difference on the workplace responses on the competencies needed by them and as possessed by HIM graduates on general HIM Competencies.

On Resource Competencies

The workplace requires resource competencies from the graduates to a great extent and the graduates possess these skills to some extent.

The resource competencies required by the workplace are not possessed by the graduates.

On Information Competencies

The information competencies are needed to a great extent by the workplace and the graduates possess these competencies to some extent. Of the four items on information competencies needed by the workplace, only the competency of using computers to process information is possessed by the graduates to a great extent.

There is a mismatch of the requirement of the workplace and the competencies as possessed by the graduates along information competencies.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

On Interpersonal Competencies

Interpersonal competencies are needed by the workplace to a great extent and are possessed by the graduates to some extent. Of the 9 competencies, there are three skills possessed by the graduates to a great extent. These are: participating as a member of a team, teaching others and serving clients/ customers.

The graduates lack some interpersonal competencies needed in the workplace,

On Basic Skills

Basic skills are needed by the workplace and possessed by the graduates to great extent.

The HIM graduates developed enough basic skills which match what is required by the workplace.

On Thinking Skills

The thinking skills are needed by the workplace to great extent and possessed by the graduates to some extent. The thinking skills of graduates as required by the workplace vary with what they possess based on the responses of the workplace respondents.

On Personal Qualities

The personal qualities of the graduates are needed by the workplace and possessed by the graduates to a great extent.

While it is true that the graduates possessed the personal qualities to a great extent the extent of having these skills is not the same as the extent of the need of the workplace.

DIFFERENCE ON THE EXTENT OF DEVELOPMENT OF COMPETENCIES OF GRADUATES WERE GROUPED ACCORDING TO GRADUATES' PROFILE

There is no difference on the extent of the development of the different competencies when graduate responses are grouped according to course and year graduated.

DIFFERENCE ON THE GRADUATES' COMPETENCIES WHEN GROUPED ACCORDING TO CHARACTERISTICS OF THE WORKPLACE

Workplaces when grouped according to location, size and year of operations require the same competencies from the graduates. However, when workplaces are grouped according to classification, competencies required from the graduates vary.

COMPETENCIES NEEDED IN THE CURRICULUM

The competencies recommended by the respondent to be included in the curriculum were categorized into the following: HIM competencies, Practical Skills, Communication Skills, Leadership qualities, Personal Qualities and Problem-Solving Skills. Most of the responses from the graduates fall under the practical skills, followed by advanced technology and computer applications and programming and system development. There is also a need for communication skills, personal qualities and leadership skill.

Workplace also emphasize the value of communication skills and personal qualities. Like the graduate respondents, the workplace respondents also suggest practical experience to be included in the curriculum.

CONCLUSION

Generally, the BSHIM graduates of SY 2015 to 2017 of the Cagayan State University-Aparri are employed in hospitality/tourism - related companies/ agencies and computer service centers within the province of Cagayan. The graduates' competency development in basic skills were greatly manifested in their workplaces, however, competencies on general HIM, resource, information, interpersonal, thinking and personal qualities were still inadequate considering the very high, advanced and dynamic requirements of the hospitality/tourism workplaces.

There is matching of competency development by the faculty and possession, of competencies by the graduates. However, there is mismatch of competencies possessed by the graduates and the needs of the workplaces considering the very fast advances in science and technology.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

RECOMMENDATIONS

With the mismatches between competency developments, competencies possessed and the needs of the workplace, the following are recommended:

To the CSU-Aparri Administration and Faculty:

1. There should be closer links between the university and HIM industry, for students on-the job training or immersion in order for them to gain wide understanding of the real workplace scenario and to acquire and be familiar with the much-needed skills in the workplace.
2. To ensure quality instruction, the university should continue to regularly update its laboratory facilities and equipment, particularly on those used for simulation on the technology know-hows.
3. The University should continuously send their faculty to training and industry immersion to update themselves and help then acquire new skills and techniques particularly in networking, trouble shooting and programming.
4. The University faculty should devise the most appropriate strategy to enable students to effectively learn and there should be a balance between theory and practice, and that hands-on should be intensified.
5. The Administration should undertake a review of the BSHIM curriculum to discard subjects that do not contribute to the competencies of the students and should add more professional subjects in BSHIM that could broaden the skills of the students in the hospitality and tourism industry.
6. The University should promote more activities that would help BSHIM students hone and master their skills in the hospitality and tourism industry.
7. The HIM faculty should inculcate into the minds of the graduates the need to continuously grow professionally.
8. In order to be assured that the graduates have developed global competence students should undergo certification exams certification agencies such as ITHP aside from earning NCs. It would mean that passing this should be made as a requirement for graduation.

To the HIM Students and Graduates:

1. Though the preparation of students for work is viewed as one of the roles of the faculty, the HIM students should not solely rely on their teacher in the acquisition and practice of skills most especially that the hospitality industry is a very dynamic field. They should continuously strive to gain deeper understanding of the lessons and gain mastery of their skills.
2. Even when already employed, the graduates should not be complacent with what they have, instead they should have the initiative to develop and master the required skills in the workplace through further study and self-learning exploration to be professionally mature and competent.

To the Workplaces:

1. Workplaces, especially the tourism and hospitality, industries should be actively engaged in efforts to address the skills gap through a variety of initiatives including efforts to improve academic outcomes through partnerships with schools, providing internships, and summer job opportunities. These will provide avenues for the students to be exposed to the realities of the workplace.
2. Workplaces should have a continuous support for employee development such as providing in-house training to help the employees grow in their profession.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Microbiological and Physico-Chemical Quality of Domestic Water in CSU-Aparri

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ABSTRACT: Water source in the campus of CSU-Aparri is has been a problem by the residents and student boarding in the dormitory. This study aimed to determine the quality of water in CSU-Aparri compound. Water sources were ground water from science laboratory, pump well from the school canteen, sample from the Aparri Water District, pump well from the single detached cottage, and pump well from the dormitory. Water quality is based on the physical, chemical and bacteriological properties of the five sampling sites. The findings showed that color of all samples is higher than the acceptable limit, while taste and odor are almost imperceptible. The pH, total dissolved solids (TDS) and salinity, most water sources were within the acceptable limits, except the salinity of water sample collected from the Aparri Water District. For total coliforms, water samples from the laboratory and from the school canteen were positive, however all water samples were negative for E.coli.

Keywords: *Microbiological, Pjysico-chemical, domestic water, Aparri*

INTRODUCTION

Water is an important component of every life. There is no life on our planet without water. For varying purposes, we need water. We need water for drinking, for industry, irrigation, swimming and fishing, etc.

For humans, groundwater is an essential source of drinking water. Nowadays, in increasing urbanization, agricultural and industrial activities have a poor effect on both surface and groundwater and can quickly reduce water quality in terms of its physical, chemical and biological characteristics (Ahmad Zaharin et al., 2014).

Water quality and suitability of water for use is determined by the taste, odor, color, and concentration of organic and inorganic matter (Dissmeyer, 2000). The chemical, physical and biological properties of water can be characterized as water quality, typically in terms of its suitability for a given use. For various purposes, with respect to composition and purity, water has its own parameters. The types of analysis could vary from simple single-analyte field experiments to instrumental multi-component laboratory-based analysis.

Coliform bacteria are commonly used bacterial indicator for sanitary water quality. (Rompré A., et.al., 2002: Tallon P., et.al., 2005) They are classified as members of genera or species within the family Enterobacteriaceae capable of growing at 37 ° C (total coliforms) or 44 ° - 45 ° C (thermotolerant coliforms) that have β-galactosidase (Edberg S.C., 2000). Coliform bacteria are common in the feces of warm-blooded animals, but can also be present in soil, aquatic environments and plants. Unlike other coliform bacteria, Escherichia coli is almost exclusively of fecal origin and can be found in high densities in human and animal urine, wastewater and water exposed to recent fecal contamination. Consequently, is considered as the best fecal predictor of microorganisms (WHO,2011).

Most people know that their bodies need water to survive, but unfortunately, millions of people unknowingly poison themselves and their families because they don't drink clean water. Today, a painfully high proportion of potable water is polluted with chemicals or other toxins.

Unfortunately, countless individuals are putting themselves and their families at risk for a number of catastrophic side effects, including cancer, by not taking the time to study the safety of their water and the potentially dangerous pollutants in it.

Students and employees, especially residents and dormitory residents in CSU-Aparri compound face so much problem on the quality of water in various sources. Water has off color and odor and if used for washing clothes, it is difficult to lather and can consume more soap.

Objectives

General Objective: This study will determine the quality of water in CSU-Aparri compound.

Specific Objectives: Specifically, the study aims:

a) To determine the physical characteristics of the water samples as to color, odor and taste.
b) To analyze the chemical quality in terms of pH, turbidity, salinity, Total Dissolved Solids (TDS),
c) To analyze microbiological quality in terms of total coliform and E. coli.

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

Methodology

This study utilized the descriptive research design. The study was carried out in a natural environment using a combination of observations and a questionnaire. Five sampling sites were purposively selected within CSU-Aparri compound. Sampling sites include the school canteen pump well, the science laboratory faucet sourced from ground water, sample from the Aparri Water District, pump well at the single detached and from the dormitory. Two sampling periods were taken: December 2019 and March 2020 wherein from a rainy season and summer. Water was pumped adequately for two minutes in the case of faucets and pump well to ensure that the samples reflect groundwater quality. In the water sample bottles, a limited air space was left to allow shaking at the time of inoculation prior to analysis. Immediately after collecting the sample at low temperatures, sampling bottles were capped and then placed inside an ice chest (filled with ice) to minimize bacterial action. Water samples collected were transported to the laboratory immediately. Samples were brought to DOST R02 for some test parameters, while those other parameters like pH, salinity, TDS were readily measured using the multiparameter instrument in the laboratory. All resulting values in the study were compared with the Philippine National Standards for drinking Water (PNSDW) set standard values.

Study 1. Physico-Chemical and Microbiological Analysis

Collect samples for microbiological examination in 1L clear bottles that have been cleansed and rinsed carefully, given a final rinse with distilled water and sterilized as directed in the standard method of analysis for water.

1. Physical Analysis

A questionnaire on the physical characteristics of ground water as to odor and taste will be prepared. Analysis for physical properties like color and odor will be recorded by a panel of evaluators.

a. Odor and Taste
   For odor and taste, we present sensory analysis methods, as these are usually carried out in order to measure qualified panelist appreciation of water.
b. Color
   The color was determined using DR 3900 spectrophotometer (Method 8025).

2. Physico-chemical Analysis

a. Turbidity
   The turbidity was determined using Turbidity Meter. (APHA-AWWA-WEF Standard Methods for the examination of water and wastewater, 3rd Ed. Method no. 2130 B)
b. Salinity, pH, Total Dissolved Solids (TDS)
   These parameters were measured using the portable water quality multiparameter instrument.

3. Microbiological Analysis

For microbiological analyses, most probable number (MPN) method was used. Enzyme substrate test with decimal dilution of 10-1, 10-2, 10-3 and others as appropriate was used following the Merck Microbiology Manual, 110620.

RESULTS AND DISCUSSIONS

Table 1. Physical characteristics of water samples

Samples	Color (CU) AWM	Odor AWM	Description	Taste AWM	Description
Lab. Faucet	62.0	2.36	Odor almost imperceptible	2.48	Taste almost imperceptible
Canteen pump well	54.5	2.6	Odor almost imperceptible	2.56	Taste almost imperceptible
AWD	34.0	1.44	Odorless	1.72	Tasteless
Cottage pump well	25.5	1.64	Odorless	1.68	Tasteless
Dormitory pump well	104.5	2.56	Odor almost imperceptible	2.60	Taste almost imperceptible
Average	56.1	2.36	Odor almost imperceptible	2.21	Taste almost imperceptible

The physical characteristics of water samples at the five sampling sites on the campus of CSU-Aparri are shown in Table 1. The water color was measured using the Spectrophotometer and the color exceeds the maximum limit of 10 color units (CU), as gleaned from the table. Water collected from the ladies' dormitory pump well has the greatest color units, followed by the sample collected from the laboratory and from the Canteen. It is very interesting to note that the sample collected from the pump well from the single detached cottage has lowest color units among the samples. The elevated color units of the samples, that is yellowish, is due primarily to decomposition of organics,

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

metallic salts or colored clays, or it can be regarded for the presence of humic or fluvic compounds, iron, IRB bacteria, anaerobic/aerobic bacteria (Driscoll, 1986; Lehr, 1980; Oram, 1990).

The general odor and taste description of the samples is almost imperceptible. Earthy odor can be due to algal by-products and metallic taste can be caused by inorganic chemicals such as iron, manganese, copper, zinc, nuisance bacteria usually from organic matter such as plants, animals, or bacteria that are naturally present during certain time of the year. Although harmless, these materials can affect the taste and smell of drinking water at low concentration.

Pure water has no color, odor, or taste, based on the Central Customs Laboratory, since there are no minerals or trace elements. The data shows that all water samples passed the test as viewed by consumers in terms of physical characteristics taste and odor.

Table 2. Physico-Chemical Analysis of Samples

Samples	Salinity (ppt)	TDS	pH	Turbidity (NTU)
Lab. Faucet	0.26	264	7.27	<1
Canteen pump well	0.24	291	7.30	<1
AWD	0.65	285	7.19	2.2
Cottage pump well	0.46	335	7.30	1
Dormitory pump well	0.48	475	7.40	<1

Table 2 presents the results obtained from the physico-chemical analyses of the five water samples of water. The salinity of the Aparri water District sample is higher compared with the allowable limit of 0 -0.5 ppt. There are times wherein the water system of Aparri Water District gives salty water, as if the treatment is questionable from its source. Plants can naturally increase soil salinity by absorbing water and by excluding salts. Groundwater contains naturally occurring salts from dissolving rocks and organic materials. Certain rocks dissolve very easily; groundwater in these areas can naturally be very high in salinity.

Total Dissolved Solids (TDS) are the inorganic matters and small amounts of organic matter, which are present as solution in water. As shown in table 2, the sample collected from pump well at the dormitory has the highest value of 2.2 NTU, but still within the acceptable limit set by WHO and Philippine National Standards for drinking Water (PNSDW) regulations which is 600 mg/L.

The pH is considered one of the most significant parameters of water quality. The calculation of pH refers to the water's acidity or alkalinity. If the pH is below 7.0, a sample is known to be acidic, meanwhile, if the pH is greater than 7.0, it is alkaline. The corrosion of metal pipes and the plumping system will result in acidic water, while, alkaline water illustrates disinfection. The standard pH range for drinking water specified in the WHO and PNSDW guidelines, that is between 6.5 and 8.5. The pH values of all water samples are found to be between 7.19 and 7.40, where samples from the Aparri Water District and Ladies dormitory have the lowest and highest values respectively.

Turbidity is defined as the pressure of suspended material such as clay, silt, finely divided organic material and other inorganic material in water. Turbidity is water cloudiness caused by a number of particles and is another key parameter in the study of drinking water. It is also related to the content of diseases causing organisms in water that may derive from soil runoff. For drinking water, the normal recommended maximum turbidity limit set by the WHO is 5 units of nephelometric turbidity (NTU). It is surprising to note that the treated water form Aparri Water District, which is expected to be the cleanest water, had the highest turbidity value of 2.2 NTU. It was observed by consumers in those days that the water supply was questionable. The findings show that the turbidity was below the maximum acceptable limit of 5NTU for all the samples studied.

Table 3. Microbiological Analyses of Samples

Samples	Total Coliform Count (MPN/100mL)	*Escherichia coli* Count (MPN/100mL)
Lab. Faucet	11	<1.1
Canteen pump well	920	<1.1
AWD	<1.8	<1.1
Cottage pump well	<1.8	<1.1
Dormitory pump well	<1.8	<1.1

The microbiological examination of water emphasizes assessment of the hygienic quality of the water source. A general indication of the sanitary state of a water source is provided by total coliform counts. Data on total coliform and Escherichia coli count are shown in Table 3. from different samples. It shows that in the five samples, the water collected from the canteen pump well has the highest count of 920 counts, compared to the water collected from the laboratory with just 11 counts of the total coliform. The two sources of water samples did not pass the drinking water level as per standard detection methods and microbiological quality values, which is <1.1 or zero general coliforms per 100mL. A positive coliform test indicates potential pollution and a risk of waterborne illness. All water

VOLUME 18 | ISSUE NO. 1 | ISSN NO: 1656 - 7927
JANUARY-DECEMBER 2021

samples have E. coli count result of <1., which means that E. coli is absent in the water samples. This result is similar to the study of De Vera (2015) wherein the total bacterial count and total coliform of the water samples tested did not pass the standard values, but the test for E. coli.is negative to the water samples.

SUMMARY AND CONCLUSIONS

Summary: These are the significant findings of the study: All samples have high color units which exceeds the limit of 10 CU. Samples from Aparri water district and from the cottage are tasteless and odorless, others have almost imperceptible odor and taste.

For the physico-chemical analyses of the five water samples of water, salinity of the Aparri water District sample is higher compared with the allowable limit of 0 -0.5 ppt.
The total dissolved solids (TDS) of the sample collected from pump well at the dormitory has the highest amount, but still within the acceptable limit of Philippine National Standards for drinking Water (PNSDW) regulations and World Health Organization which is 500 mg/L. The pH result of all the samples is within the limit range of 6.5 - 8.5 which is usually considered satisfactory, according to PNSDW. For the measurement of turbidity, sample from the Aparri water district has the highest value of 2.2 NTU, however it is still within the acceptable limit of <5 NTU.

For the microbiological qualities of the water samples, in terms of total bacterial counts, two water samples are positive to the bacteria. The sample collected from the canteen has the greatest number of total coliform bacteria, that is 920 MPN/100mL and the water collected from the laboratory has 11 MPN/100mL, however no E.Coli was detected in all of the samples.

Conclusion: The water samples in general exhibit off color (light yellowish brown) which is supported by its color units of above 10 CU, however its taste and odor are almost imperceptible. The values of water quality parameters such as pH, turbidity, TDS, and salinity from all samples collected from different sample sites, except salinity of water from Aparri Water District, were found to be within the recommended limits of WHO and PNSDW. The presence of total coliform in water collected from the school canteen and laboratory makes water not safe and not potable, however all samples are negative from E. coli.

RECOMMENDATIONS:

Based from the study conducted, the following are highly recommended:

1. Water hardness would be included in the test parameters so as to answer the laundry problems of the users of water.
2. The inclusion for test of metals is recommended in researches related to the quality of ground water.
3. Study for the remediation of removing the off color be conducted, which will help a lot students as well as household owners inside CSU-Aparri campus as well as residents near the campus having similar water quality.

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The CSU Aparri Research Journal is the official journal that publishes annually faculty, students, and collaborative scientific articles ranging from fisheries and marine sciences, education and training, business management, information and communications technology, hospitality management, law and governance, industrial technology, as well as policy and impact studies contributing to the greater quest for new discoveries, innovation, and countryside development. The latest issue of the research journal was in October 2012 and with the urgency of various evaluation and monitoring schemes set by various standards-based organization, the research, and development office is challenged to produce quality and science-based publication that would enhance instruction, research, extension, and production. With the available resources to advance the conduct of research, as well as presentation and publication of these intellectual outputs, faculty and student as well as collaborators/contributors, are highly encourage to submit their articles for publication in the CSU Aparri Research Journal. Hence, through publication, CSU Aparri will be able to surpass performance indicators set forth by CHED Program Compliance, PBB, SUC Levelling, Institutional Sustainability Assessment, Program Accreditation by AACCUP, and possibly by international standards.

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RESEARCH, DEVELOPMENT, AND EXTENSION OFFICE

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