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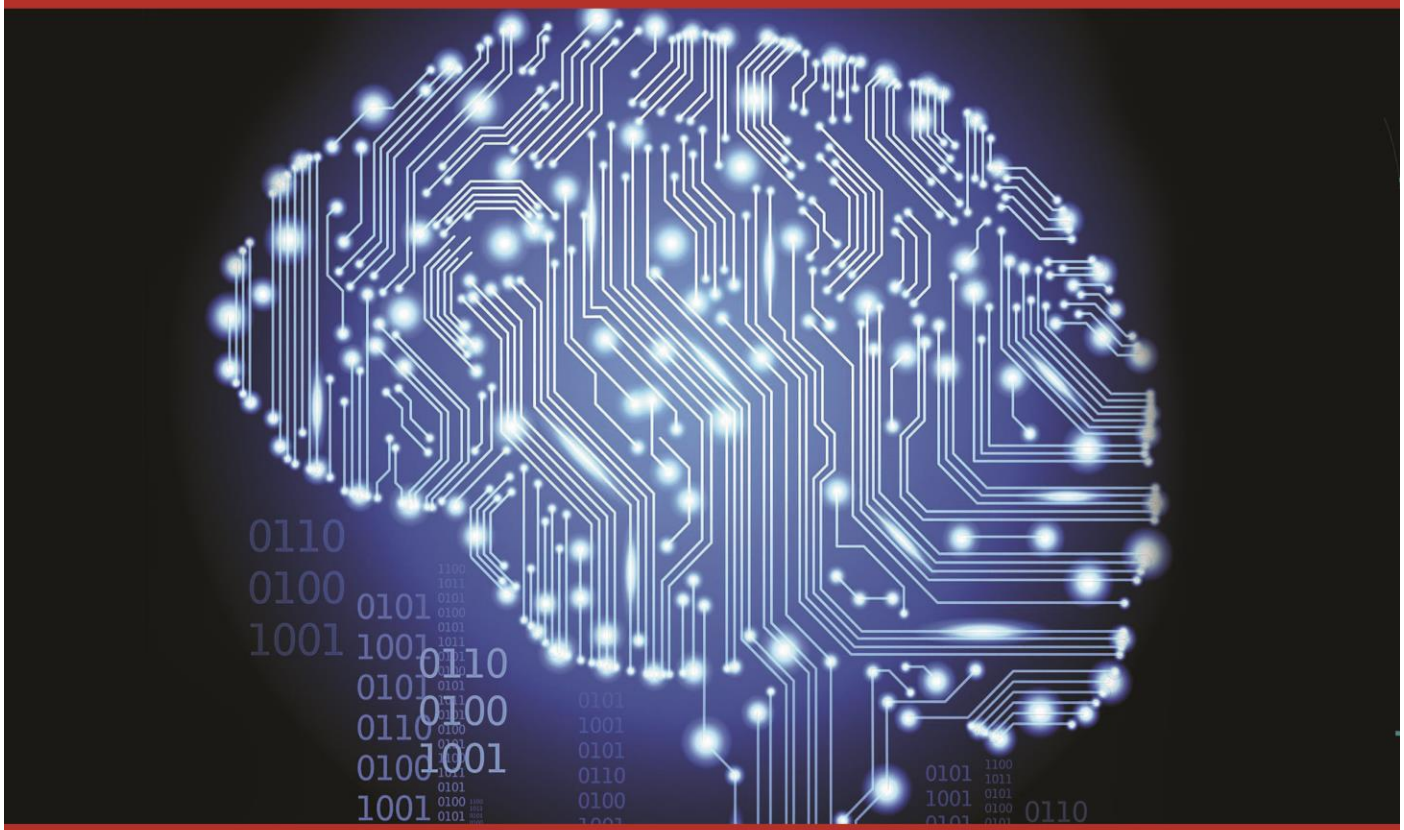

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FOREWORD

I am pleased to put into the hands of readers Volume-5; Issue-1: Jan, 2019 of **"International Journal of Advanced Engineering, Management and Science (IJAEMS) (ISSN: 2354-1311)" ,** an international journal which publishes peer reviewed quality research papers on a wide variety of topics related to Science, Technology, Management and Humanities. Looking to the keen interest shown by the authors and readers, the editorial board has decided to release print issue also, but this decision the journal issue will be available in various library also in print and online version. This will motivate authors for quick publication of their research papers. Even with these changes our objective remains the same, that is, to encourage young researchers and academicians to think innovatively and share their research findings with others for the betterment of mankind. This journal has DOI (Digital Object Identifier) also, this will improve citation of research papers.

I thank all the authors of the research papers for contributing their scholarly articles. Despite many challenges, the entire editorial board has worked tirelessly and helped me to bring out this issue of the journal well in time. They all deserve my heartfelt thanks.

Finally, I hope the readers will make good use of this valuable research material and continue to contribute their research finding for publication in this journal. Constructive comments and suggestions from our readers are welcome for further improvement of the quality and usefulness of the journal.

With warm regards.

Dr. Uma Choudhary
Editor-in-Chief
Date: Feb, 2019

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Neutron Imaging and Tomography with Medipix2 and Dental Microroentgenography: An Over View

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Abstract**—** *An over view of Neutron Imaging and Tomography (NIT) with Medipix2 and Dental Micro-roentgenography have been presented in this article. This over view confined to semiconductor detector Medipix2, neutron radiography and tomography and dental microroentgenography. Medipix2 is a pixel-based detector technology employed to measure charge particles, photons (visible through gammas) and neutron. Neutron Beam for this technology are LVR-15 Research Reactor (10^7 n/cm^2 s) and Spallation neutron source (3×10^6n/cm^2 s) .This technology has been verified with photograph and neutronogram of a relay and photograph and tomographic 3D reconstruction of a bullet cartidge, tooth and fishing thread. Comparison of spatial resolution among different imagers also has been presented.*

Keywords—Neutron Imaging and Tomography, Medipix2 and Microroentgenography.

I. INTRODUCTION

Neutron Radiography (NR) is based on the application of the universal law of attenuation of radiation passing through matter.

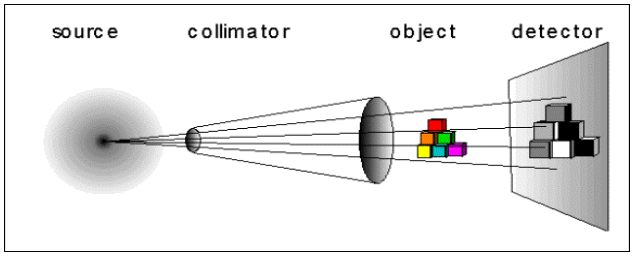

Fig.1: The basic experimental set-up for neutron radiography.

Because different materials have different attenuation behavior. The neutron beam passing through a sample can be interpreted as signal carrying information about the composition and structure of the sample. The basic experimental set-up is given by the following arrangement as shown in fig.1 [1].

Neutrons pass through the sample and strike the scintillation screen. Neutrons ionize the phosphorus in the screen, which cause it to produce flashes of light. The flashes of light are recorded by a camera and converted to numbers in a matrix. Fig.1 describes the configuration of the neutron radiography system. The neutron sources for these experiments are neutron sources LVR-15 Research Reactor (10^7 n/cm^2 s) and Spallation neutron source (3×10^6n/cm^2 s) .And the collimator is a beam forming assembly which determines the geometric properties of the beam and may also contain filters to modify the energy spectrum of the beam or to reduce the content in gamma rays of the beam. The object in the figure above represents the sample that is to be imaged. The selected objects were a relay, a bullet cartidge, tooth and fishing thread. The Medipix2 device with 300µm thick silicon sensor was tested as a neutron detector. The Medipix2 Detector on chip-board (left) is attached to the new USB readout (right) which connects to PC via USB as shown in fig.2 [2, 3].

II. METHODOLOGY

2.1: Compact portable set up with USB interface

The Medipix2 Detector on chip-board (left) is attached to the new USB readout (right) which connects to PC via USB. USB provides both communication and power

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supply lines. A significant reduction in interface electronics dimensions is achieved and no external power supply.

Fig.2: Compact portable set up with USB interface.

2.2: Semiconductor Detector Medipix2

The state-of-art semiconductor hybrid pixel detector Medipix2 consists of converter, detector chip, bump-bonding and readout chip.

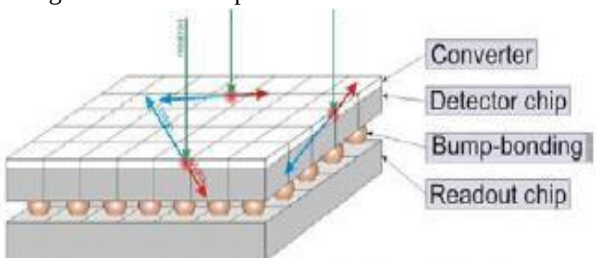

Fig.3: Coated ^{6}LiF neutron converter deposited on the sensor surface. Heavy charged particles are detected within few pixels.

Various converter materials were investigated such as ^{6}LiF powder, Amorphous ^{10}B, Cadmium foil and Gadolinium. ^{6}LiF produces exclusively heavy charge particles and no gamma rays. Compact USB Readout Chip comprises of Preamplifier, Discriminator, Digital Counter,DAQ PCI Card, User friendly software and Sensor Bias Voltage (5 – 100V).

2.3: Neutron Radiography

During neutron radiography image of a relay taken with metal cover in place as shown in fig.4.

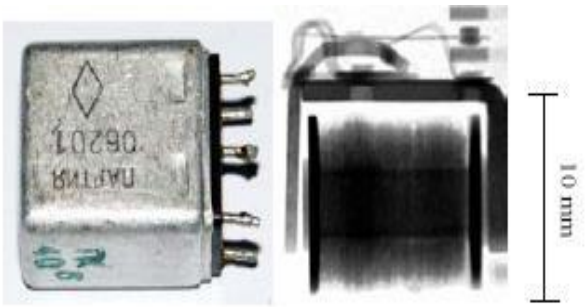

Fig.4: Photograph and Neutronogram of a relay.

2.4: Neutron Tomography

During neutron tomography blank cartridge (inner powder filling) and tooth have been used as object. 100 projections/150s taken for each object as shown in fig.5 and fig.6 .The Filtered Back Projection algorithm for reconstruction.

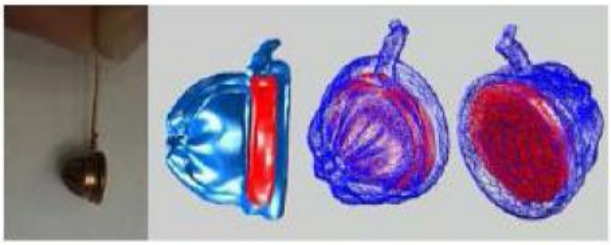

Fig.5: Photograph and tomographic 3D reconstructions of blank cartridge (inner powder filling is shown in red).

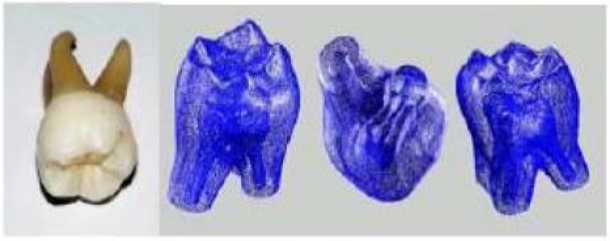

Fig.6: Photograph and tomographic 3D reconstructions of tooth.

2.5: Dental Microroentgenography

Based on Medipix position sensitive detector fully electronic, high efficiency (low dose) and high spatial resolution portable digital dental imaging device. To observe the bone-to-implant interface and surrounding bone tissue of orders tens of microns (X-ray Source L8601-01). Preliminary tests were carried out on Phantoms of dental implants coated by a thin wax layer (simulating bone-to-implant tissue interface) embedded in plaster (simulating bone). A wax layer 40 micrometer thick was determined for the selected position.

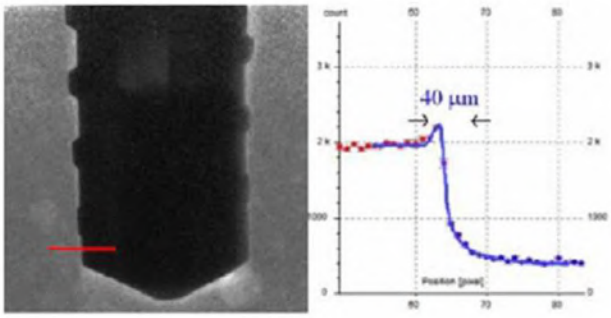

Fig.7: Medipix2 transmission X-ray image (left) and transmission curve and fit (right) of implant phantom. Image acquired in 150s (dose ~ 4mGy) with 3x magnification.

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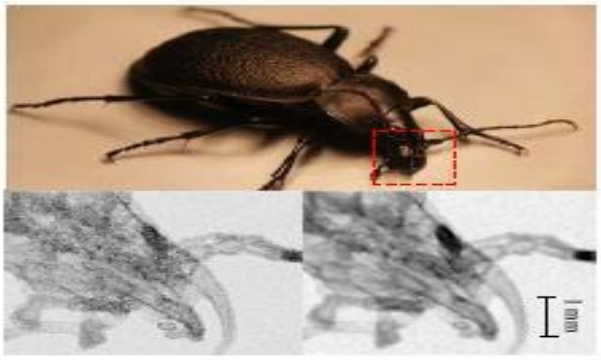


Fig.8: Photograph (above) and X-ray transmission radiograms (below) of a ground beetle with two methods of flat-field correction: standard (left) and newly developed calibration method (right).

2.6: Results and Discussion

High spatial resolution, single quanta counting digital imaging device for X-ray and Neutron imaging USB Readout adds portability and ease of use. Therefore, isotropic illumination by diffuse source as shown in fig.9. Isotropic and diffuse neutron reactor source significance for objects rich in H and light elements, Increase the detection efficiency and transmission imaging techniques.

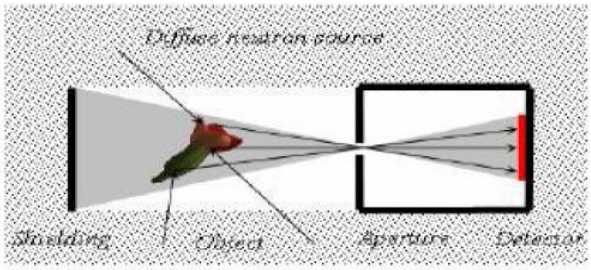


Fig.9: Neutron radiography with isotropic illumination in a diffuse field.

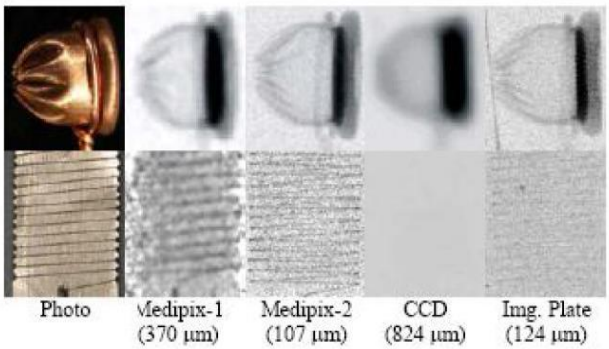
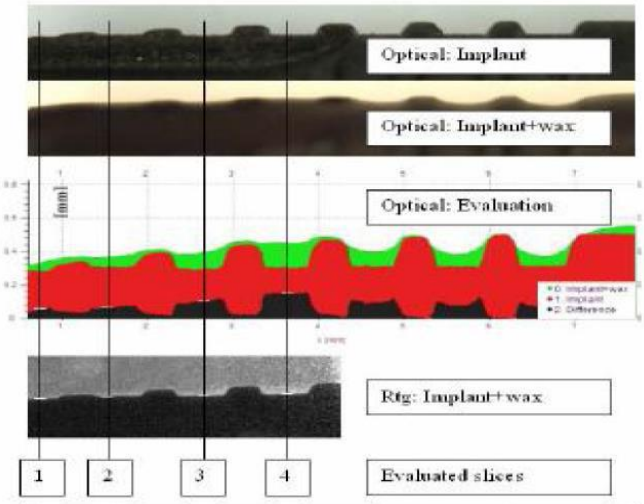


Fig.10: Photograph and neutronographs of bullet cartridge (top) and finishing thread with 100 µm in diameter (bottom) taken by different imagers. Spatial resolution (FWHM of LSF) is included.

Comparison of spatial resolution for bullet cartridge (top) and finishing thread with 100 µm in diameter (bottom) among different imaging devices such as medipix-1 (370 µm), medipix-2 (107 µm), CCD (824 µm) and image plate (124 µm) have been shown in fig.10.



Slice	Rtg. Measurement [µm]	Error Estimation [µm]	Optical Measurement [µm]	Difference [µm]
1	40,1	2,9	40,0	0,1
2	75,4	10,9	65,2	10,2
3	106,2	9,8	96,9	9,3
4	150,8	8,6	148,0	2,8

Fig.11: Interface wax thickness from X-ray transmission measurements evaluated along 4 slices directions. Comparison with optical method (top) is included.

Comparison and Verification of Results with Optical Measurements have been shown in fig.11. Interface wax thickness from X-ray Transmission Measurements evaluated along 4 slice directions. It has been observed that differences between Rtg measurement and optical measurement in 4 slices are 0.1 µm, 10.2 µm, 9.3 µm and 2.8 µm respectively. The error estimations in Rtg measurement for the same slices are 2.9 µm, 10.9 µm, 9.8 µm and 8.6 µm respectively.

III. CONCLUSION

An elaborate study about the Neutron Imaging and Tomography (NIT) with pixel-based detector Medipix2 of high spatial resolution, single quanta counting digital imaging device for X-ray and Neutron Imaging have been presented in this article. USB Readout adds portability, ease of use, significant reduction in interface electronics and no external power supply. Moreover, dental roentgenography is a high resolution microimaging device. Isotropic illumination by diffuse neutron source is also being investigated.

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An Evaluation of MM Anupol Poultry Farm through SWOT Analysis: An IFE and EFE Matrix Approach

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Abstract**—** *The study aimed to evaluate the existing business of MM Anupol Poultry Farm through itsInternal Strengths and Weaknesses and External Opportunities and Threats using the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) Matrices. This study utilized descriptive research design and found out that: the poultry farm is a stable business which already exists for 58 years and under the closed corporation form of business; for the IFE Matrix, the poultry is considered a strong in their industry position which means that its internal position is good;for the EFE Matrix, the poultry is responding in an excellent manner to existing opportunities and threats of the industry; and the firm's strategies is capitalizing on its opportunities effectively and minimizing the effects of potential threats efficiently.*

Keywords— External Factor Evaluation, Internal Factor Evaluation, Poultry Farm, SWOT Analysis.

I. INTRODUCTION

Layer farming is a profitable business venture with growing demand for egg. It provides venturing farms with income and employment opportunities of secure, return and profit over investment[1]. Running a chicken farm requires more than just an agricultural know–how, if one is interested to be a chicken farmer, he must also think like a business person while growing their brand. Choosing a focus, establishing a brand, raising their chickens, improving the quality of produced eggs, proper record keeping and building their business are all part of chicken farming. Then, as the farm business grows, the owner or the manager must be knowledgeable enough on the different functional areas of business like management, finance, marketing, technical and network to grow the business.

San Isidro, which is a 2nd class municipality in the province of Nueva Ecija, Philippines, has a population of 54,023 people according to the 2017 census. The community in the said municipality primarily depends on rice and vegetable farming, poultry and piggery. If one passes by in the town, a number of vendors selling day olds and culled chickens in the street would be noticed, which is considered as one of the sources of income of the people in the municipality. One of most popular egg layer farm businesses in the place is the MM Anupol Poultry which is a Closed Corporation owned by the Anupol family. The business has been inherited by the family from their late father Manuel Anupol who started the business while he was raising his kids and was able to manage and to sustain the business and has now become his inheritance to his children to secure them financially.

This study was conducted to evaluate the MM Anupol Poultry Farm which is a business operating as the biggest egg layer farm in the municipality of San Isidro using the SWOT Analysis specifically the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) Matrix of Fred David (2011). Furthermore, the purpose of using SWOT Analysis is for the business owners to identify their strengths that provide an exploration of the firm's leads over its adversaries. "Weaknesses consider areas in which the companies are at a competitive disadvantage and must be overcome before it turned out the business success into failure. Opportunities are a list of untapped markets or business developments. Threats explore the external environment that could affect the company, including technological, environmental and regulatory factors [2]."

Objectives of the Study

The study aimed to evaluate the existing business of Anupol family which is the MM Anupol Poultry Farm through the use of its Internal Strengths and Weaknesses and External Opportunities and Threats using the IFE and EFE Matrix. Moreover, it is intended to propose a strategic solution to these weaknesses found by the business owners to sustain the profitability and good financial condition of the corporation. Also, the study aimed to come up with the

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game plan to withstand the threats along their way especially the epidemic of bird flu which had been an issue in the industry.

II. RESEARCH METHODOLOGY

This study utilized descriptive research design. According to authors in [3] as cited by[4], "descriptive research describes what is. It involves the description, recording, analysis and interpretation of the present nature, composition or processes of phenomena".

The gathering of data was conducted during August of 2018at MM Anupol Poultry through their managing owner in the person of Amelito Baylon Anupol and his employees at San Roque, San Isidro, Nueva Ecija, Philippines using questionnaire and unstructured interview. The study used the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) Matrix as tools to evaluate the business of MM Anupol Poultry Farm. "The internal and external factor evaluation matrices have been introduced by Fred R. David (2011) in his book Strategic Management". "According to him, both tools are used to summarize the information gained from company's external and internal environment analysis. The summarized information is evaluated and used for further purposes, such as, to build SWOT analysis [5]."The tools are nearly identical so it can help in enhancing the company especially in overcoming its weaknesses, taking advantage of its opportunities and decreasing threats.

Scoring: Each response to every item was evaluated based on the following scale and verbal interpretations:

Responses

Internal Strengths and Weaknesses		**External Opportunities and Threats**	
1	Major Weakness	1	Poor
2	Minor Weakness	2	Average
3	Minor Strength	3	Above average
4	Major Strength	4	Superior

Statistical tools utilized in this study were weight, rating and weighted score.

III. RESULTS AND DISCUSSIONS

Table.1: Internal Factor Evaluation Matrix for MM Anupol Poultry Farm

Internal Strengths	**Weight**	**Rating**	**Weighted Score**
95% of the 50,000 chickens are producing quality eggs	0.10	4	0.40
70 to 80 weeks of productive laying phase of chickens	0.15	4	0.60
Low disease incidence encountered	0.05	3	0.15
Well supplemented vaccines and medicines	0.05	4	0.20
Proper litter management	0.05	3	0.15
Little noise in the location of the farm	0.05	3	0.15
High degree of specialization in farm management	0.10	3	0.30
Rural labor force in the site	0.05	3	0.15
Low environmental pollution	0.05	3	0.15
Huge number of distributors in the town	0.05	3	0.15
Internal Weaknesses			
Minimal control of biosecurity system	0.10	1	0.10
Break–even profit during the summer season	0.05	2	0.10
Lack of high–technology poultry system	0.05	2	0.10
Low level of egg shelf life	0.05	2	0.10
Location site near residential area	0.05	2	0.10
Total	**1.00**		**2.90**

The company having a total weighted score of 2.90 which is higher than 2.50 is consider as strong in their industry position. It means that the company's internal position is good.

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Internal Strengths

Factors like 70–80 weeks of productive laying phase is considered as a major strength since by normal range it is only up to 60 weeks which shows that they exceeded the life span for the chickens to lay eggs before culling procedure and they are 20 weeks over than the normal range. According to [6], "chickens start laying eggs commercially from 18–19 weeks of age and they remain laying eggs continuously until their 72–78 weeks of age." This means that the business owners have already determined the method of prolonging the life span of chickens to produce more eggs, thus, providing them optimum returns to their investments in vitamins, medicines and feeds or in their inputs.

Having a huge number of chickens laying eggs is considered by the owners as one of their major strengths since more chickens being housed in the cage means more eggs that can be produced. Notwithstanding the fact that 95% of the 50,000 chickens are producing quality eggs everyday which denotes that about 47,500 eggs are being harvested everyday giving the business a huge income.

Based on the interview conducted by the researchers, it has been disclosed that having a good management system is very significant in running a business like poultry farm since one has to use common business sense when running and operating a farm business. He added that the first step is to determine the market and see if the existing business has enough space and facility to supply the needs in the market. Having a formal education as he added is also essential as to proper management of the labor force, technical know–how in operating the farm, knowledge on proper bookkeeping and accounting and even the customer relations management and dealing with different stakeholders. The high degree of specialization in the egg production is seen as strength because it provides opportunities to perform better due to more knowledge of a specific part of the production chain and due to costs being divided over larger units [7].

With their goal of maximizing the lifespan of their chickens laying eggs, the owner has revealed that well supplemented vaccines and medicines is the key. The vaccination programme is designed by a poultry specialist and must be stringently followed until the hens reach culling age. This is also the reason of having low disease encountered by them.

As to the poultry's hygiene to avoid complaints from the people living near the area, the business has proper litter management that prevents the spread of maggots and flies. Besides, they also keep chicken manures and sell these as fertilizers for plantation and field crops which served as their additional income. As can be noted, the environmental impact of manure proper disposal can contribute considerably to the environmental impact of egg production [8].

Additionally, little noise in the poultry is maintained since chickens are stressed with noise and love music a lot.

Subsequently, the farm has 10 layer houses and they can maximize a ratio 1:5,000 chickens. This means that the business generates jobs and gives an opportunity to many jobless in the community including out of school youths and unemployed people in the area.

To minimize environmental pollution, the business has complied with the standards or requirements of Department of Environment and Natural Resources (DENR) to mention some of these are their compliance to continuous supply of adequate power, potable water and good access road; the place is not near the bodies of water and wetlands that are frequented by migratory fowl and it is not prone to flooding [9].

Another good aboutthe business is,there are huge numbers of distributors present since marketing chicken eggs in the Philippines is not difficult. Eggs don't go bad so soon and there is a massive demand for chicken eggs in the Philippines [10].

Internal Weaknesses

On the other hand, the respondents have also divulged some of the weaknesses of the business. One of the major weaknesses they have considered is the minimal control of biosecurity system. Biosecurity is the protection of animals from any type of infectious agent—viral, bacterial, fungal or parasitic. It is done by not permitting other animals from entering the poultry farm to bring disease and for the animal not brought to disease [11]. The manager also added that controlling people coming in and out of the poultryis another problem. That is why they cannot avoidtransmission of diseases to chickens since people can also spread diseases as they move from one facility to another [12].

Another weakness mentioned by the respondentsis that egg layer farm business has its lean season.Especially during summer break, on the months of March to May. During these months, since students are on vacation, egg consumption decreases thus, their income is onlyin the break–even point. Also, low shelf life of eggs is another weakness of the business. The U.S. Department of Health & Human Services, 2018, mentioned that eggs can only last until two weeks and if refrigerated it lasts 3 to 5 weeks.

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Additionally, due to the fact that MM Anupol Poultry Farm is still using the conventional type of housing and the traditional feeding and watering system, it has been considered to have lack of high–technology poultry system. Knowledge on how to manage a business integrating technology is very necessary nowadays because it is a contributor for the business to become sustainable in the long range perspective.

The location site is also a weakness since it is near the residential areas.Due to several reasons, the manager haven't complied with the requirement of at least 1 kilometer away from their neighbors.

Table.2: External Factor Evaluation Matrix for MM Anupol Poultry Farm

External Opportunities	Weight	Rating	Weighted Score
Increasing consumer demand and consciousness	0.20	4	0.80
Creating strong functional relations between the owner and the stakeholders	0.05	2	0.10
Availability of good quality raw materials	0.10	3	0.30
Availability of high technology farm facilities	0.15	3	0.45
Operating in a duopoly market structure	0.05	2	0.10
External Threats			
Not favorable temperature	0.05	2	0.10
Potential entry of new competitors	0.05	1	0.05
High cost of inputs (raw materials and medicines)	0.15	4	0.60
Disease outbreak	0.10	2	0.20
Bad media exposure on bird flu issues	0.10	3	0.30
Total	**1.00**		**3.00**

A combined weighted score of 3.0 shows that thepoultry farm is responding in an exceptionalmanner to prevailing opportunities and threats.This means that the business is capitalizing on its opportunities effectively and minimizing the effects of potential threats efficiently.

External Opportunities

"Being a basic food item, the chicken egg is a regular component of every family's home. Over the last two decades, the per capita consumption of eggs has risen from 6 to 10 kilograms which only shows that there an increasing demand and consciousness on the need for eggs on every family's table and that only shows that this is great opportunity every egg layer farm business can take advantage so as for the continuous profitability of this business[13]."

According to the Manager of MM Anupol, since the farm is using a self–mixed feeding system, instead of buying commercial feeds, they have a nutritionist who formulates the feeds for the laying chickens. The availability of such inputs in the market is very necessary. "There are many companies available throughout the world, which are producing commercial feed and feed supplements for layer chickens [6]." These can be bought from local market thus the manager need to be sure that the feed and feed supplements they purchased are supplemented with vitalnutrients so as to increase its life span and decrease mortality rate.

The employees mentioned thatthey need to adopt the latest technology in poultry raising. They need to enhance their environmental control, automation in feeding, drinking and other management [14] and since there is an availability of high technology farm facilities in the market, if the business would like to shift from conventional housing to modern one, they could always take advantage of this opportunity to increase and enhance their production.

"The continuing survival and growth of the Philippine poultry industry therefore depends on its ability to compete in the local and global market, which, in turn, depends largely on the efficiency of its production and marketing systems [14]." Creating strong functional relations between the owner and the stakeholders is very necessary for the business owners to create loyalty to all of their stakeholders especially to their employees, distributors, suppliers and consumers.

As of 2018, based on the Business Permit and Licensing Office of the municipality of San Isidro, there are only 2 existing commercial layer poultry farms in the town which means that the MM Anupol Poultry Farm is operating under the duopoly market structure. Due to this

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market control, these firms have the ability to influence the entire market. "Dominating market players are able to create barriers of entry for new entrants, thereby making it difficult for them to get into the business and that mean less competition on the part of this business owners [15]."

External Threats

The business owner has revealed some of the threats they have been encountering since the company had been established 58 years ago. He stated thatrise and fall of their business depend largely on good management, choice of chicken layer breed, readiness for disease outbreak, quality of egg and feed efficiency."The advances in feeds formulation influence the increase in the efficiency of chicken layers to produce eggs [13]." Since the MM Anupol Poultry Farm is applying the ad libitum in feeding their chickens and is using their own formulation of feeds, the high cost inputs (raw materials and medicines) has become a threat.

According to [16], "the first bird flu outbreak in the country has spread to two towns in Nueva Ecija, which include the municipality of San Isidro, where over 300,000 poultry had been culled." This kind of disease outbreak could immediately ruin the business without any control of the owners. This issue was also worsened by fake news and bad media exposures.

Another threat in a poultry business is temperature or theclimate in a chicken house. It plays a great influence in the health and production level of the chickens especially those young and productive birds. An ambient temperature between 20 and 25 ^{o}C fits the laying hen best. When layers are exposed to much higher temperatures, the birds would be looking for cooler places; there is less activity; the birds start panting and spreading their wings in order to increase their body surface; water consumption increases and feed intake drops; egg production drops; egg weight decreases; shell quality and strength decrease [17] thus, creating a negative impact in the egg production business.

In addition, a flock of pullets or layers can only perform up to its genetic potential when disease influenced is minimized. The diseases of economic importance vary widely between locations, but in every case the challenge is to identify and control those diseases. "Biosecurity is the best method of avoiding diseases. A good biosecurity program identifies and controls the most likely ways a disease could enter the farm [12]."

Lastly, in every business there is always a risk of having new competitors. When fresh competitors move in and offer similar products, their poultry's competitive position will be at risk. Therefore, the threat refers to the ability of the new poultry farmto enter in the industry that can lead toupsurge in the company's market share and lesser profit or worst may lead to losses if they cannot sustain their market.

IV. CONCLUSION

1. The MM Anupol Poultry Farm is a stable business which already exists for 58 years and under the Closed Corporation form of business.
2. For the Internal Factor Evaluation (IFE) Matrix, the poultryis considered a strong in their industry position which means that its internal position is good.
3. For the External Factor Evaluation (EFE) Matrix, the poultry is responding in an excellent manner to existing opportunities and threats to the industry.
4. The firm's strategies is capitalizing on its opportunities effectively and minimizing the effects of potential threats efficiently.

V. RECOMMENDATION

1. The business owners of MM Anupol Poultry Farm should consider improving its biosecurity control in the site to avoid diseases of chickens
2. The business owners must consider transforming their housing from conventional type into a modern based one.
3. Improvement may be made by the owners of the MM Anupol Poultry Farm regarding investments in breeding and genetic improvements to produce its own breeder stock and integrating forward into further processing and distribution of eggs.
4. Other studies on evaluating businesses like egg layer poultry farm should be done by future researchers through the application of other analysis tools like PEST Analysis, TOWS Matrix and other strategic management tools.

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Coconut Farming Industry in Dingalan, Aurora: Practices and Challenges

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***Abstract*—** *This study attempted to describe the status of coconut farming industry practices and challenges in Dingalan, Aurora. Using Descriptive research design with 50 purposively chosen coconut farmers as respondents, the study revealed that the coconut farming industry in the subject town was in need of improvement in terms of farming practices. It also needed assistance to addressing the challenges that included low yield and lack of strong political assistance. Two from among the recommendations were to establish an extension activity focused on farmers' training and capability building and to strengthen political will in promoting marketing and farming practices in the town.*

***Keywords*— Coconut farming industry, coconut farming practices, industry challenges.**

I. INTRODUCTION

"The coconut is a very useful plant with a wide range of products being sourced from it. Coconut products are used to make everything from clothing to animal feed to beauty creams[1]."

Coconut palm is grown in over 80 countries worldwide and excels in tropics, like India, Philippines and Indonesia [2].

Among the coconut producing countries in the world, "India has made unprecedented progress in coconut cultivation from mid 2014 to 2018 and now it has become the leading country in coconut production and productivity. Productivity increased to 11516 fruits per hectare in 2017-18 as compared to 10122 in 2013-14. Between 2014 and 2018, 13,117 hectare was brought under new plantation as compared to 9,561 hectare during 2010-2014."[3]. This has given India a huge income and consequently provided jobs to most of their unemployed youths.

Aside from India, coconut farming is also a profitable industry in the Philippines. With 68 out of 81 coconut growing provinces in the country, coconut exports earn more than a billion dollars for the country every year [4].

More or less, 3.5 million hectares of the country is currently planted with about 339 million nutbearing trees. Each tree bears an average of 46 nuts per year or an average of 13.8 million of nuts annually. At first glance, the figure may appear large, but in comparison with other coconut growing countries, our country's coconut yield is way behind that of India, Mexico and Brazil where the average nut yield per tree were 250, 300 and 400 respectively.

According to author in [4], "coconut farmers in the Philippines are more or less 3.4 million; but with the current situation of coconut industry in the country, it can be deduced that these coconut farmers must be living below poverty line. It is ironic because coconut farming has big potential, if only problems related to it could be addressed."

Problems in coconut farming include low yield per tree due to low genetic quality, absence of fertilizer; and limited replacement of aged trees. The unorganized supply chain also adds up to the misfortune of the coconut farmers, because it tends to disperse small holdings resulting to high logistics cost due to small production lots and high transport [5].

There are other issues that confront the coconut industry. These include the following: lack of a serious development program for the industry; resource allocation criteria, which is biased toward rice; institutional issues with the PCA implementing mostly under-funded, short duration programs; implementation of programs with limited involvement of LGUs, the private sector, the civil society, and the academe; and the lack of civil society engagement, particularly in analyzing and settling the issues, which can be addressed by a strong political will, except for low yield which can be addressed at the farm level. The average yield of 46 nuts per tree per year may be increased by using hybrid variety and by application of good agricultural practices. On the other side, an organized system of marketing can also help cut expenses and thus boost profit.

With the way things are in the coconut farming industry, it is believed that a study could help. That is why

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the proponents ventured on this research, taking the case of Dingalan, Aurora in focus.

According to the Philippine Statistics Authority, Dingalan has a land area of 304.55 square kilometers constituting 9.68% of the 3,147.32-square-kilometre total area of Aurora. Dingalan's total land area comprises of 24,706 hectares of forestland and 15,972.15 hectares of alienable and disposable land which includes 2,981 hectares of farmland and 315.44 hectares of built up areas. The 25% or 7,714.51 hectares of the municipality is considered as agricultural land and 55.65 hectares are used for coconut intercropping [6].

Next to fishing, rice farming and forestry, coconut farming has become a major source of livelihood in Dingalan, Aurora. Coconut farming is very conducive in the locality because of its type IV climate and the salty sea breeze which is considered beneficial to coconut growth. However, the actual status of the industry in the municipality is undetermined due to lack of baseline data from the Municipal Agriculture Office (MAO) and from the Philippine Coconut Authority [7].

Generally, the study sought to determine the status of coconut farming in Dingalan, Aurora. It specifically aimed to:

1. Describe the status of coconut farming industry in Dingalan in terms of:
   1.1 Size of coconut farm by farmer
   1.2 Number of trees grown
   1.3 Annual coconut yield per tree
2. Describe the coconut farming practices in Dingalan in terms of:
   2.1 Insect pest and use of pesticides
   2.2 Coconut diseases and use of chemicals
   2.3 Fertilizer management
3. Describe the marketing practices in the coconut industry of Dingalan.
4. Describe the coconut industry in terms of financial aspect.
5. Identify the problems encountered by coconut farmers.

II. RESEARCH METHOD

Descriptive research design was used in this study to determine the status of coconut farming in Dingalan, Aurora. According to [8] as cited by the authors in [9], descriptive research design "is an attempt to describe systematically a situation, problem, phenomenon, service or program or provides information about, say, living condition of a community or describes attitudes towards an issue."

A total of 50 purposively chosen respondents were involved in the study. These respondents were all from Brgy. Matawe, the largest coconut producing area in Dingalan. There were a total of 398 farmers in the said Barangay, and only those who were growing coconut for 25 years already were taken as respondents. They were chosen believing that they are children of old farmers with traditional practices, but who are capable of getting coconut farming information.

Validated survey questionnaire and personal interview were the main data gathering techniques used. The questionnaire was divided into 3 parts. Part I described the personal profile of the respondents. Part II contained items describing the production, marketing and financial aspect of coconut farming. Part III consisted of problems ecountered by coconut farmers and potentials of coconut farming.

Data were analyzed using frequency, percentages, averages and weighted mean.

III. RESULTS AND DISCUSSION

I. Description of Coconut Farming in Dingalan

Coconut farming in Dingalan was described in terms of coconut land area by farmer; number of trees grown; and yield per coconut tree.

Table.1: Coconut Farming in Dingalan

Size of coconut plantation by farmer (hectare)	**Frequency**	**Percentage**
1.0 to 1.5 hectares	28	56%
1.6 to 2.0 hectares	6	12%
2.1 to 2.5 hectares	4	8%
2.6 hectares and above	12	24%
Total	50	100%
Mean	1.68	
Number of Coconut Trees Grown by Entrepreneurial Classification		
Small Scale Coconut Farmer (10-50 trees)	6	12%
Medium Scale Coconut Farmer (51-149 trees)	16	32%
Large Scale Coconut Farmer (150-250 trees)	19	38%

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Extra Large Scale Coconut Farmer (above 250 trees)	9	18%
Total	50	100%
Annual Coconut Yield per Tree		
31 - 60	6	12%
61 – 90	12	24%
91 – 120	17	34%
121 – 150	5	10%
151 – 180	9	18%
181 and above	1	2%
Total	50	100%
Mean harvest per year	107	

Land area planted with coconut

It can be viewed from Table 1 that majority of the respondents comprising 28 or 56 % have one (1) to 1.5 hectares of land planted to coconut. Second majority (12 or 24%) have 2.6 hectares and above; followed by six (6) or 12% have 1.6 to 2.0 hectares and four (4) or 8% have 2.1 to 2.5 hectares coconut farm, respectively.

The average area of coconut farm per farmer is 1.68 hectares. This implies that the area planted to coconut is manageable for each farmer. With the size, the farmer may have ample time to attend to their crops and the management needed, considering that coconut trees do not need as much attention as the seasonal crops required. What the farmers probably need the most are the technical know-how as regarding pest control and financing.

Number of Trees Grown

It can be gleaned from Table 1 that the number of coconut trees grown in Dingalan was described in accordance to their entrepreneurial classification or whether they could be considered small, medium large or extra-large.

The findings revealed that majority of them comprising 19 or 38% were classified as large scale with 150 to 250 trees grown in their farm; followed by 16 or 32% which is medium scale and thus maintains 51 to 149 trees. Only nine (9) or 18% and six (6) or 12 % can be described as extra-large and growing more than 250 trees, and under small scale classification with 10-50 trees, respectively.

Annual Coconut Yield

Table 1 also shows that the average annual yield of coconut trees in Dingalan was 107, which was larger than the national average yield of 46 per tree per year. Majority of the respondents (17 or 34%) claimed that they harvested 91-120 pieces per year; 12 or 24% claimed they harvested 61 to 90; and the rest were harvesting either 151 to 180 or even as few as 31 to 60.

The findings indicated that there was still much room to improve coconut yield in the Dingalan to make it comparable with the yield in other Asian countries.

1. Coconut farming practices in Dingalan

The coconut farming practices in Dingalan were described in terms of insect and pest, and chemical/fertilizer management.

Use of insecticides/pesticides

The data shown in Table 2 revealed that rat was voted by 19 or 38% of the respondents as the pest most devastating to their crop; followed by coconut leaf beetle with 16 or 32% vote, and by rhinoceros beetle with 15 or 30% vote. Despite these identified pests, however, it was found out that only four (4) or 8% resorted to using pesticide, while a very big majority comprising 46 or 92% did not use any pesticide at all.

The findings implied that while there were presence of pests which may negatively affect production, the farmers barely employed preventive measures to control them. The coconut trees might be infested and yet the farmers would not use pesticides to avert them. It could be because of any or all of the following: farmers were not aware of the benefits of using pesticides; they did not have financial means to buy chemicals; or there were no pesticides available in Dingalan. One thing may be certain; if the practice continues, the coconut farms may have been seriously infested before the farmers knew it.

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Table.2: Summary Table for Insect/Pest and Use of Pesticides by Farmers

Insect/ Pest	**Frequency**	**Percentage**
Coconut leaf Beetle	16	32%
Rat	19	38%
Rhinoceros Beetle	15	30%
Total	50	100%
Pesticide Used		
Using Pesticide	4	8%
Not Using Pesticide	46	92%
Total	50	100%

Coconut diseases and use of chemicals by farmers

The data shown in Table 3 revealed that root wilt or *"panunuyo ng palapa*" was the most common disease devastating coconut trees in Dingalan as identified by 34 or 68% of the respondents; the second most occurring diseases identified by 11 or 22% of the respondents was leaf spot; followed by bleeding identified by 4 or 8%. Only one (1) or 2% identified bud rot as a disease.

Table.3: Summary Table for Coconut Diseases and Use Chemicals by Farmers

Coconut Diseases	**Frequency**	**Percentage**
Bleeding	4	8%
Bud Rot	1	2%
Leaf Spot	11	22%
Root Wilt	34	68%
Total	50	100%
Chemical Used		
No chemicals used	49	98%
Fungicide	0	0%
Insecticide	1	2%
Total	50	100%

Despite the presence of the said diseases, almost all of the farmers (49 or 98%) did not even use any chemicals. Only one (1) or 2 % used insecticide to avert the disease. None of them used any fungicide at all.

It can be deduced from the data that coconut diseases abound, however no control was being undertaken by farmers to avert possible devastation of their crop which would hurt their future income. This further implies that they may not be aware of the consequences this may bring, or simply they may be needing an assistance from an agriculturist to address the problems.

Fertilizer management of coconut farmers

Table 4 shows the fertilizer management practices of the respondent coconut farmers. Management was described in terms of type of fertilizers used and frequency of application.

Table.4: Summary Table on Fertilizer Management Practices by the Coconut Farmers

Fertilizer Used	**Frequency**	**Percentage**
Organic (salt)	7	14%
Inorganic	0	0%
No Fertilizer Used	43	86%
Total	50	100%
Frequency of Fertilizer Application		
Monthly	3	6%
Semi-Annual	0	0%
Quarterly	3	6%

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Annually	1	2%
No Fertilizer Application	43	86%
Total	50	100%

It can be viewed from the table that only seven (7) out of 50 respondents used fertilizer, specifically organic fertilizer in coconut farming. Of these seven (7) or 14%, three (3) or 6% applied fertilizer monthly, another three (3) or 6 % applied fertilizer quarterly and another applied fertilizer annually. It can also be noted that salt was used as fertilizer by the three (3) or 6% of the total number of farmer-respondents used organic fertilizer. Interview with the respondents revealed that two (2) of them used 20 to 30 kg of salt quarterly, while one (1) used 40 to 50 on a per year basis.

The findings on fertilizer management practices of the respondents only verified the previous findings that they seemed to have no adequate know-how on coconut farming, other than the conventional use of salt as fertilizer. They were unaware that (inorganic) fertilizer was necessary in farming. It was also evident that they were aware on the frequency fertilizer application. It was evident that farmers need to be trained on the kind and frequency of fertilizer use to make their coconut farming sustainable.

2. Coconut marketing practices in Dingalan

Marketing Practices

The marketing aspect of coconut farming is described in terms of the farmers' manner of marketing their product, pricing approach, and harvesting mode.

As can be gleaned from Table 5, the data on marketing method practiced by farmer-respondents show that majority of them use the farmer-harvester-retailer way of selling their product wherein upon harvest, it goes directly to the retailer without the involvement of any middle man. They price coconut on a per piece basis. The interview also revealed that coconut, primarily "buko" or young coconut are desired for its succulent meat and sweet juice, is sold from P6 during lean season to P13 during peak season. Summer and Christmas season were considered the peak seasons. Majority of the coconut farmers harvested and marketed their produce once a month. They sold at an average of 9 to 12 fruits per tree per month.

Table.5: Summary Table in terms of Marketing Practices

Marketing Method (Buko/Matured Coconut)	**Frequency**	**Percentage**
Farmer – middlemen – consumer	3	6%
Farmer – wholesaler – retailer – consumer	1	2%
Farmer – retailer – consumer	2	4%
Farmer – processor – consumer	2	4%
Farmer – end - user	10	20%
Farmer – harvester – retailer	32	64%
Total	50	100%
Pricing Approach (Buko/Matured Coconut)		
Per kilogram	0	0%
Per piece (at an average of P8 per piece)	50	100%
Per bunch	0	0
Total	50	100%
Frequency of Harvesting		
Every 15 days	1	2%
Monthly	46	92%
Every 45 days	3	6%
Total	50	100%

3. The financial aspect of the coconut farming industry in Dingalan

The financial aspect of coconut farming industry was described in terms of capital investment and income per harvest.

Table 6 shows that the respondents' capital investment on coconut farming from the time of planting the stock up to the point the trees are producing fruits which ranged from P10,000 to P50,000.

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Table.6: Capital Investment and Income per Harvest of Coconut Farmers

Amount of Capital	**Frequency**	**Percentage**
P 10,000 to P 20,000	21	42%
P 21,000 to P 30,000	2	4%
P 31,000 to P 40,000	0	0%
P 41,000 to P 50,000	27	54%
Total	50	100%
Mean = P 32,100		
Average Income per Harvest (Php)		
P 1,000 to P 4,000	35	70%
P 4,001 to P 7,000	10	20%
P 7,001 to P10,000	2	4%
P10,001 to P13,000	3	6%
Total	50	100%
Mean = P 3,880		

Considering that the capital investment of the farmers was only a one shot investment, the gain could be equated into monthly income. Note that earnings could be more than twice the investment. However, the average monthly income of P3,880 was low relative to the cost of living for a family with children who needed to be educated and fed. This was indicative of the difficulty the farmers were experiencing because of the meager income they get from coconut farming not even sufficient for their daily subsistence.

As reflected in the table, the income of farmers ranged from P1,000 to P13,000. However, a large majority of them (35 or 70%) were earning only between P1,000 and P4,000; followed by 10 or 20% who were earning between P4,001 and P7,000. Only a few, comprising two (2) and three (3) or 4% and 6% were earning P7,001 to P10,000 and P10,001 to P13,000, respectively.

4. Problems Encountered by Coconut Farmers

The study revealed that the problems encountered by coconut farmers ranged from a number of factors that included climatic events, plant infestation and diseases, lack of coconut farming knowledge, and lack of support, among others. Enumerated below are the problems they identified**:**

1. Natural calamities like typhoon and bad weather.
2. Infestation of pest and attack of coconut leaf beetle, rhinoceros beetle, and rat.
3. Destruction of coconut trees due to coconut diseases like root wilt, leaf spot, bleeding and bud rot.
4. Lack of technical knowledge in production and technology for both farm owners and workers.
5. Lack of agricultural support from the government like providing farm inputs, calamity assistance and fertilizer subsidies.
6. Poor farm-to-market road.
7. Indiscriminate cutting of trees
8. Low yield, low return from coconut farming
9. Theft of coconut fruits
10. Low and fluctuating price of coconut products.

Summary, Conclusions and Recommendations

The following are the findings of the study:

1. The average size of coconut plantation of farmers was 1.68 hectares; majority of the farmers were growing 51 to 250 trees; and the average coconut yield per tree per year was 107.

2. In terms of farming practices, it was found out that although majority of the coconut trees were infested by coconut beetle, rat and rhinoceros beetle, only four (4) or 8% of the farmers were using insecticides. Even if coconuts were infected with bleeding, bud rot, leaf spot and root wilt, only one (1) or 2% was using insecticides.

In terms of fertilizer management, only seven (7) out of 50 farmers used fertilizers, and all of these seven used organic fertilizer (salt). Three (3) out of these seven (7) applied fertilizer monthly, another three (3) applied fertilizer quarterly or every three months and another applied fertilizer annually.

3. In terms of marketing practices, majority of the farmers were found to be selling their produce by way of farmer-harvester-retailer mode on a per piece basis. Majority of them harvested and marketed their produce monthly.

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4. The farmers spent an average of P32,100 as one-time capital investment in growing and maintaining their coconut farm. Out of this, they earned an average of P3,880 per harvest or an average of P46,560 per year.

5. The problems encountered in coconut farming included the following: natural calamities, infestation; diseases; lack of technical knowledge in farming; lack of agricultural support from the government; poor farm-to-market road; indiscriminate cutting of trees; low yield; theft of coconut fruits, and low and fluctuating price of coconut products.

IV. CONCLUSIONS

The following are the conclusions of the study:

1. Coconut farms in Dingalan was manageable in terms of size and number of trees, but the yield was low and needed improvement.
2. The farming practices of coconut farmers are too traditional that needs improvement.
3. The coconut farming industry has no systematic marketing system that would promote their product and enhance their pricing.
4. The coconut farming industry in Dingalan was not very profitable and did not help improve the condition of the farmers.
5. The problems encountered in coconut farming are due to technical, natural and social factors that can be addressed by strong policy measures.

Recommendations

Based on the findings and conclusions of the study the following are thus recommended:

1. Schools, particularly SUCs, must implement functional extension program to help the coconut farmers in Dingalan, to improve their farming capabilities.
2. The farmers must be provided with capability training to familiarize them with more effective farming system.
3. The farmers should be taught how to form a cooperative that will look into their marketing practices and value-adding their product and possible by-products.
4. Further study on how to improve the profitability of coconut farming must be conducted.
5. The LGU should support the industry by issuing industry-friendly issuances that would address even their problems on illegal coconut tree loggers and thieves.

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Development of Instructional Model Based on Indonesian National Qualification Framework to Improve *Soft Skills* Students in Vocational Technology in North Sumatera Province

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***Abstract*—** *This study aims to develop a learning model based on the framework of Indonesia's national qualifications in an effort to improve students' vocational high school soft skills in North Sumatra Province. In particular, this study aims to (1) find soft skills that are in accordance with the needs of the world of work through needs analysis from various sources (stakeholders) and library studies, (2) find the basis of KKNI-based learning models through design based on the results of needs analysis and library studies. (3) finding the effectiveness of the learning model through testing the learning model on a limited and broad scale, (4) and disseminating the developed learning model to the teachers of Technology Vocational Schools in North Sumatra Province.*

This research uses development research methods, carried out directly with descriptive data collection that processes and analyzes inductive data. To produce operational products, namely the Indonesian National Qualification Framework (KKNI) based learning model, a cycle of research and development was carried out known as "the R & D cycle" which was carried out in stages over a period of three years.

In the first year research, survey methods were used through needs analysis. The second year, the trial method was used through expert review procedures, one-on-one trials, small group trials, and field trials (first class). In the third year using a quasi-experimental method with the design of "Pretest-Posttest Control Group Design", for a broader scale and method of dissemination. The population of this research is the State Technology Vocational School students in the field of technology and engineering expertise in North Sumatra Province. The research sample was taken by area randomly. Data collection techniques used in this study were non-test techniques and test techniques. The non-test techniques used were questionnaire techniques, interviews, and documentation. The test technique used is the appearance test technique (performance test). The data analysis techniques used are (1) descriptive analysis to describe the data analysis of the needs and results of the trial data, and (2) One Way Anova test to determine the differences in the effectiveness of the teaching materials tested.

Keywords*— *Soft Skills, Learning Model, KKNI, Technology Vocational School.

I. INTRODUCTION

Conceptually, competency-based curricula can be recognized as one of the means for implementing teaching and learning processes in the classroom to provide and broaden students' insights about knowledge, skills and other basic values in the hope that they can be reflected in the habits of thinking and acting. However, students have a very strong dependence on how they are treated by educators. That is, the success of students / students mastering competencies (learning outcomes) with regard to how lecturers / teachers practice learning systems in the implementation of learning.

The main problem in conceptually based Indonesian National Qualification Framework (KKNI) is how to relevance competencies (learning outcomes) with the framework of Indonesia's national qualifications contained in the planning and readiness of teachers / lecturers to manage their learning in order to achieve the desired competencies in students effectively , efficient, and interesting. Graduates' competencies for all educational institutions are related to *hard skills* and *soft skills*. In this regard, in general, education today is more about the development of hard skills (90%) than the development of *soft skills* that are only 10% (Santoso, 2008). In fact, the results of research in Europe show that a person's success in the business world is 80% determined by his *soft skills*and only 20% is determined by his *hard skills*(Wahidi in Santoso, 2008). This means

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that they prioritize *soft skills* rather than *hard skills for* graduates of educational institutions. The survey findings are in line with the opinion of Bergh, et al. (2006) which states that the human resources (HR) that will be able to exist in the 21st century are those who have *soft skills* strong, in the form of the ability to think creatively, productively, make decisions, solve problems, learn how to learn, collaborate, and self-management.

Workers often complain that workers from educational institutions who do not have good soft skills generally cannot stand the world of work, are not honest, get bored quickly, cannot work together, and cannot communicate verbally or write reports with good (Irma, 2007). Therefore, various survey results also show that in recruiting workers almost all companies prioritize *soft skills* applicants'rather than their *hard skills* (Sutabri, 2007;
Admin, 2008).

From the description above, it can be concluded that reliable graduates from educational institutions expected by the business / industry are graduates who have high *soft skills* . If these reliable graduates are specified as graduates of Vocational High School (SMK), it means that the teaching staff (teachers) in Vocational Schools are required to first understand and have *soft skills* as expected by the business / industry to then form and / or develop them in their students through teaching and learning strategies. The logical consequence is that all Educational Teaching Institutions (LPTKs), including the UNIMED Faculty of Engineering's Mechanical Engineering Education Study Program, which will produce prospective teaching staff at Vocational Schools must also be able to form and develop these *soft skills* to their students as long as they attend college on campus. For this reason, the need for teachers / lecturers to design learning that can shape and develop *soft skills* that are clear and systematic, through needs analysis and developed by accommodating the demands of various stakeholders, and getting full support and commitment from all teaching staff (lecturers / teachers) in their implementation.

The implementation of the competency-based curriculum has been started in Vocational Schools since the 2006 school year. However, based on the results of the questionnaire given to students about the achievements of the *soft skills* designed in the learning implementation plan it turns out that it has not been in line with the target. Based on the survey of the practical learning process there were several problems. First, most students do not have the willingness to do the best and the standard or prioritize perfection, there is a tendency to just fulfill the task. Second, lack of systematic, well-coordinated work habits that reflect efficient and effective work. Third, lack of work independence, there is a tendency towards dependence on friends and teachers so that there are often process errors or products. Fourth, lack of initiative or creative ideas when encountering problems in the process or product, so the results are not optimal (Sudjimat, 2010).

These problems are due to the learning pattern so far emphasizing the mastery of *hard skills* and giving less portion to the efforts to develop
soft skills so that they are side by side with *hard skills*.

This is thought to be caused by the learning strategies implemented not relevant to the characteristics of the field of study and the characteristics of students, as stated by Reigeluth (2009) that results that are effective, efficient and interesting are determined by the suitability of learning strategies with the characteristics of the study area and participants. Effective learning strategies are closely related to learning models. Kauchak and Eggen (2012) suggest that learning strategies are wrapped by learning models. Therefore, the assessment of learning strategies requires an assessment of the learning model. That is why the focus of the problems in this study were examined from the aspect of the learning model. The field of study or field of expertise in this study is limited to the field of design and construction, namely the design of metal splicing concentration machine elements.

The main problem in conceptual learning of vocational technology competencies is how to relevance learning outcomes with the Indonesian National Qualifications Framework contained in the planning and readiness of teachers to manage their learning in order to achieve the desired competencies in students, effectively, efficiently, and attractively, especially in field of welding technology. Achievement of learning outcomes is determined by the learning model applied. Therefore, the focus of the problem in this study is the development of an IQF-based learning model that can improve students' soft skills.

In this regard, the formulation of the problem in this study is:

How is the effectiveness of the Indonesian national qualification framework (KKNI) based learning model developed in an effort to improve students' soft skills?

II. LITERATURE REVIEW

Competence is basic knowledge, skills, and values reflected in the habit of thinking and acting. (Ministry of National Education, 2002). According to Burke (1995) *"being able to perform whole work roles, to the standards of expected employment in a real working environment"*. From this definition, there are three competency criteria: a) able to carry out the overall tasks of the employee, rather than having specific skills or work tasks; b) in

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accordance with the standards expected in the work; c) in a real work environment that puts pressure on and relates to all work and the actual variations of work.

From the report SCANS (1991) identifies 5 (five) compotencies and 3 (three) basic parts of a person's skills and qualities to be able to handle work, namely: *The five competencies*: (a*) resources: identifies, plans, and allocates resources; (b) interpersonal: works well with others; (c) information: acquires and uses information; (d) systems: understands complex interrelationships; (e) technology: works with a variety of technologies. The three-part foundation consists of: (a) basic skills: reads, writes, performs arithmetic and mathematical operations, listens, and speaks effectively; (b) thinking skills: thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons; (c) personal qualities: display responsibilities, self-esteem, sociability, self-management, integrity, and honesty.*

Competence is a basic characteristic that consists of skills, knowledge and other personal attributes (*soft skills*) that are able to distinguish a person from *performing* and not *performing*. Spencer & Spencer (1993) classifies competencies as basic characteristics, causal relationships and reference criteria as follows: 1) Basic characteristics are competence as part of an individual's personality and can predict behavior in situations and tasks, namely: a) motives as encouragement from self someone consistently to take an action; b) nature / character, namely physical characteristics and consistent responses to situations or certain information; c) self-concept, namely the values of attitudes or self-image possessed by individuals; d) knowledge, namely information that someone has for a particular field; and e) skills, namely the ability to carry out tasks physically or mentally. 2). Causal relationships are competencies that cause and predict behavior and performance. Motive competency, character / self-concept can predict behavioral actions that can ultimately predict performance results. 3). Reference criteria are the most critical competencies that can distinguish competencies with high or average performance. Thus vocational competence is a manifestation of one's abilities and skills to carry out overall vocational tasks in accordance with the expected standards in a real work environment.

Soft skills are non-technical competencies that point to personality characteristics. This can be seen in a person's behavior, both when interacting in social situations, language skills, personal habits, or important traits to support optimistic behavior. Based on this, it can be said that *soft skills* are the strength of oneself to change or to overcome various work problems. Mastery *soft skills* of students'is the essence of competence that must be mastered and measured through performance during learning. Learning *soft skills is* seen as part of the effort to form a professional attitude. This attitude will influence behavior caring for quality, fast, right, and efficient, respecting time and reputation (Djoyonegoro, 1998). The attitude formation must be carried out from the beginning through the process of habituation to work that is developed and harmonized with learning needs.

Wagner (2008) emphasizes seven *survival skills* that have important values in this 21st century era. When examined, *skills* theseare *soft skills*, namely: (1) critical thinking and problem solving, 2) collaboration through networks and leading with influence, (3) agile and able to adapt, 4) initiative and entrepreneurship, (5) effective communication both written and unwritten, (6) accessing and analyzing information; and (7) imagination and imagination. Thus, mastery of *soft skills is* important so that graduates are able to survive various work challenges.

Soft skills can be observed through performance such as speaking ability that reflects ideas and information, or clearly explains a topic, is easy to understand topics that are unknown, able to interact and work cooperatively in groups. A person with high mastery of *soft skills* will reflect abilities that exceed the capacity as a workforce. This ability arises because the person concerned is independently able to move internal processes to continue learning, trying and finding something that benefits his work or for self-development. Thus *soft skills are* important to master because they are needed by someone to develop themselves in doing work.

learning is *Soft skills* packaged using an integration model with some ease of consideration. This means that the implementation of learning follows thelearning pattern

hard skills implemented in accordance with the applicable curriculum implementation, does not require special funding and is more useful for strengthening *hard skills*.learning of *softs skills* Integratedis implemented with aapproach *connected model*, and *nested models* (Forgarty, 1991 & Drake, 2007).

The integration of *connected models* emphasizes the relationship between *soft skills* and *hard skills* on every topic, concept, skill, and with the world of work today and in the future. *Nested models are* oriented towards achieving *multiple skills* and *multiple targets*. With this model, learning *soft skills* will be easily achieved because *soft skills* integratedare not forced. Every learning activity in it already has *soft skills* that are measured through learning targets.

Richey (1986) defines the model as an illustration that results from the fact that it has an arrangement of a certain sequence. According to him the model can be used to organize knowledge from various sources then used as

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a stimulus to develop hypotheses and construct theories into concrete terms / conditions to apply them to practice or test theories.

Gustafson and Branch (2002) which emphasizes the practical function of a model that is a means to facilitate communication, or regular instructions (algorithms) that are prescriptive in order to make decisions, or planning instructions for management activities. Furthermore, it is said that a good model is a model that can help the user to understand what the overall process is fundamentally. The basis of a good model is the connection of several theories. Thus, it can be said that the benefits of the model for the user include: (1) explaining several aspects of human behavior and interaction, (2) integrating what is known through observation and research, (3) simplifying complex humanitarian processes, (4) guidelines to carry out activities.

In relation to learning, the learning model serves to direct educators to design learning that is used as a guide in the implementation of learning in order to achieve effective, efficient, attractive, and humanistic learning. Joice (2009) explains the learning model is a plan or a pattern that is used as a guide in planning classroom learning or learning in tutorials and for determining learning tools and directing us to design learning to help learning participants so that learning objectives are achieved.

Kaufman and English (2008) distinguish 3 (three) types of development models to determine which ones are appropriate and appropriate to use, namely: (1) inductive models, which depart from students' current behavioral experiences, then grouped, compared, developed and finally evaluated for revisions, (2) deductive models, beginning with determining general goals, determining criteria, finding links between existing / partner elements, collecting data, formulating specific objectives, developing and implementing, then evaluating and revising , (3) classic models, starting with some general requirements of objectives, program development, program implementation, then evaluated and revised.

The University Consortium for Instructional Development and Technology (UCIDT) presents a model that can be applied to the development of learning (Wittich & Schuller (1999). The model includes 3 (three) stages: definition, development, and evaluation, divided into 9 (nine) with each of the 3 (three) steps and are interrelated with each other, namely:

Level I. Defining, including 1) Identifying the problem. In this first step what is done is identifying the problem, namely the gap between what is expected and the one that exists. More specifically, determine the conditions, what and what should be achieved by students, 2) The second step is the analysis of the situation, namely in an environment such as what learning is carried out, including students, learners (teachers), managers, and sources or materials learning, 3) The third step is organizing management, namely the executive leader who is responsible and carries out communication and other authorities.

Level II. Development, including 4) identification of objectives, as part of the development stage of learning begins with identifying specific learning objectives, if achieved, then the problem in the first step will be solved. In the formulation of goals must be stated: who are the participants or students *(Audiences)*, behavior *(Behavior)* what can be done after the program is completed, under conditions *(Condition)* what they are formed, and level *(Degree) of* expertise achieved, 5) selection special methods or learning methods used to achieve goals, 6) constructing blueprints or *prototypes*, namely the components used, such as teaching preparation, exam materials, and specific guidelines and program evaluation.

Level III. Evaluate, copy 7) test the *prototype*. The evaluation phase begins by testing each component of the program. This initial trial was conducted on small samples and observations were held to see the presentation. Student comments are used as an assessment of what they are achieving, 8) analysis of results. The data collected in step seven determines the significance of the extent of the contribution given by each component to achieving goals, useful or not, 9) implementation / revision. Program improvement is done by looking at the achievement of certain goals, by reevaluating the contribution of learning components to achieving goals.

Regarding the product design model, there are five learning design models identified. The five models are (1) Kemp (1977), (2) Banathy (1978), (3) Calvano (1980), (4) Paul Harmon (1982) and (5) Dick & Carey Models (2005).) Of the five models, the learning design model from Dick, Carey & Carey was chosen to be used in this study.

III. RESEARCH METHODS

This research uses development research methods. Conducted directly with descriptive data collection that processes and analyzes inductive data. To produce operational products, namely the KKNI-based learning model for the improvement of *soft skiils* effective, efficient and interesting student, a cycle of research and development is known as *"the R & D cycle"* (Borg & Gall, 2007) combined with a design model learning from Dick, Carey and Carey (2009).

In this study, survey methods were used through needs analysis, trial methods through procedures (a) expert review, (b) one-on-one trials, (c) small group trials,

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and (d) limited scale field group trials, and (e) trials of large-scale field groups to produce operational products. Implementation of large group trials (field trials) using quasi-experimental methods with the design of "*Pretest-Posttest Control Group Design*".

Population and Sample

The population of this study were all students of the State Vocational School in the Field of Welding Technology in North Sumatra Province. The subjects of this study consisted of students from the State Vocational School of Welding Technology, each one from two cities and five regencies. This sampling uses a simple random technique.

Data collection techniques used in this study were questionnaire techniques and interview techniques, as well as documentation techniques to capture data on needs analysis activities, questionnaire techniques to capture data about riviuwer responses and students on expert validation activities and one-on-one trials and group trials. small, and test techniques and observations on limited field testing activities as well as large-scale field trials.

The data analysis techniques used are (1) descriptive analysis to describe the data from the results of needs analysis and expert validation and one-on-one and small group trials. (2) One-way ANOVA test to find out the difference in model effectiveness for limited and wide-scale field testing.

IV. RESEARCH RESULTS AND DISCUSSION

Research Results

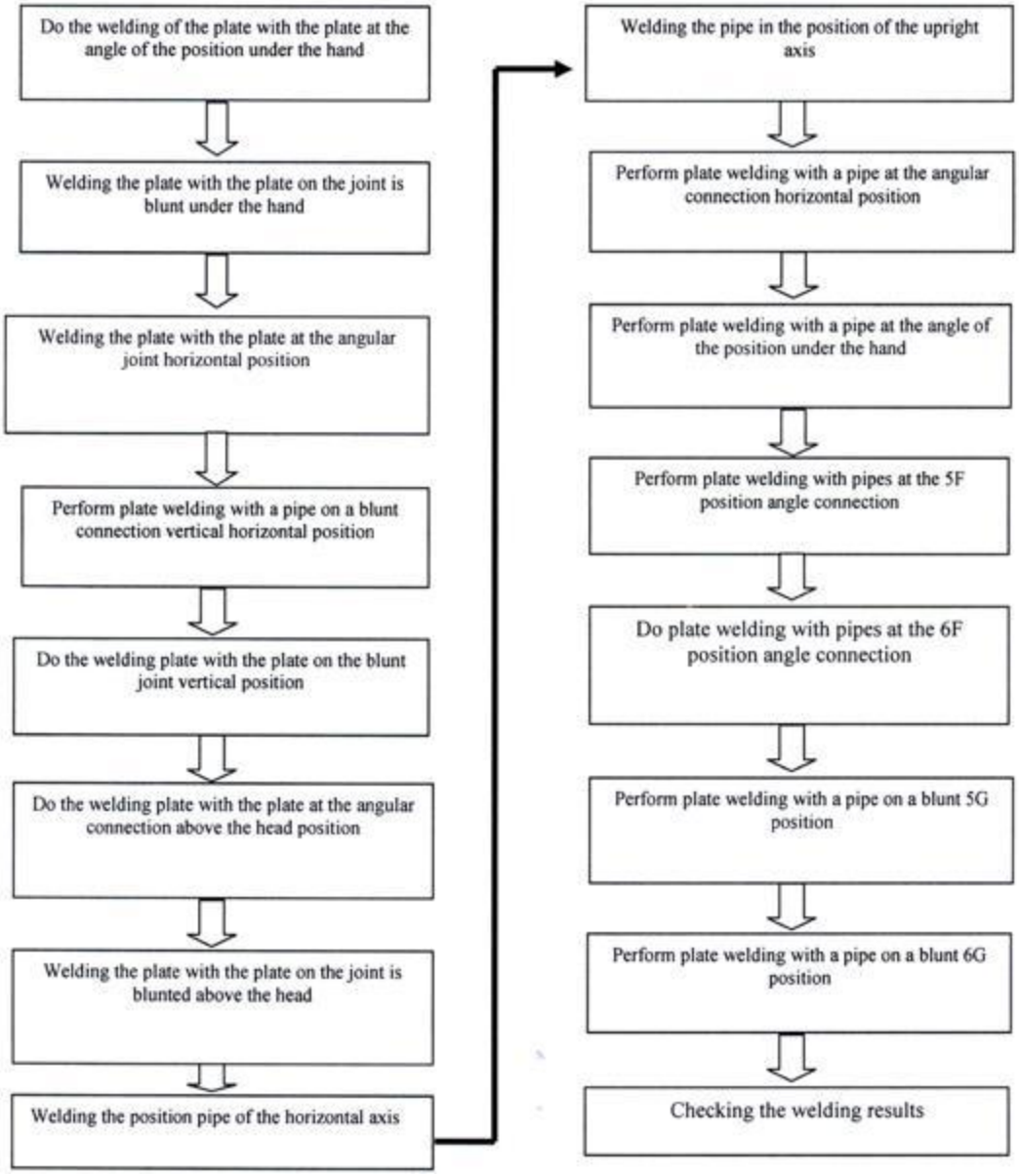

Fig.1: Wiring Skills Competency Map

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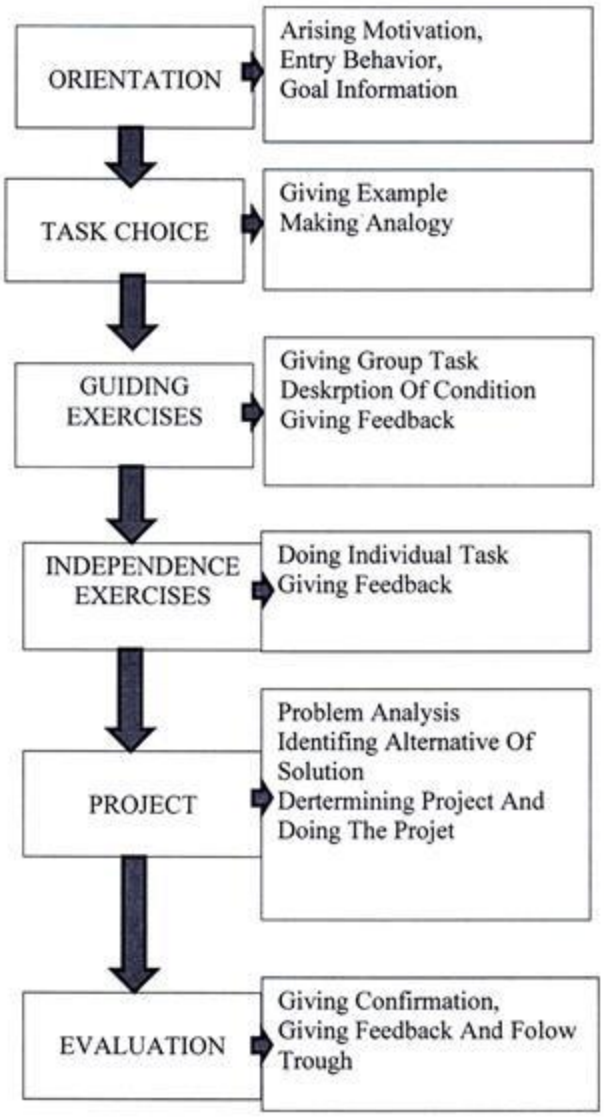
Based on the results of the analysis of the literature study, 10 soft skills were obtained which needed to be possessed by professional workers, namely 1) communication skills, 2) computer and technical literacy, 3) interpersonal skills, 4) adaptability, 5) research skills, 6) project management skills, 7) problem-solving skills, 8) process improvement expertise, 9) strong work ethics, and 10) emotional intelligence.



Picture. 2. Draft Welding Engineering Learning Model Based on KKNI to Improve Soft Skills.

Based on the results of the needs analysis found six soft skills that must be owned by workers, namely 1) communication skills, 2) team work and collaboration, 3) adabtability, 4) problem solving, 5) critical observation, and 6) conflict resolution.

Based on the results of curriculum analysis of vocational technology (K13) found seven soft skills that must be possessed by graduates, namely 1) creative, 2) productive, 3) critical, 4) independent, 5) collaborative, 6) communicative, and 7) solutions.

Based on the results of learning analysis found the skills competency map (*hard skills*) as follows.

Draft learning model based on the analysis of the results of the literature study and competency characteristics and characteristics of the field of study which in the process raises the soft skills that have been identified based on needs analysis as follows.

The KKNI-based welding technique learning model to improve soft skills as shown in Figure 2 above is still the initial model that will be continued through testing or through formative and summative evaluation as consistency of the application of the Dick, Carey and Carey (2005) models, consisting of six main steps , namely: 1) Orientation, including activities to build motivation, review the initial ability to explain objectives, 2) Select tasks, include activity description of conditions and analogies, 3) Guided exercises, including activities to provide examples, Group assignments, and Feedback, 4) Exercise Mandiri, covering individual task activities and feedback, 5) Projects, including problem analysis activities, alternative solutions, determining projects, completing projects, and 6) confirmation (testing), feedback, and follow-up.

Discussion

The Learning Model of Welding Engineering Based on KKNI to improve soft skills as described earlier, is the initial product in this study which still requires further testing through formative evaluation and summative evaluation. However, it can be expected that the model will be more effective than the learning model carried out by technology vocational education institutions (SMK) so far. This is because the model has been built through theoretical studies of learning models that are thought to be able to foster personal competence, thinking skills, social competence, and vocational competence, as adapted from the learning models presented by Joyce, Weil, and Calhoun (2009), as well as Kauchak and Eggen (2012).

The learning model is also based on the characteristics of the field of study / expertise and characteristics of students. Reigeluth (1996) suggests that if the learning method is adapted to the conditions of learning it will produce effective, efficient, and attractive results. This is also supported by Nadler (1988) explaining that a good model is a model that can help the user to understand what the process is fundamentally fundamental. Furthermore, it is said that the basis of a good model is the relation of several theories. Because the building of the learning model has been based on the interrelationship between several theories, it can be

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assumed that the model will be effective, efficient and attractive.

Furthermore, the model will be filled with the content of welding techniques to achieve the competency of knowledge and skills which in the learning process has been adjusted to the results of the learning analysis that will also fostercompetencies *soft skills*.

V. CONCLUSIONS

The KKNI-based welding technique learning model to improve the *soft skills* that have been produced as the initial product is a hypothetical model that has six main components1) Orientation, including motivation building activities, reviewing the initial ability to explain goals, 2) Choosing assignments, including activity description conditions and analogies , 3) Guided training, including activities to provide Examples, Group Tasks, and Feedback, 4) Independent training, covering individual task activities and feedback, and 5) Projects, including problem analysis activities, alternative solutions, determining projects, completing projects, and 6) Evaluation includes confirmation activities, feedback, and follow-up.

The model is expected to be an effective, efficient, and attractive learning model, because it has been built based on the links of several theories, which are in accordance with the characteristics of students and the characteristics of the field of study / expertise to be achieved.

VI. IMPLICATIONS

Based on these conclusions it has the following implications:

1. Formative evaluation procedures need to be carried out through the reviews of experts, including: learning design experts, study experts, and instructional media experts each consisting of two or more people.
2. Formative evaluation procedures need to be carried out through one-on-one testing, consisting of three trainees who each represent high, medium, and low academic potential trainees.
3. Formative evaluation procedures need to be carried out through a small group test consisting of eight to 12 trainees.
4. Formative evaluation procedures need to be carried out through field testing.
5. Summative evaluation procedures need to be carried out through the identification of existing learning techniques of welding techniques developed by other parties.

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Appraising the Implementation of the Accountancy, Business and Management (ABM) Strand of the Senior high School Curriculum in the Division of Science City of Munoz, Nueva Ecija, Philippines

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***Abstract*—** *This research aimed to conduct a formative assessment in the implementation of Accountancy, Business and Management (ABM) Strand in the Division of Science City of Muñoz for years 2016 and 2017. The study assessed three main areas or variables, namely: instructional input, conduct of instruction and outcomes of instruction. The study revealed a tremendous increase of over one and one-half times its number compared to the previous year (2016) enrolment in ABM Strand which also accounted to learners' own preference and decision to enrol along this track was documented. It was also observed that the most basic instructional inputs such as classrooms, television, LCD projector, computer, and printer were deficient. Textbooks still served as the daily instructional material followed by hand outs and modules. It further revealed that teaching methodologies and strategies employed by the ABM teachers were varied as to the extent of use. Results further revealed that much of the instructional time was devoted to lecture method. The teacher-student and student to student interactions were not evidently seen in the study. In terms of assessment, Paper and Pen test was used as mode of assessment in order to measure and evaluate the learners' learning outcomes. On the contrary, in terms of output of instruction, learners still obtained outstanding and very satisfactory grades. Given the qualifications and vertical specialization of teachers and the limitations cited, student-learners managed to acquire quality education.*

Keywords*— *K to 12Program, Accountancy, Business and Management Strand, Implementation.

I. INTRODUCTION

The landscape of the basic education in the Philippines was changed in 2012; from 10 years to 12 years termed as Kindergarten to 12 (K-12) Program. The Philippine government finally enacted into law Republic Act 10533, otherwise known as the Enhanced Basic Education Act of 2013 on May 15, 2013(Caballero and Cabahug, 2015). Furthermore, there is a clear model of program tracks, namely: Academic, Technical and Vocational (Tech-Voc), Sports, and Arts and Design with at least 10 strands (Sarmiento and Orale, 2016) wherein Accountancy, Business and Management (ABM) is one.

More so, Department of Education (DepEd) argues that K-12 program will be the solution to yearly basic education woes and the deteriorating quality of education(Philippine Online Chronicles, 2011).The additional two years in Senior High School (SHS) started on School Year (SY) 2016 (Sarmiento and Orale, 2016).

Meanwhile, only four schools offer SHS in Schools Division of Science City of Munoz, Of these, only the Munoz National High School- (MNHS)offer Academic Tracks namely: Humanities and Social Sciences (HUMSS), Accountancy, Business and Management (ABM), and Science and Technology, Engineering and Mathematics (STEM); and b) Technology-Vocational and Livelihood (TVL)Track consists of Home Economics (HE), Shielded Metal Arc Welding (SMAW), Information, Communication and Technology (ICT) respectively.

Preliminary survey further revealed that other schools do not offer the ABM Strand due to following reasons, namely: a) need-based criteria of the community (Larosa, 2018);b) lack or no available resources and facilities related to business;c) small number of Grade 11 enrolees who chose ABM during pre-registration activity (Alvarez, 2018); and d) few potential industry partners for immersion activity

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including the travelling expenses incurred (Romagosa, 2018).

Since MNHS is the only school in the Division offering ABM Strand, a formative assessment on the implementation of this strand is imperative to know the effectiveness of its implementation which may help them improve the system. Specifically, the study analysed three main components or variables such as a) instructional inputs in terms of students, teachers and facilities and equipment; b)conduct of instruction based on instructional materials used, methods and s strategies of teaching employed, and assessment of student's learning adopted.; and c) outcomes of ABM instruction.

II. METHODOLOGY

Thestudy framework used the General System's Theory of Ludwig von Bertalanfy(1968). In his theory, he posits that an organization operates as a system based of interdependent parts operating as a whole for some purpose. Bertalanfy claimed that the total parts contained in a system and the relations between them are known and defined clearly, the behaviour of the system may be derived from the behaviour of its parts" (Guberman, no date). Put differently, "the whole is the sum of its parts", and this is the synergy component of the system (Orpilla, 2014). . Figure 1 shows the study paradigm

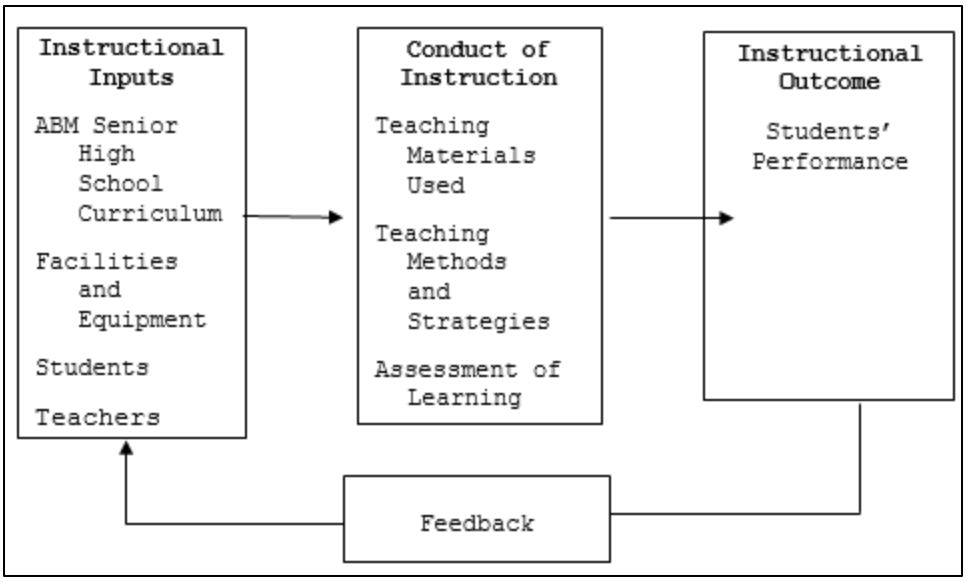

Fig.1: The Research Paradigm

The input box includes the SHS ABM Curriculum, Students, Teachers, and Facilities and Equipment. The process box contains variables on conduct of instruction measured in terms of instructional materials used, teaching methods and strategies employed, and assessment of students' learning. The output box contains the outcome of instruction measured in terms of students' performance. The feedback loop provides information as to how the system's flow and relationship of the variables

The descriptive research design was employed in the study. In particular, the instructional inputs, conduct of instruction, and instructional outputs were specifically discussed.

The study was conducted at Munoz National High School at Science City of Muñoz, Nueva Ecija during the first semester of School Year 2018-2019.

As to study locale, Science City of Muñoz is one of the five (5) cities in Nueva Ecija. It is traversed by the Maharlika National Highway going to Cagayan Valley Region and a secondary national road going to Pangasinan.

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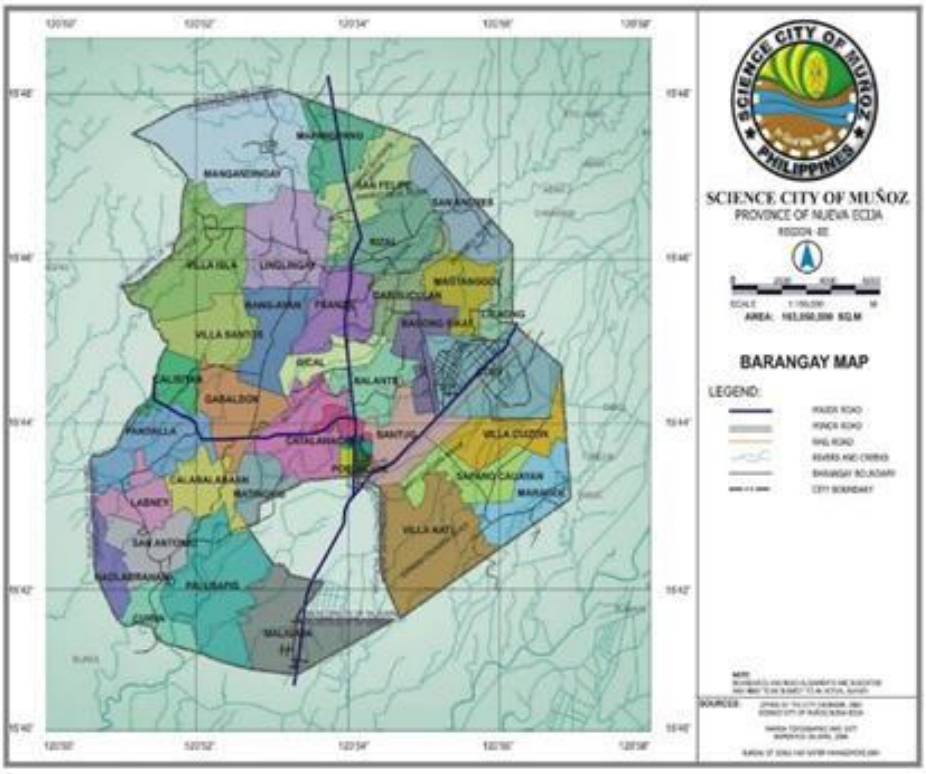

It is situated 147 kilometers North of Manila or 30 kilometers away from Cabanatuan City. It is bounded by six municipalities and one city, such as Municipality of Lupao on the North, Municipality of Talugtug on the Northwest, Municipalities of Santo Domingo and Talavera on the Southwest, Municipality of Guimba on the West, and the Municipalities of Llanera and San Jose on the East(Science City of Muñoz Handbook).

The research employed the purposive technique of non-random sampling. The study purposely selected the MNHS – Main Campus, among the four public schools implementing the SHS Program in the Division of Science City of Munoz, Nueva Ecija. Only MNHS-Main School in the Divisionoffers the ABM Strand.Out of 312 Grades 11 and 12 students enrolled in the aforementioned, 176 served as study respondents. Ninety-three (93) were Grade 11 and 83 were in Grade 12, respectively. The sample size was computed using the Raosoft sample size calculator software. In the same school, all ABM teachers were likewise served as respondents of the study.

Two sets of questionnaires for the SH students and for ABM teachers were utilized. The questionnaire for students included the reasons in choosing the ABM Strand, facilities and equipment used for instruction, how instruction was conducted based on methods and strategies used by their teachers. The questionnaire for teachers comprised items on their educational attainment, subjects taught, facilities and equipment, how instruction was conducted based on instructional materials used, teaching methods and strategies employed, assessment of students' learning, and the outcome of instruction. Problems encountered in teaching ABM subjects were also asked.

The instruments were checked by the adviser and the personnel of the Data and Statistical Analysis Center of Nueva Ecija University of Science and Technology (NEUST). To check the instruments clarity of content and direction, these were "tried out" or pre-tested in MNHS – Annex Campus. After which, results of the said initial or practice test was considered in the final draft of the study instruments or questionnaires.

The researchers requested permission from the Office of the Schools Division Superintendent of the Division of Science City of Muñoz to conduct the study before the actual gathering of data was made. After the approval of request, coordination with the SHS Principal, ABM Subject Group Coordinator/Head, ABM teachers and selected 176 Grades 11 and 12 learners were made. Instruments were administered on the dates agreed upon. The researchers were present in the administration of the instruments. Retrieval of instruments followed after the administration. Observation on the facilities and equipment used for ABM instruction was made after the initial gathered data were organized and analysed.

In the aspect of data analysis technique, inputs to ABM instruction were discussed based on students, teachers, and facilities and equipment. As to students, the total enrolment

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in the ABM Strand during the S.Y. 2016 and 2017 was identified and compared and the reasons why students chose ABM, and were ranked based on the frequency of the reason/s given. The teachers were described in terms on the subject/s taught and their educational attainment (Figure 1). The alignment of the subjects they are teaching and their educational attainment were described in terms of their alignment. In addition, the facilities and equipment were textually described as to availability. Meanwhile, the conduct of instruction was based on instructional materials used (Table 3), teaching methods and strategies employed (Tables 4, 5, 6), and assessment of students' learning adopted (Table 7). The teaching methods employed were enumerated per teacher, and the extent of use of these methods was described using the descriptors always, sometimes, and never.Outcome of ABM instructions was based on the grade point averages of all learner-respondents in all ABM specialized subjects (Table 9).

III. RESULTS AND DISCUSSION

3.1 Input of Instruction

3.1.1 Students

Results of the study showed a large increase in enrolment in the ABM Strand within the schoolyear (2017) was documented. The increase in Year 2 (2017) enrolment surpassed the initial enrolment in Year 1 (2016). A percentage increase of 171.30 percent was obtained.Table 1 presents theenrolment data in the ABM Strand at MNHS in years 2016 and 2017.

Table.1: Two years Students' Enrolment Data in the ABM Strand

Year	Number	Enrolment Increase	Percentage Increase
2016	115		
2017	312	197	171.30%

Seventy-two (72%) percent of the students said that the choice of the ABM strand was their own preference and decision. Only 33 students for every 100 students said that they considered their interest in the field of ABM, and 31 per 100 students wanted to become entrepreneurs after finishing SHS if they would not be able to enrol in college. Only about 20 to 22 percent were influenced by their classmates and parents. Sixteen students have family business which they want to manage in the future. Very few students (7 % only) considered their teachers' advice in choosing ABM. The given results imply that the reasons on the choice of the ABM track emanated from their own personal decision and interest. Table 2 represents the reasons of the students in choosing the ABM Strand.

Table.2: Students' Reasons for Taking ABM Strand

No	Particulars	Frequency	Percentage	Rank
1	Own Preference	127	72	1
2	Interested with ABM Subjects	58	33	2
3	Become Future Entrepreneur (after SHS)	54	31	3
4	Influence by Classmates/Friends	39	22	4
5	Parents' Choice	36	20	5
6	Manage Family Business	28	16	6
7	Teacher's Advice	12	7	7
8	Other Reasons	5	3	8

3.1.2 Teachers

The highest educational attainment of the teachers is shown in Figure 2. Only four teachers are teaching the specialized subjects in the ABM track in Grades 11 and 12, namely: Entrepreneurship, Organization and Management, Business Marketing, Business Economics, Fundamentals of Accounting I and II, Business Mathematics, and Business Finance. Each teacher handled a minimum of 40 students and a maximum of 55.

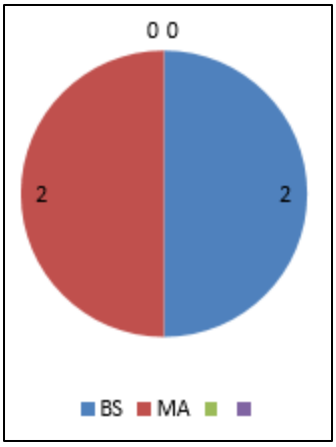

Fig.2: Educational Attainment of the Teachers

All four teachers hold bachelor's degree in Agribusiness Management and Business Management. Two of them likewise finished Master's degree in Agribusiness Management and Business Administration in state universities in the province. One of the teachers has earned

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doctorate units only in the same field. Their educational attainment and the subjects that they are teaching are vertically aligned; hence they sufficiently possess the content knowledge in teaching these subjects

3.1.3 Facilities and Equipment

All four teachers maintainedtheir classrooms, the areas as of which were just enough for the class size of 40 to 55 students. The classrooms are ventilated with ceiling and wall fans. Two teachers said the ventilation were enough while two teachers said that the electric fans were few. The lighting condition of the classrooms was just right. All teachers did not use laboratory room in their classes.

The following were the provisions to be made available in the classrooms namely: students' chairs, teacher's table and chair, blackboard, television printers, and supplies like chalk. Not all classrooms are furnished with television, LCD projector, computer, and printer.

With such limitations in the provision of equipment, conduct of instruction is affected. Some of the teachers opined that these lack of equipment in the classroom should be provided at the earliest possible time in order to offer better or the quality of instructionrequired of an ABM graduate.

3.2 Conduct of Instruction in ABM

The classes in ABM were conducted four times a week with one hour time allotment.

3.2.1 Instructional Materials Used

The instructional materials used in the ABM classes at MNHS are shown in Table 3. The common instructional material used in every day ABM classes was a textbook. Hand outs were sometimes used by three teachers. Three of them also used modules. Although the four teachers used power point slides in teaching, this instructional material was not used every day by the four teachers. With the limited number of the LCD projector, its use was made by schedule. Since the LCD was not available every day in all ABM classes, the ABM teachers compensated the shortage by using pictures and lectures posted on cartolina. Only one teacher had lecture printed in tarpaulin.

Table.3: Instructional Materials Used in ABM Classes

Instructional Material	Class A	Class B	Class C	Class D
Textbooks	/	/	/	/
Hand outs	/	/		/
Modules		/	/	/
Power point slides	/	/	/	/
Visual materials like pictures	/	/	/	/
Lecture posted in cartolina		/		/
Lecture in tarpaulin		/		

It was observed that the textbook was the main source of information of the students and teachers. The use of instructional materials generated from e-technology was minimal.

3.2.1 Methods and Strategies Employed in Teaching

The teaching methodologies and strategies employed by the ABM teachers vary as to the extent of use.

Classes A and C

Teachers A and Cused five teaching methods/strategies in their ABM classes. These teaching methodologies and their extent of use are shown in Table 4.Note that they never used the lecture method with novisual aid posted on the board. Whenever the two teachers used the lecture method, the lecture is accompanied by power point presentation.

Table.4: Teachers A and C Teaching methodologies/strategies used and the extent of use

Method/Strategy	Extent of Use		
	Always	Sometimes	Never
Lecture with no visual aid			/
Lecture with visual aid posted on the board			/
Lecture with power point presentation	/		
Group discussion after the teacher's lecture	/		
Role Playing		/	
Reporting		/	
Instructional Games		/	

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Under the always category, the lecture was followed by group discussion. Role playing, reporting, and instructional games were also sometimes used.

Class B

Table 5 shows the data on the teaching methods/strategies and extent of use employed by Teacher B.According to Teacher B, never did she use instructional games in her ABM class. She claimed that although the students enjoyed playing games, this method usually consumes so much instructional time. When the LCD projector was not available, she sometimes delivered her lecture with no visual aid and when there were pictures available, she posted these on the board while delivering the lecture. When it was her turn to use the LCD, she always delivered her lecture thru the power point presentation. After lecture, student group discussion or teacher-students discussions always followed.Role playing and reporting were sometimes used in class

Table.5: Teaching methods/strategies and extent of use employed by Teacher B

Method/Strategy	Extent of Use		
	Always	Sometimes	Never
Lecture with no visual aid		/	
Lecture with visual aid posted on the board	/		
Lecture with power point presentation	/		
Group discussion after the teacher's lecture	/		
Role Playing		/	
Reporting		/	
Instructional Game			/

Class D

Table 6 presents the data on the teaching methods/strategies employed by Teacher D in her ABM classes and the extent of using these.

Table.6: Teaching Methods/Strategies Used by Teacher D and the Extent of Using Them

Method/Strategy	Extent of Use		
	Always	Sometimes	Never
Lecture with no visual aid		/	
Lecture with visual aid posted on the board		/	
Lecture with power point presentation		/	
Group discussion after the teacher's lecture	/		
Role Playing		/	
Reporting		/	
Instructional Game		/	

Six teaching methods/strategies were sometimes employed by Teacher D in her ABM classes. These were lecture method with no visual aid, lecture with pictures posted on the board, and lecture using power point presentation. Never did the teacher use the lecture method without visual aids. Group discussion always followed the teacher's lecture.

It can be observed from the foregoing results that lecture was the primary teaching method used by the ABM teachers. The use of e-technology through power point presentation was not fully maximized due to the limited number of LCD units that the school has. The other teaching methods were sometimes used because of the longer instructional time that these teaching methods may be applied as claimed by the teachers.

The learner's engagement to learning tasks was not so evident. Much of the instructional time was devoted to the teacher's lecture. Because of these limitations, the teacher-student, and student to student interactions were not evidently seen.

The instructional climate in the classroom is the result of the instructional equipment use, which also eventually influences the teaching method and strategies employed by the teacher. The learning engagement of the students is also affected in this kind of learning environment.

A well-balance blend of the instructional materials used and the methods/strategies employed by the teachers, and the learning engagement of the learners is necessary to produce the maximum outcomes of instruction.

3.2.3 Assessment of Students' Learning Adopted

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The ABM teachers and some of the students interviewed at random confirmed that the "Paper and Pen test" was the primary mode of assessment used to assess and evaluate the students' learning outcomes. The test constructed by the teachers had different formats. In the said tests, the students were usually asked to select or supply the answer to the given test items.

The ABM teachers Performance-based and Portfolio assessment were seldom used. This finding is triangulated by the teaching method/strategies employed by the ABM teachers.

The Grading System in the Academic Track of Grades 11 and 12 in Senior High School, where ABM is clustered is shown in Table 7.

Table.7: Grading System Components and their Weight in SH- ABM track

Grading System Components*	Weight of Component in Academic Track
Written Work	35 %
Performance Tasks	40 %
Quarterly Assessment	25 %

*Source: Department Order No. 8, s 2015

Table 8 below shows the descriptors, grading scale in Senior High School

Table.8: Descriptors of the Grading Scale

Descriptor	Scale	Remarks
Outstanding **(O)**	90 - 100	Passed
Very Satisfactory **(VS)**	85 – 89	Passed
Satisfactory **(S)**	80 -84	Passed
Fairly Satisfactory **(FS)**	75 – 79	Passed
Did Not Meet Expectation (DNE)	below 75	Failed

*Source: Department Order No. 8, s 2015

Callingham (2010) pointed out however, that assessment is viewed as more than the data collection about learners. It likewise incorporates the process of drawing inferences from the data collected and acting on those judgments in effective ways.

3.3 Outcomes of Instruction in ABM Subjects

Table 9 presents the average grades obtained by the Grade 11 and 12 SH students in their ABM Subjects.

Table 9. Average grades obtained by Grade 11 and Grade 12 Students

ABM Subjects	Grade 11	Description	Grade 12	Description
Organization and Management	88	V VS		
Business Mathematics	88	V VS		
Business Finance			86	VS
Fundamentals of Accounting I			90	O
Fundamentals of Accounting II			89	VS
Entrepreneurship			88	VS
Marketing			89	VS

The outcome of ABM instruction to the students who had taken the different subjects was impressive. Despite the limitations found on the inputs of instruction on facilities and equipment, the students got very satisfactory and outstanding grades in the different subjects.

IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

As the central part of this descriptive research, the formative assessment on the implementation of ABM Strand of the Senior High School Curriculum in the Division of Science City of Munoz. Three main variables were analysed in this study, namely: a) instructional inputs in terms of students, teachers and facilities and equipment; b) conduct of instruction based on instructional materials used, methods and strategies of teaching employed, and assessment of students' adopted learning; and c) outcomes of instruction in ABM.

Employing the purposive sampling of non-probability sampling, the study involved 176 respondents from 312

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MNHS-Main (SHS) total enrolees, which consisted of 93 Grade 11 learners and 83 Grade 12 leaners. Furthermore, 4 ABM teachers (total enumeration) were interviewed.

The study utilized two sets of questionnaires for the SH students and for ABM teachers.

Summary of Findings and Conclusion

Percentage increase of 171.30 in Year 2 (2017) enrolment surpassed the Year 1 (2016) of ABM Strand (Table 1) accounted to learners' own preference and decisions (Table 2). Learners' choice defined his/her future careers. Personal career choice considered the innate strengths that shaped the said reference.

Four ABM qualified SH teachers who taught ABM specialized subjects both in Grades 11 and 12, with 40-55 learners on the average, namely: Entrepreneurship, Organization and Management, Business Marketing, Business Economics, Fundamentals of Accounting I and II, Business Mathematics, and Business Finance. Teachers' educational attainment and the subjects taught were vertically aligned. Thus, they sufficiently possess the content knowledge in teaching the aforementioned ABM subjects (Figure 2).

As regard the facilities and equipment, it was documented that most basic instructional inputs such as classrooms, television, LCD projector, computer, and printer were deficient. However, teachers exhausted all the possible means still and offered the best quality of instruction to learners.

Textbooks, on one hand, still served as the daily instructional material followed by hand outs and modules. In relation to the preliminary findings on limited facilities/equipment (LCD projectors in particular), teachers rarely used PowerPoint slides. Nonetheless, they compensated the said insufficiency by their creativity. They used pictures and lectures posted on Cartolina and sometimes in tarpaulin. Again, lack of materials or facility, did not inhibit the quality of instruction planned for a specific day.

Meanwhile, teaching methodologies and strategies employed by the ABM teachers varied as to the extent of use.

For example, Teachers A and C did not use lecture method with no visual aid posted on the board. If they adopted the method, PowerPoint slides strengthened the class discussions. Sometimes role playing, reporting, and instructional games were likewise utilized. On one hand, Teacher B did not opted to educational games because of time constraints or insufficiency. LCD projector was used in the delivery of lessons whenever it was available. In its absence, sometimes the teacher delivered the lectures with no visual aid and when there were pictures available, she posted these on the board. Similar to Teachers A and C, reporting and role playing were occasionally used as mediums of instruction. Finally, Teacher D sometimes employed 6 teaching methods/strategies ABM classes, namely: lecture method with no visual aid, lecture with pictures posted on the board, and lecture using power point presentation. Lecture method was not used without visual aids. Group discussion was frequently followed the teacher's lecture.

Preceding results show that much of the instructional time was devoted to lecture method. The teacher-student, and student to student interactions were not evidently seen in the study. To answer this, Mazur (2009) proposed a change of traditional lectures by giving time to students to consolidate their notes that can provide reflection to what has been written.

Generally, the effectiveness of teaching methods relied much on the nature of the students, the difficulty of the lesson, the accessibility and sufficiency of instructional materials, the teacher's specialization and the classroom climate (Katigbak, 2011).

Primarily, the "Paper and Pen test" was used as mode of assessment in order to measure and evaluate learning outcomes. The grading system used was based on the Department Order issued for that purpose.

In terms of output of instruction, considering the aforementioned number of ABM teaching force, learners still obtained outstanding and very satisfactory grades between 88-90 average ratings (Table 9). Given the qualifications and vertical specialization of teachers, even huge or large number of learners (outmost 55 learners in a classroom) received the quality or scholarly education today's generation of student-learners deserved.

Recommendations

To further strengthen the implementation of ABM Strand for the Senior High School Curriculum in the Division of Science City of Munoz, it is recommended that the management provides the necessary facilities and equipment that would be of great help for both teachers and students in the conduct and inputs of instructions. Moreover, it is imperative to add classrooms and workshops due to escalating number of enrolees

Requisite also is to increase the manpower requirements who will handle / teach ABM subjects based on the required qualification standards.

It is recommended to conduct a tracer study of the graduates of ABM graduates as to their employment.

Other studies might consider widening the scope of the study to include other division/s which will then give

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comparison as to strategies employed in the implementation of the ABM Strand or include other tracks of the Senior High School Program.

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Impact of CSR activities on Organizational Identification (OI) and Job Satisfaction (JS) in Lebanese Commercial banks.

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***Abstract*—** *This study examined the impact of CSR activities oriented to employee, customer, and society on the identification and satisfaction of frontline employees in the Lebanese banking sector while comparing the perceptions between Beirut and Beqaa branches. The study adopted a quantitative research approach based on positivist paradigm and subject to verification by hypothetico-deductive reasoning in order to investigate the relationships between employees' perceptions of CSR initiatives, organizational identification and job satisfaction, in Lebanese commercial bank located in Beirut and Beqaa area. A structured questionnaire was used to test the hypotheses and answer the research questions. The target population was the frontline employees of four major Lebanese commercial banks operating in Beirut and Beqaa area. Four-hundred from frontline employees of four major banks branches located in Beirut and Beqaa areas were invited to participate in the study. The final number of usable questionnaires was 214 for frontline employees, with a response rate of 53.5%. The causal relationships for the 3 models ("1", "1a", "1b") were estimated using SEM with latent variables once the validity of the measurement scales were successfully being verified. The software SmartPLS was used for the application of structural equation models with latent variables "PLS-PM". For model "1", "1a", "1b" the findings indicated that some hypotheses were not significantly supported and the impact of CSR on employees differs according to branch location. Nonetheless, no significant differences exist between the employee's perception of Beirut and Beqaa regarding the strong influence of CSR employee on JS and the strong influence of OI on JS. However in Beqaa branches, CSR customer is affecting OI, and CSR society is affecting JS. Thus, this study provided evidences to assess the visibility of CSR activities in the eyes of stakeholders and to identify which domains are to be enhanced in order to set more effective social strategies in organizations to reach the identification and satisfaction of employee. Moreover, implications for decision making and policy making as well as recommendations for future research constitute the end product of this thesis.*

Keywords— Corporate Social Responsibility (CSR), CSR activities oriented to employee (CSR employee), CSR activities oriented to customer (CSR customer), CSR activities oriented to society (CSR society), Organizational Identification (OI), Job Satisfaction (JS)

The importance of investigating CSR in developed countries has been accentuated in the last decade (Kim et al., 2010), however, researches exploring this concept in developing countries are still few especially on individual level of analysis (Jamali & Karam, 2016). Torres et al. (2012) pointed out that there are no researches that have explicitly tested the differential impact of CSR activities on stakeholder behavior. Although the prominent emphasis on embedding CSR in the business market, scant researches are conducted on CSR activities and banks (Carnevale et al., 2012) and on stakeholders' responses to CSR activities in the banking sector (Rugimbana et al., 2008). In this context, building CSR models as per stakeholder perceptions in the banking sector of a developing country such as Lebanon constitute undoubtedly an added value to CSR scholars and practitioners. Therefore, this study presented a discussion related to the findings obtained from examining the impact of CSR activities on organizational identification and job satisfaction of frontline employees in the Lebanese banking sector while comparing those perceptions between Beirut and Beqaa branches.

An extensive review of literature was elaborated aiming to build a conceptual model (figure 1) that could be examined empirically. A questionnaire was developed to test

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the link between employees' perceptions of CSR activities, organizational identification, and job satisfaction.

Four-hundred eligible participants from frontline employees of four major banks' located in Beirut and Beqaa areas were invited to participate in the study. The researcher used 4 data collection methods (face to face, telephone, online, and mail). After 10 weeks of data collection, 231 questionnaires were returned from employees' participants, 17 questionnaires were incomplete, thus, the final number of usable questionnaires was 214 with a response rate of 53.5%.

The causal relationships for the 3 models (model "1" representing the global employee's perception of CSR in Beirut and Beqaa area; model "1a" representing the employee's perception of CSR only in Beirut area; and model "1b" representing the employee's perception of CSR only in Beqaa area) are shown respectively in figure 1, 1a, 1b and were estimated using SEM with latent variables once the validity of the measurement scales has been successfully verified. The software SmartPLS was used for the application of structural equation models with latent variables "PLS-PM" due to its user-friendly interface and to the opportunity to see representation of the estimated model (Ringle et al., 2012). The results or the findings are shown in the table below.

Interpretation of the findings, recommendations for researchers and practitioners, limitations and suggestions for future research are explicitly discussed to address the result of testing the impact of CSR activities on OI and JS in four major Lebanese commercial banks that operate in Beirut and Beqaa area.

INTERPRETATION AND DISCUSSION OF THE RESULTS

The findings of this study confirm the validity of the use of CSR activities to the banking industry. This is evident if such banks need to generate affection or emotional responses (identification and satisfaction) from their stakeholder's behavior with the implementation of CSR activities. In other words, the employees' thoughts and beliefs about CSR activities (cognitive dimension) may influence their affection and emotions such as identification and satisfaction towards the bank (affective dimension). However, this research demonstrates that these outcomes are not equally attained by all CSR orientations, some are more influential and worthwhile than others, and even they differ from region to others.

The results indicate specifically in the global model "1" that OI and JS are positively and highly affected by employee's perception of CSR activities oriented to employee. JS is also positively and highly affected by OI. In contrast, employee's perception of CSR activities oriented to society does not have any influence on OI and JS. In addition, employee's perception of CSR activities oriented to customer does not have any effect on OI but it does have a positive low effect on JS.

On the contrary, CSR employee, society, and customer have different impacts on employee's affective and cognitive responses depending on the branch location where the employee is employed. Some initiatives are relevant for Beirut branches while others are irrelevant for Beqaa branches.

As per employees' perceptions of both Beirut and Beqaa banks' branches (model "1a" and "1b") JS is positively and highly affected by employees' perceptions of CSR activities oriented to employee followed by OI. However, for both employees of Beirut and Beqaa, JS is not affected by CSR customer. In addition, employees' perceptions of CSR activities oriented to society have a positive and direct effect on JS in Beqaa branches but without any effect on JS in Beirut Branches. While CSR employee has a positive and strong effect on OI in Beirut branches, CSR society shows a lower effect and CSR customer shows a non-significance effect on this concept. However, in Beqaa branches, only CSR customer generates a positive and strong effect on OI, while CSR employee and society are irrelevant to generate an influence on this concept.

Of the three CSR dimensions, employee focused CSR activities appears to be the strongest predictor of OI. This result is consistent with the research of Farooq et al. (2014) who found that CSR toward employee have the strongest influence on OI. The author of this study believes that the strongest impact of CSR employee on OI is justified by a main logical reason. The actions undertaken by companies toward the employees such as paying fair salaries, offering safety at work, treating fairly without discrimination, offering training and career opportunities… tend to send positive signals. These positive signals are perceived by the employees as the organization is concerned in improving their well-being and consequently these kinds of activities induce them to reciprocate by feeling a strong sense of belonging and membership to the organization. This feeling leads to organizational identification where employees' values are overlapping with the organization's values. This result is also consistent with research on strategic human resource management that emphasizes the use of good HR practices to improve employees' motivation and to create a high-performance work systems (HPWS) that is source of competitive advantage (Datta, Guthrie, & Wright, 2005).

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CSR oriented to society has no relationship with OI. In this study, CSR society has no influence (weak influence only among employees of Beirut branches) on employees' identification with the organization, even if it constitutes an important dimension of CSR. This result is not consistent with the research of Farooq et al. (2014) who found that CSR towards the society strongly affect OI after CSR towards employees. The author of this study considers 3 possible explanations. First, environmental and social responsibilities are voluntary and not legal issues in Lebanon. Therefore, there is no minimum requirement to comply with laws in purpose to remain in the business. Second, the voluntary social activities may not be viewed by the employees as powerful to improve the welfare of people such as by donations, helping to solve social problems, contributing to art and cultural events, protecting and respecting the environment. Third, due to the bad economic situation in Lebanon and high unemployment rate, employees are more concerned about their paycheck at the end of the month than the social impact of corporate operations. Therefore, CSR society in this study is irrelevant.

Concerning CSR activities oriented to customer, the result of this study reveals their non- significant influence on OI. However, Farooq et al. (2014) find a poor relation between customer-related CSR actions and OI. The author of this study justifies this result by the reason that CSR actions towards customers lead to ensure CS and loyalty more than directly affecting attitudes and behavior of employees. In addition, it is hard to differentiate between them and marketing actions or product features that the company aims to implement to enhance customer satisfaction.

In Beqaa, to our surprise, CSR towards employees doesn't affect OI, however, only CSR towards customers have the strongest effect on OI, contrary to the findings of Farooq et al. (2014). Perhaps, the CSR actions focused on Beqaa employees are below their expectations. For example, the employees of Beqaa view that they don't have a career development because the head office where the main positions are available is far from their home and family, which lead them to stay in the Beqaa even if they are more qualified than the position they occupied. In addition, the number of banks' branches in the Beqaa is very limited, leading also to decrease the available vacancies to progress within the same area. Furthermore, because of this lack of career opportunities, they perceive that they don't receive fair salaries since salaries are paid per positions. So, if they lack the opportunity to change rapidly their positions, they will feel underestimated by receiving the same salary for a long period. These reasons lead them to not appreciate the CSR activities oriented to employee to affect their identification with the bank. However, the author justifies the strong influence of CSR activities oriented to customer on OI by the strong relationship between customer and employee in the Beqaa. Most of customers in the Beqaa choose to open an account in a specific bank because they know the bank's employee at the personal level. In this case, the employee feels an engagement toward the client who chooses to deal with the bank because of his presence, and this feeling of engagement leads him to care more about the satisfaction of the customer that couldn't be attempt without CSR actions related to customers. Thus, CSR customer is very important for the employee of Beqaa branches since it is considered as his weapon to satisfy the customer who chooses to deal with the bank because of his presence. In this case, CSR customer leads the employee to feel that his values are overlapping with the values of the bank and consequently it affects positively his organizational identification.

Moreover, the findings of this study have demonstrated that no significant differences exist between the employee's perception of Beirut and Beqaa regarding the strong influence of CSR employee on JS. These results are consistent with previous researches where researchers have demonstrated that employees consider CSR activities oriented to their self, such as fair salaries, safety, training, career advancement, no discrimination… affect positively their satisfaction within the job (Bhattacharya et al., 2009; Shen & Jiuhua Zhu, 2011; Tuzzolino & Armandi, 1981). This is justified by a main logical reason that to have an employee satisfied in his job, the organization should implement initiatives towards him to influence directly his affective and cognitive attitude and behavior. For example, if an employee is not fairly paid and is treated with discrimination and without being offered training and career opportunities, he will not be satisfied even if the organization is giving back to the society through other activities. However, it is important to mention that JS in the global model and the one of Beirut and Beqaa is reflected by some different intrinsic and extrinsic items. This is justified by different organizational structure at the level of the branch due to different banks undertaken in this study, different management, different needs at the personal level, different positions, different job descriptions, different power of authorities, different teams, different challenges, different characters etc. For example, the employees of Beqaa stress the point on some intrinsic items that those of Beirut don't, such as the chance to do different tasks from time to time and the chance to be someone in the community; however, the employees of Beirut stress the point on an extrinsic item (the way my co-workers get along with each other) and on an

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intrinsic item (the feeling of accomplishment I get from the job) that those of Beqaa don't.

The findings of this study demonstrate also that employee's perception of CSR activities oriented to society is only affecting JS in Beqaa branches. This result was consistent with the work of Riordian et al. (1997) and Closon et al. (2015) who found that organizations that undertake responsibility towards their society and environment have higher level of employees' job satisfaction. However, the result of Beirut branches and the global model was not consistent with their findings. Thus, the author of this study explains this result per four main reasons. First, banks' activities towards the society are not well communicated to their employees, leading employees to be unaware of this type of activity such as, donations, contributing money to art, cultural and social events, improving the general well-being of society, respecting and protecting the environment. And even if a good channel of communication exists, employees don't find time to read the emails or reports related to these activities due to the load of daily work at the level of the branch. Second, most probably employees don't participate in social activities that are scheduled outside working hours which lead them to be insensitive to the positivity generated by these kinds of activities and cause a lack in the job satisfaction (Upham, 2006). Third, these types of activities may not have a direct impact on their lives or they don't meet their expectations and thus their satisfaction. For example, the positive impact of respecting and protecting the environment by banks doesn't fit their expectations due to the massive negative impact of the garbage crisis on the environment. Forth, because Zahle has higher social problems and is smaller than Beirut in area and population, the echoes of improving the well-being of the society could be higher than the one of Beirut.

The findings demonstrate low effect of CSR customer on JS and a non-significance effect of CSR customer on JS in both regions. This result is inconsistent with previous researches where researchers have demonstrated that employees consider external CSR activities affect positively JS (Bhattacharya et al., 2009; Shen & Jiuhua Zhu, 2011; Tuzzolino & Armandi, 1981). The author of this study believes that the low and the absence impact of CSR customer on the employee JS is justified by a main logical reason. CSR customer aims to reach customer satisfaction and loyalty and not the employee JS. However, the reason of the communication could not justify the result because CSR customer is communicated to customer through the frontline employee at the level of the branch.

Also, this study demonstrates that JS is positively and highly affected by OI. This result is consistent with previous studies (Gioia et al., 2000; Karanika-Murray et al., 2015; Mete et al., 2016; Sluss & Ashforth, 2007; Tuzun, 2009; Van Knippenberg & Van Schie, 2000; Van Dick et al., 2004; Wei et al., 2007).The clear justification is that when an employee has a high affective bond with the company such as strong sense of belonging, overlapping of values, strong sense of membership, and the feeling of oneness , means that these affective sensations lead the employee to perceive and assess positively his job.

Consequently, the findings of the study demonstrate that employees are more concerned or sensitive to CSR actions oriented directly to them comparing to the actions that are oriented to other stakeholders. Therefore, the findings of employee's perception of CSR activities provide significant implications for the banking corporations that will be discussed largely in the following section.

RECOMMENDATIONS FOR RESEARCHERS AND PRACTITIONERS

The implications of this study might be deemed emerging in a developing country context. This research provides a roadmap on how to assess CSR activities, how to build CSR models, and what relationships exist between CSR dimensions, organizational identification, and job satisfaction in a highly competitive Lebanese banking sector.

Recommendations for Researchers

1. This research contributes to the understanding of the CSR concept based on stakeholder theory. For researchers, this study would add to the literature if not being the springboard of the CSR dimensions and its link to employees' behaviors in the Lebanese context.
2. To the best of our knowledge, this research could be considered new of its nature in the Lebanese banking sector by digging deeper to understand whether multiple dimensions of CSR affect directly and positively the identification and satisfaction of employees.
3. This research provides significant information and valuable insight to comprehend the relationships between CSR orientations, organizational identification, and job satisfaction in the Lebanese banking sector.
4. Using stakeholder approach to measure CSR activities constitutes an important contribution since this approach enables to assess the visibility of CSR activities in the eyes of stakeholders and to identify which domains are to be enhanced to set more effective social strategies in organizations (Maignan & Ferrell, 2004; Torres et al., 2012).

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5. This research can produce an avenue for future research to tackle CSR from a micro organizational angle that will lead to the enhancement of Lebanese corporate responsible practices. The author suggests that corporate responsible behavior can have a positive influence on identification and satisfaction of employee. Addressing a responsible culture could create a favorable environment for employees to expand their knowledge and expertise to the benefit of the company.
6. In this study, the author has conceptualized CSR by adopting stakeholder management principles and by using a multidimensional construct to assess external customer perceptions of three CSR dimensions in Lebanese commercial banks: customer, employee, and society. This conceptualization of measuring each dimension or orientation of CSR independently is more adequate and informative than measuring CSR as one dimensional concept. Previous research has been extensively exploring CSR as a one-dimensional concept leading to mixed findings (Perez & Rodriguez del Bosque, 2016).
7. Findings confirmed that CSR activities could be used as an antecedent to generate positive behavior at the level of employee. Therefore, founders and managers are invited to align their mentality of profit generation with more responsible orientation towards all stakeholders.
8. The results of this study assist both practitioners and scholars in predicting employees' identification and satisfaction, and assure the usefulness of understanding CSR effects by measuring it per multiple dimensions.
9. The final implication in this research is the eminent mediating role that identification process plays between CSR orientations and satisfaction. To explain employee responses towards CSR activities, the causal model should always include OI. Based on that, the author highlights the use of identification's variables while testing similar stream of hypothesis in future research.

Recommendations for Practitioners

The empirical evidence obtained by testing the hypotheses provides the following recommendations for practitioners of CSR in the banking industry.

1. Since CSR orientations are less visible in the eyes of employees, banks should not only invest in CSR but should also important to communicate all the initiatives oriented to enhance the wellbeing of stakeholders. Communication is not a show- off; it is a disclosure that is a part of the company engagement towards its stakeholders. Referring to Hartman et al. (2010) organizational leaders were doing little to keep stakeholders well informed regarding their green initiatives and their relationships with sustainability. Thus, banks should improve their CSR communication and disclosure via CSR reports, letters, emails, and social media because it seems that some CSR orientations are not enough visible to employees who demonstrate a poor and weak assessment of these orientations. Hence, banks are not only asked to increase awareness of their CSR activities among employees through disclosing, but must also encourage CSR-based communication between those various stakeholders so consequently customer and employee become aware of the company's CSR activities. In addition, banks could improve their communication in both directions, by informing employees directly of what the bank is doing in the field of CSR and by asking them their recommendations and expectations regarding social activities. Furthermore, due to the direct contacts with clients at the level of the branch, frontline employees can play a crucial role in communicating to clients what bank is doing as CSR activities and ask their recommendations and expectations in this field while executing the banking daily transactions. Hence, CSR-based communication could be used as a connection tool and a motivator to group employees, customers, and the management in one group.
2. To put a framework for strategic and systemic CSR in the banking system, BDL is asked to issue circulars obliging banks to report their CSR activities in a specific annual report per Global Reporting Initiatives (GRI) G4 and GRI standards (encompassing 36 standards released in October 2016). Noteworthy, these GRI guidelines and standards should be revised by BDL to be adapted to local context. Therefore, asking banks to report their CSR activities after being audited by responsible authority might have many advantages: evaluating self-activities, competing with other banks to do better activities, discovering gaps by displaying these activities to all stakeholders, assuring the adoption of responsible practices in daily operations, and enhancing the communication at the level of all stakeholders.
3. The empirical evidence of this research helps CSR managers and practitioners to be aware of the current perception of CSR, organizational identification, and job satisfaction to enhance these concepts in their organizations. Also, it pushes them to reorient CSR strategy towards adequate activities taking into

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consideration employees' needs and expectations to survive and gain competitive advantage. Furthermore, CSR managers and practitioners should be conscious of the strong positive relationship between CSR activities oriented to employee, OI, and JS. These results suggest that banks should manage their CSR in harmony with philosophy of employee centric orientation where CSR employees constitutes the most prominent dimension for frontline employees. In this regard, CSR practitioners and managers should align their CSR initiatives according to the perceptions, expectations, and needs of their employees because this study shows that CSR orientations could have different effect on identification and satisfaction ranging from high, slight, to insignificant effect. In summary, this study helps CSR managers and practitioners to understand, recognize, and identify the significant role of each CSR orientations that might have on work related outcomes. Understanding these differential influences enables them to design and implement more powerful CSR practices to fit those needs and expectations.

4. Since stakeholders' demands, needs, and expectations differ significantly with time (Moneva, Rivera, & Muñoz, 2007), and their perceptions differ according to the type of CSR orientations (Perez & Rodriguez del Bosque, 2016), CSR practitioners are invited to test regularly how stakeholders perceive their CSR practices. This updated information leads to an effective dialogue and communication between companies and stakeholder in defining corporate values to generate an organizational culture aligned with stakeholders' needs and expectations (Moneva et al., 2007). Doing so would promote and facilitate to build a solid bridge between companies and their significant stakeholders to improve and to be competitive in the Lebanese banking sector. For example, preparing regular sessions to discuss directly with employees their needs and expectations from CSR activities, like increasing salaries, providing career development specially for those of Beqaa branches, launching employee volunteering programs during working hours, preparing training programs to all employees at equal level, taking care of employee's newborn kids by having nurseries or paying the fees of nursery in order to retain mothers in their job, and recruiting disable people.
5. Banks should reconceive their financial products before proposing it to the market. They should recognize the direct impact of their financial activities on the environment and society. In other words, banks shouldn't only focus how to increase their profit while selling their financial products; they must think how to increase their profit while asking at the same time about the impact of their loans on the environment and society. Hence, they should do due diligence not only on the solvability of the company but also on respecting human rights, labor, environment, and anticorruption principals. In addition, they should impose responsible conditions while providing loans to finance corporations and even the government. This pressure from the banking industry could empower the responsible culture and behavior especially at the government level by fighting anticorruption. For example, banks would not automatically subscribe in government bonds because of holding high level of liquidity. Banks should place conditions on the state in order to take reformative steps and put an end to the corruption before providing the necessary funding. In addition, SME's and large corporations would not benefit from banks' loans to finance their projects until they respect conditions related to transparency, human rights, environment protection, product safety… For example, banks should not provide loans to factories that are polluting the community around or not respecting human rights by employing kids. Furthermore, banks should not put pressure on doubtful clients by taking their mortgaged houses or lands; they should help the customer to find solution to his financial problem. Thus, banks will constitute not only the backbone of the Lebanese economy but the backbone of the growth of a responsible economy.
6. Since the impact of CSR activities oriented to society is unrecognized at the level of employee in this study, banks are asked to maximize their social and environmental impact by helping to solve social problems. But even they are playing a role in helping to solve social problems through their financial products; banks showed that there are not looking beyond their profit generation (as per this study). In fact, banks are not experts in solving social problems; hence, the author recommends banks to invest in social enterprises by creating business with purpose instead of contributing to support their activities by donations or by only providing loans. But how? The author proposes the issue of a new BDL circular to organize the relation between banks and social enterprises for boosting the investment in social enterprise by the banking sector regarding the wide need to solve social problems in Lebanon. In this case, the social entrepreneur from the civil society, who is expert in the social field, will set long term strategies independent from any political and

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religious influences to invest the money provided by banks at the right place and under the control and supervision of banks, BDL, and the government. By this, banks can maximize their social and environmental impact through investing directly in these social enterprises. Yet, CSR will be transformed from activities oriented to society to sustainable investments oriented to society that provide a direct return on investment. In this regard, CSR will affect at the same time the well-being of the society and the growth of the bank.

7. This study provides significant information concerning the relation between CSR and job satisfaction. It reveals the importance of the presence of a responsible culture in the world of business. Nowadays, individuals especially the millennials are searching for job opportunities in companies that CSR constitutes the pillar of companies' success. Thus, the opportunity for the millennials to be satisfied in their job in Lebanon specifically in the banking sector will increase and limit their emigration towards Gulf region, Canada, Australia, and other countries. In addition, CSR could be a motivator to push the growth of knowledge economy in Lebanon that is based on the knowledge of human being in creating innovative ideas. Hence, satisfied employees due to the positive effect of CSR could be able to develop new technological and competitive banking products. Therefore, CSR managers and practitioners should meticulously develop the best CSR practices through an updated research.
8. Banks should consider spending money to implement responsible practices as an investment and not a cost. Banks should also recognize that CSR not only affects identification and satisfaction of their employees but it creates better image and reputation as well as a competitive advantage in the marketplace.
9. Facing the period of uncertainty that Lebanon is experiencing now, customers are more demanding to ethical and legal behavior from commercial banks. This implies that banks should make more efforts to adhere and comply with national and international standards and regulations to keep their customers satisfied.
10. This research can be particularly useful for CSR practitioners especially among those of the banking sector who would be interested in measuring employee's perceptions of CSR in a turbulent political situation and volatile Lebanese economy. In Lebanon, CSR is still at its embryonic stage as well as the level of awareness and understanding still low, thus understanding the effect of CSR activities on employee could encourage CSR practitioners to embed this concept not only in their strategy but systematically in their daily operations undertaken by each department. In addition, companies that are far from CSR could have an incentive to practice this concept due to its positive effect.
11. Results of this study showed a high number of banks' branches located in Beirut area and a very restricted number of banks' branches located in Beqaa area. The author suggests to inaugurate new branches not only in Zahle but in more remote and rural area in Beqaa due to many reasons: to reach more clients, to create more job opportunities for employee's career advancement, to have less queues, to spread financial literacy and responsible culture, to develop the rural areas by providing loans or microcredit, to orient, support, and mentor people in rural areas towards creating new businesses instead of doing nothing or doing unethical work.
12. Banks should realize that there is no customer without the effort of the frontline employee at the level of the branch. And when there is no customer, there is no profit generation. So, the employee comes before the customer. Moreover, frontline employee faces more challenges than the employee who works in the head office, since he is always working under the pressure of satisfying customers, colleagues, and the management team. In addition to that, frontline employee must realize a weekly and monthly budget on which accounts his job performance. Consequently, the author recommends increasing the salary of frontline employees at the level of the branch since banks generate huge profit and pay limited corporate tax.
13. As if branches' managers are in daily and direct contact with people, they could know much better than the bank's management located in the head office the need of the community around the branch. Thus, branch manager can be more sensitized in the issue of CSR by proposing development program for the region where the branch is located. Strengthening the role of branch manager in the issue of CSR can increase the impact of CSR activities.
14. To encourage banks or any organization to look after the well-being of the stakeholders, government is asked to issue new laws such as tax exemption on employees' benefits or donations or any other types of CSR activities. As a matter of fact, the role of government is important in encouraging and embedding the culture of CSR in the world of business but governments cannot

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work alone. To have a successful CSR activity at the national level, the public and private sector and civil society should cooperate all together to solve social problems. In this case, the impact of CSR activities will be more visible in the eyes of any stakeholder as if it is affecting their way of life.

15. In fact, women are poorly represented in the board of directors of Lebanese banks, and, since CSR managers are women, specifically in the 4 banks under the study, this could reflect that banks don't engage women in their strategic decisions and planning and thus women and CSR might be considered as an unimportant issue. Hence, the author suggests empowering woman by breaking the glass ceiling and letting her be present in the BOD to orient the bank towards more strategic and systematic responsible business practices. If so, banks could show to the public that they are tackling the issue of CSR more seriously.
16. Nowadays, stakeholders are looking for transparent companies with CSR values. Therefore, BDL as a regulatory authority and responsible of Beirut Stock Exchange (BSE) can issue a Beirut Stock Exchange Sustainable Index (BSESI) to evaluate the sustainability performance of the companies already listed on BSE and have issued audited CSR reports. This index could attract more local and foreign investors, more clients and competent employees to companies listed on BSE.
17. In the end, the author perceives that the misunderstanding of CSR concept is due to its large domains. Thus, narrowing the content of this concept will be a tool for clarification and good implementation. In this regard, the author proposes to replace the term Corporate Social Responsibility (CSR) by the term Corporate Business Responsibility (CBR), because it should be the business main and core responsibility (and not its social responsibility) to act systematically in a responsible way towards employees and to help solving social problems through its offered products and services. Noteworthy, if a company doesn't act in a responsible way in all its daily actions, it will not survive (P. Issa, personal communication, April 4, 2016). Any stakeholder, primary or secondary, especially the one who is from the millennials generation could damage the image and the reputation of the company by attacking it directly through the social media in case he perceives any unethical or irresponsible behavior (P.Issa,personal communication, April 4, 2016). Consequently, the author proposes to use the term CSR only for activities oriented to society, community, and environment; and to use the term CBR for all other types activities related to the core business. Thus, a new definition for CSR could be elaborated: CSR is the corporate voluntary responsibility to implement social activities outside the circle of its products and services to enhance the well-being of the society, community, and environment.

LIMITATIONS

This research shows to be one of the more comprehensive researches about the effect of CSR dimensions on internal customer in Lebanese commercial banks operating in Beirut and Beqaa branches, due to the presence of reliable and valid instruments, an acceptable sample size, and sound data analyses. On the other hand, the implications of this study must be considered in light of the following limitations.

1. The lack of a research culture in Lebanon and the resistance of banking sector to participate in research and to facilitate data collection imposed high obstacles to choose a representative sample of all frontline employees in the banking sector. Noteworthy, the sample of the study was drawn from 4 alpha banks, participants in UNGC, and specifically from their branches operating in Beirut and Beqaa area. Although the sample's size was greater than the minimum of 200 participants (Garver & Mentzer, 1999; Hoelter, 1983; Sivo et al., 2006), the non-probability sampling method used may decrease the validity since there is no evidence that they are representative of the populations that the researcher is interested in generalizing to (Cavana et al., 2001). A bias might be caused by this sampling method through contacting specific groups (self- selected) of frontline employee. These points of views might not reflect the perceptions of frontline employees in other banking categories and other Lebanese governorates. In addition, they do not reflect the point of views of frontline employees in other sectors and other governorates. And, even if all Lebanese governorates are sharing same history, culture, tradition, language, and religions, the results cannot be generalized to the whole country and even to whole of Beqaa and Beirut governorates. The sites of the study were the most populated area of Beirut and Beqaa, such as Achrafieh and Hamra for Beirut, and Zahle and Chtoura for Beqaa. Therefore, the findings of this research should be interpreted with prudence and cannot be generalized to other commercial banks, other sectors, or other areas.

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2. The sample size of frontline employees was quite small due to three main reasons: First, the homogeneity of bankers' participants with at least 2 years of experience and work at least as tellers at the branch level; as per Hejase and Hejase (2013), the more homogeneous the population is, the smaller the sample size can be. Second, the non-support of the management of some participant banks by not providing the authorization to collect data among their employees. This latter reason pushed many employees to refuse participating in the study even if the questionnaire was confidential and anonymous. Third, the limited number of branches and frontline employees in Beqaa lead to a limited number of participants. Not to forget that the author respects the minimum of 50 observations to conduct the comparative study (Hair et al., 2010).
3. The instruments used were developed in a non-Lebanese context. Thus, it's possible that these instruments comprise or deny variables that are cultural or related to specific circumstances. More theoretical analysis and empirical studies in many areas are needed to be tested. In fact, caution should be taken in generalizing the models identified in the study.
4. Employees who participate in the study were not sufficiently aware of CSR practices of their banks to mention confident response to the questions of questionnaires.

SUGGESTIONS FOR FUTURE RESEARCH

In accordance with the limitations of this research, the author proposes the following recommendations for future research.

1. Since the level of CSR awareness of respondents was not measured, an unmeasured impact on the study results could occur (Auger et al., 2008). To extend the findings of this study, future researches measuring the influence of CSR dimensions on employee behavior should control the level of awareness or knowledge related to CSR practices in the company.
2. This research focalized on the CSR perception in the Lebanese banking sector in branches operating only in Beqaa and Beirut, a service sector in an international context. Measuring the relation between the dimensions of CSR and outcome variables in other sectors, other work conditions, and other areas in Lebanon would be interesting to discuss in future research to generalize the findings. In addition, a comparison study is recommended not only cross areas in Lebanon, but cross banks, cross industries, and cross countries.
3. Further examination is needed to determine why employees have a low sensitivity and even not sensitive at all towards CSR activities oriented to society in Lebanon by developing a comprehensive qualitative study.
4. This study uses the stakeholder theory as the only mechanism to understand the impact of CSR dimensions on employee related outcomes for clarity. Hence, future research could use other theories such as social identity theory for an adequate comprehending of the models.
5. To gather more contextual and insightful data, future research can base their data collection on personal in depth interview, focus groups, on site observations, and individual case studies.
6. Future research should extend the models by adding other CSR dimensions in both models such as shareholder dimension and general dimension and other dependent variables such as job performance, retention, loyalty, commitment, and engagement.

At the end, CSR can't be used to solve every problem but it can shift the organizations' mindset from profit to purpose, from controlling to empowering and from privacy to transparency. CSR is a friend and not an enemy, so embedding CSR in the business makes a difference while being profitable. CSR is an addition to the business, it is the corporate business responsibility, i.e response ability towards the sustainability. Thus, when Lebanese commercial banks are committed to CSR, they will constitute not only the backbone of the Lebanese economy but also the backbone of the growth of a responsible economy.

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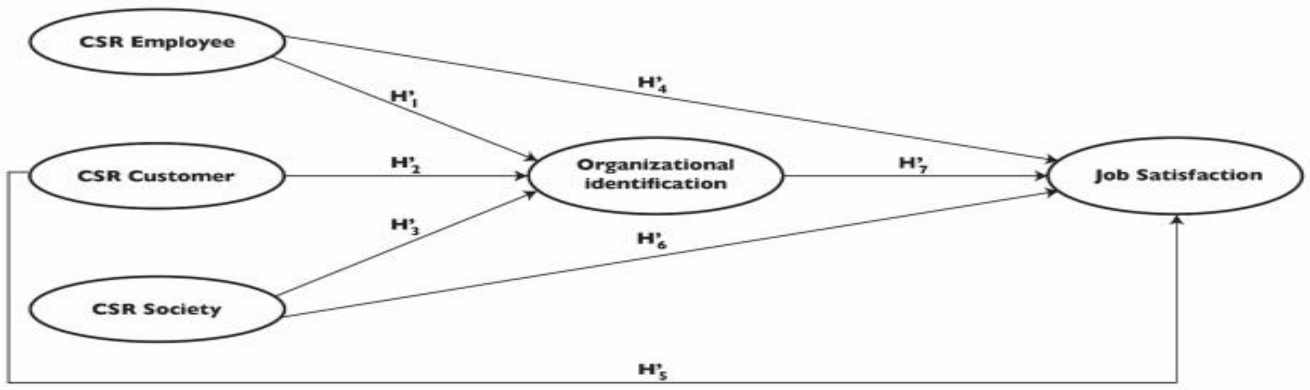

Figure 1. Hypothetical Causal Model "1": Linking Employee's Perception of CSR to OI and JS (Conceptual Model).

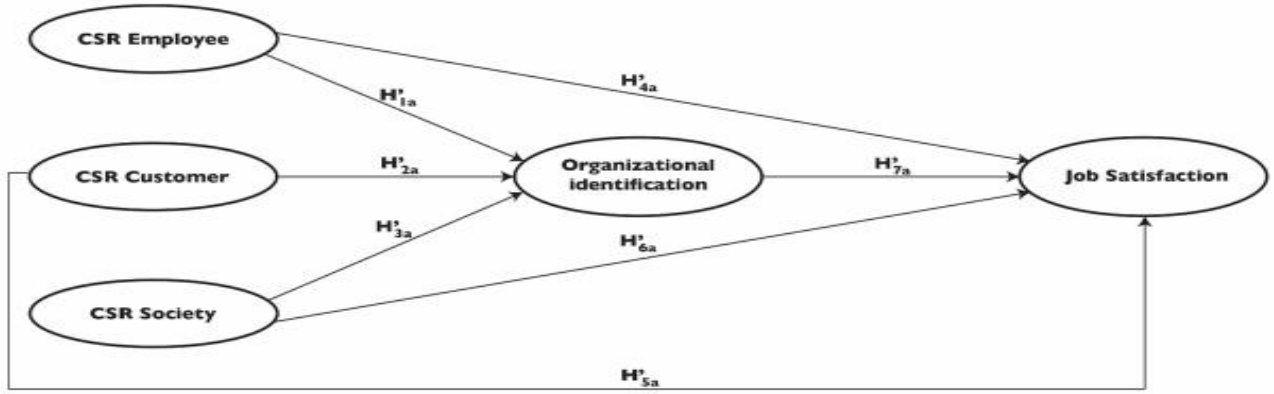

Figure 1a. Hypothetical Causal Model "1a": Linking Employee's Perception of CSR to OI and JS in Beirut Banks' Branches

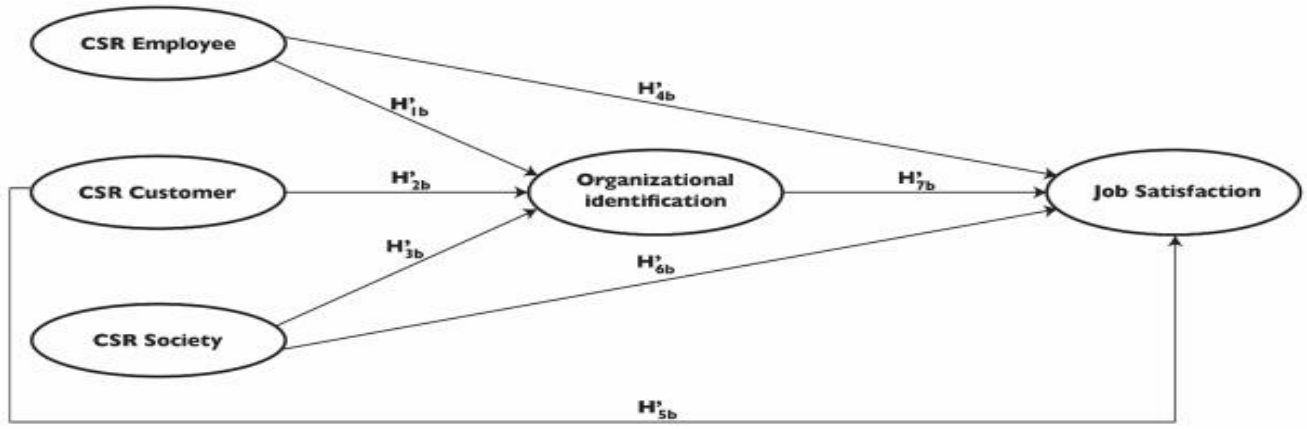

Figure 1b. Hypothetical Causal Model "1b": Linking Employee's Perception of CSR to OI and JS in Beqaa Banks Branches

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Results of Hypothesis Testing

Model	Hypothesis	Result
"1" – Global	H'_1: CSR Employee → OI	Supported (strongly)
	H'_2: CSR Customer → OI	Not supported
	H'_3: CSR Society → OI	Not supported
	H'_4: CSR Employee → JS	Supported (strongly)
	H'_5: CSR Customer → JS	Supported (weakly)
	H'_6: CSR Society → JS	Not supported
	H'_7: OI → JS	Supported (strongly)
"1a" – Beirut	H'_{1a}: CSR Employee → OI	Supported (strongly)
	H'_{2a}: CSR Customer → OI	Not supported
	H'_{3a}: CSR Society → OI	Supported (weakly)
	H'_{4a}: CSR Employee → JS	Supported (strongly)
	H'_{5a}: CSR Customer → JS	Not Supported
	H'_{6a}: CSR Society → JS	Not Supported
	H'_{7a}: OI→ JS	Supported (strongly)

Model	Hypothesis	Result
"1b" - Beqaa	H'_{1b}: CSR Employee → OI	Not supported
	H'_{2b}: CSR Customer → OI	Supported (strongly)
	H'_{3b}: CSR Society → OI	Not supported
	H'_{4b}: CSR Employee → JS	Supported (strongly)
	H'_{5b}: CSR Customer → JS	Not Supported
	H'_{6b}: CSR Society → JS	Supported (strongly)
	H'_{7b}: OI→ JS	Supported (strongly)

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Implementation of Robotic System Using Speech Recognition Technique based on Neuro-Fuzzy Controller

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Abstract**—** *Recently, voice becomes one of the methods commonly used to control the electronic appliances, because of easily being reproduced by human compared to other efforts needed to operate to control some other appliances. There are many places which are hard or dangerous to approach by human and there are many people with disabilities do not have the dexterity necessary to control a keypad or a joystick on electrical devices. The aim of this study is to build a mobile robotic system, which can be controlled by analyzing the human voice commands. The robot will identify the voice commands and take action based on received signal. In general, the robotic system consists of the voice recognition module (AD-VR3) which serves as the ear that will listen and interpret the voice command, while the Arduino serve as the brain of the system that will process and coordinate the correct output of the input command to control the robot motors to perform the action.*

Keywords**— *Arduino, robot; voice recognition, brain, disabilities, joystick*.**

I. INTRODUCTION

Voice recognition robotic System would be an advanced control system that uses human voice/audio speech to identify the speech command. It has many applications and advantages such as providing support to disabled people, Alerts/warning signals during emergencies in airplane, train and/or buses, Develop of educational games and smart toys, Automatic payment and customer service support through telephones.

All that with No key required for devices such as personal computer and laptops, automobiles, cell phones, door locks, smart card applications, ATM machines etc [1].

The aim of this paper is to study the develop a voice driven control robot using artificial intelligence and speech recognition method, where the motors are going to be voice driven. Then the action can be taken based on the given commands. Generally, these kinds of systems are known as Speech Controlled Automation Systems (SCAS). Our system will be a prototype of the same [1].

Speech recognition is the process of electronically converting a speech waveform (as the realization of a linguistic expression) into words (as a best-decoded sequence of linguistic units). Converting a speech waveform into a sequence of words involves several essential steps[2]:

1) the microphone picks up the signal of the speech to be recognized and converts it into an electrical signal. A modern speech recognition system also requires that the electrical signal be represented digitally by means of an analog-to-digital (A/D) conversion process, so that it can be processed with a digital computer or a microprocessor

2) This speech signal is then analyzed

3) (in the analysis block) to produce a representation consisting of salient features of the speech. The most prevalent feature of speech is derived from its short-time spectrum, measured successively over short-time windows of length 20–30 milliseconds overlapping at intervals of 10–20 milliseconds. Each short-time spectrum is transformed into a feature vector, and the temporal sequence of such feature vectors thus forms a speech pattern.

4) The speech pattern is then compared to a store of phoneme patterns or models through a dynamic programming process in order to generate a hypothesis (or a number of hypotheses) of the phonemic unit sequence. (A phoneme is a basic unit of speech and a

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phoneme model is a succinct representation of the signal that corresponds to a phoneme, usually embedded in an utterance.) A speech signal inherently has substantial variations along many dimensions [3].

II. DESIGN HARDWARE IMPLEMENTATION

The most challenging part of the entire system is designing and interfacing various stages together. Our approach was to get the analog voice signal being digitized in the microphone. The frequency and pitch of words be stored in a memory. These stored words will be used for matching with the words spoken. When the match is found, the system outputs the address of stored words. Hence we have to decode the address and according to the address received, the car will perform the required task. Since we wanted the car to be wireless, we used TX & RX wireless module. The address was decoded using decoder in microcontroller and then applied to TX module. This together with driver circuit at receivers end made our complete intelligent systems.

A. Circuit Construction

Most ANFIS models are designed using software. The ease of manipulating data and changing the architecture make software a popular choice. An often unlooked at side of ANFIS is when they are created using hardware.

The first goal of this study was to create a circuit implementing ANFIS technology that utilized stand-alone hardware to perform the functions instead of the more commonly used software.

The AD-VR3 and all the other components comprising this circuit were assembled and wired on a car model of FL-330 Breadboard. Table 1 below shows the parts list used in creating this circuit including components of transmitter and receiver circuit.

Table.I: Components Used In Circuit's Construction

Components	Type
Arduino uno	Microcontroller
AD_VR3	Voice recognition module v 3.1
Microphone	AVR's microphone
HT12E	Encoder
HT12D	Decoder
CDT-88	Transmitter module
CDR-C05A	Receiver module
L293D	Driver module
FL-330	Car module
SPL-003010	Multipurpose circuit board
1 M Ω	Resistor
56 K Ω	Resistor
LED	Green led
5V battery	Power bank

The circuit below was wired according to the schematic shown in Fig. 1. and 2 below, and a picture of the completed circuits is shown in Fig. 7. and 8.

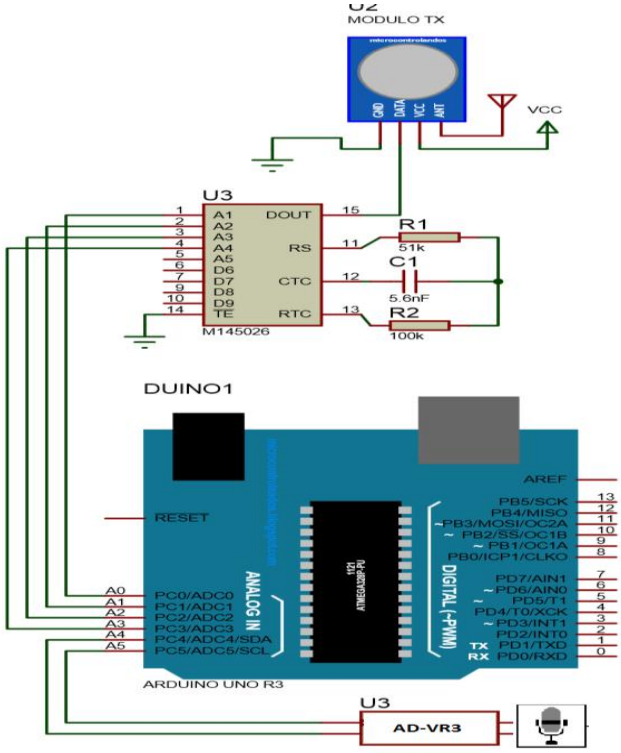

Fig.1: Transmiter Circuit

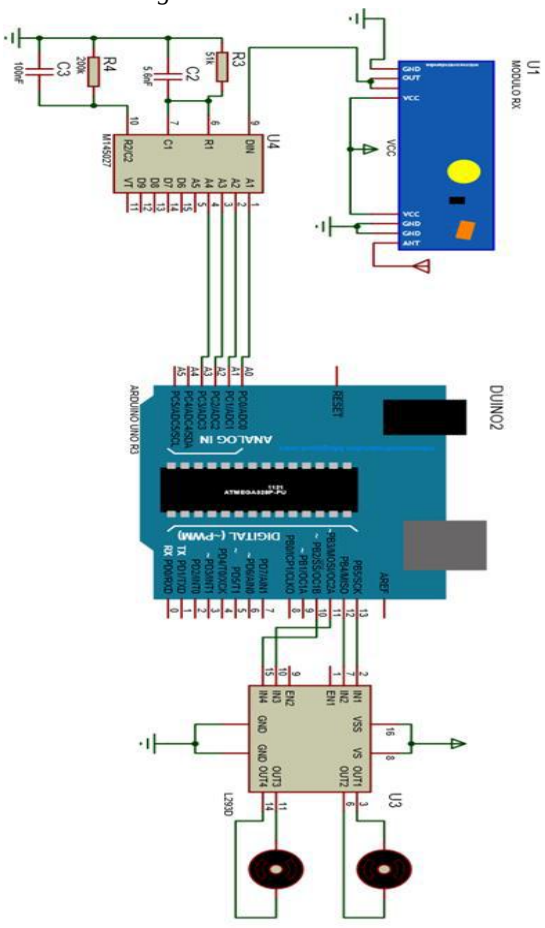

Fig.2: Receiver Circuit

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B. Schematic Descriptions

1) Microphone

The user will speak voice commands ("Right", "Left", "Forward", etc.) through the microphone which will pick up and use as an input. The microphone will be an electrets condenser, so it will need a voltage input of about 4 to 5V. The microphone itself contains a built-in field effect transistor amplifier stage, so the sound is amplified before it is sent to the voice IC for further amplification.

2) Voice recognition module

The AD-VR3 will get the voice input from the microphone and perform the speech processing (training &testing) as required, the AD-VR3 Speech Recognition chip is the basis of the voice recognizing. For every command that has been trained into the chip, the corresponding output will be set high. Using the output, the correct action ("Right", "Left", "Forward", etc.) can be implemented.

Fig.3: Microphone and voice recognition module

3) DC Power Source

The main power supply to all parts of the robot is a chargeable 9 V battery that is in the form of power bank for the receiver part and a direct DC supply of 5V for the transmitter part

4) Microcontroller (Arduino uno)

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. [7] The Arduino microcontroller is essential to the design of the robotic car as it provides communication between the voice recognition components and the motors.

Also the microcontroller will be essential for the integration of the rest of the system blocks. It will receive its inputs from the AD-VR3 voice module and interpret the signals to direct the motors to follow its next instructions. It will be integral for the microcontroller to decide when to send the input to the motor driver, which signal to send, and which motor to move at what time in order to get the robot to move in the correct direction and in a fluid motion.

5) DC Motor

The motion part contains two motors (right and left) with their drivers, the motors are DC types allowing the wheelchair to move forward, backward, turn right, and turn left. The motors will be synchronized so that the movement of each side will be one fluid motion.

DC motors are very simple to use and control, which make them a short design-in item, generally two different styles of high torque DC motors: Brush Commutated and Gear Motor where the last one has high torque at load affects.

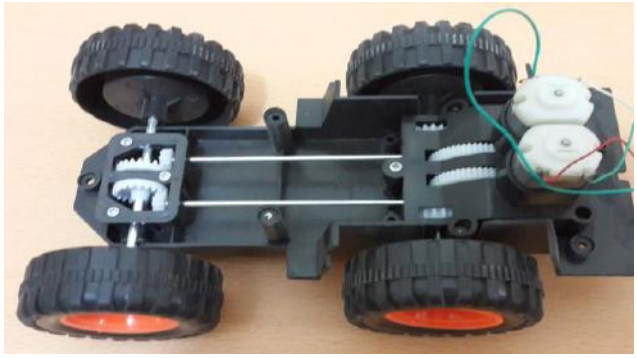

Fig.4: DC motor and main chassis of the robotic car

6) Motor Driver Controller (L293D)

The L293D is a quadruple high-current half-H driver. It is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D isalso designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

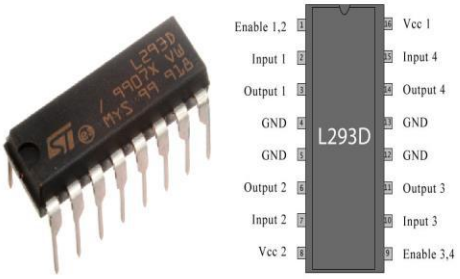

Fig.5: L293 driver

7) Transmitter and receiver modules (TX & RX)

Wireless Transmitter Modules allow the arduino to wirelessly communicate with other arduino, or with radio frequency (RF) controlled devices that operate in the same frequency (433Mhz in this case).

They work in pairs, meaning you need both a receiver and a transmitter to communicate with each other.

The receiver has 4 pins, but we actually use 3 of them: GND (Ground), VCC (5V) and one DATA pin.

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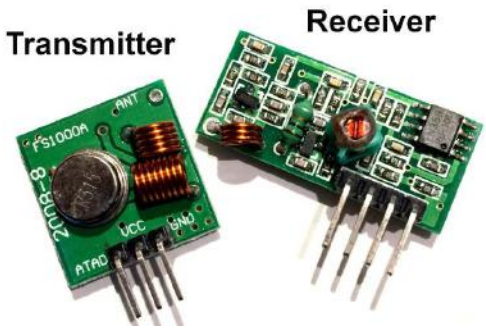

Fig. 6: Tx & Rx wireless modules

8) Encoder and decoder

The HT12E Encoder IC is used at the end of the sending arduino for Remote Control of the system. They are capable of Encoding 12 bit of information which consists of N address bits and 12-N data bits. Each address/data input is externally binary programmable if bonded out.

The HT12D decoder IC is placed before the receiver arduino to decode encoded the signals. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected. The Decoder receive the serial address and data from its corresponding decoder, transmitted by a carrier using an RF transmission medium and gives output to the output pins after processing the data.

9) Voice Recognition Circuit

The most important elements used in this research consist of a microphone which acts as a voice sensor connected to AD-VR3 for audio processing. The AD-VR3 is then connected to arduino microcontroller for wireless command communication to the robot which is received at the receiver end using another arduino circuit. The main transmitter board is shown in Fig 3.8 below. Voice Recognition Module is a compact and easy-control speaking recognition board. It is a speaker-dependent voice recognition module. It supports up to 80 voice commands in all. Max 7 voice commands could work at the same time. Any sound could be trained as command. Users need to train the module first before let it recognizing any voice command.

This board has 2 controlling ways: Serial Port (full function), General Input Pins (part of function). General Output Pins on the board could generate several kinds of waves while corresponding voice command was recognized. The other arduino circuit will act as a receiver, then transmit the received data to a microcontroller that drives the robot motors using L293D motor driver IC.

The circuit can be powered from a 5 volt battery or directly from a laptop usb slot that is connected to the Arduino Positive Voltage Regulator to limit and stabilize the board voltage to +5.0 volts. All ICs are powered from this regulated +5.0 volts. The microphone consists of the only user interfaces with the circuit. The microphone is a standard microphone which acts as the transducer converting the pressure waves to an electrical signal. The microphone is coupled to the AD-VR3 module which is attempting to classify each word into the different trained categories.

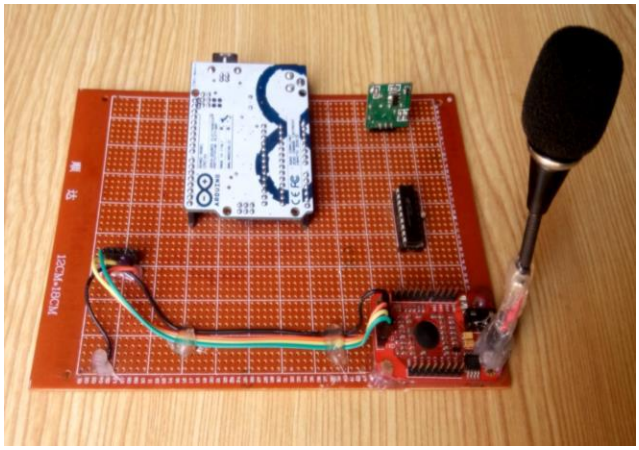

Fig. 7: Transmitter Circuit with Microphone and AD-VR3 module

C. Microcontroller Based Circuit

The microcontroller is the brain of the ssystem and nothing can be done if it isn't fully functioning. It has the ability to send different signals to the DC Motors to reach the appropriate tasks [5].

The design of the mobile robot is simple yet convenient for the system. The main board and the arduino module along with the motor driver are placed on the upper outside of the vehicle as shown in Fig. 4. below

The mobile robot consists of a chassis mounted on four wheels out of which two are dummy wheels and the other two are attached to 12V gear motors. The complete circuit for the robot operation is placed on the chassis. The gear motors are driven by motor controller driver IC L293D for forward, backward, left and right movements. The chassis also holds a power bank as battery for power supply.

Fig.8: Robotic Car and Receiver Part Circuit

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D. Training and Recognition

The important step in this stage is to select an appropriate type of microcontroller language for the programming; here it will use C language for Arduino and the compiler provided by Arduino Company.

Since the microcontroller is the Arduino Uno microcontroller, the number of pin is limited, thus, the number of appliances that can be controlled are just a few but still sufficient.

To record or train a command, the AD-VR3 chip stores the analog signal pattern and amplitude and saves it. In recognition mode, the chip compares the user- inputted analog signal from the microphone with those stored already and if it recognizes a command, an output of the command identifier will be sent to the microprocessor through the AD-VR3 ports of the chip.

Steps for Training Words to be recognized

a) Open vr_sample_train (File -> Examples -> VoiceRecognitionV3 ->vr_sample_train)
b) Choose right Arduino board (Tool -> Board, UNO recommended), Choose right serial port.
c) Click Upload button, wait until Arduino is uploaded.
d) Open Serial Monitor. Set baud rate 115200, set send with Newline or Both NL & CR.
e) Send command settings (case insensitive) to check Voice Recognition Module settings. Input settings, and hit Enter to send.
f) Train Voice Recognition Module. Send sigtrain 0 on command to train record 0 with signature "left" for example. When Serial Monitor prints "Speak now", you need to speak your voice (can be any word, meaningful word recommended, may 'left' here), and when Serial Monitor prints "Speak again", you need to repeat your voice again. If these two voices are matched, Serial Monitor prints "Success" and "record 0" is trained, or if are not matched, repeat speaking until success.

What is a signature? Signature is a piece of text description for the voice command. ForExample, if our 5 voice command are "0, 1, 2, 3, 4", we could train in the following way:

Sigtrain 0 left
Sigtrain 1 right
Sigtrain 2 forward
Sigtrain 3 backward
Sigtrain 4 stop

The signature could be displayed if its command was called. When training the two led on the Voice Recognition Module can indicate the training process.

After sending the training command, the SYS_LED (yellow) is blinking fast which remind you to get ready. Speak your voice command as soon as the STATUS_LED (red) light lights on. The recording process ends once when the STATUS_LED (red) lights off. Then the SYS_LED is blinking again, get ready for next recording process. When the training process ends successful, SYS_LED and STATUS_LED blink together. If the training fails, SYS_LED and STATUS_LED blink together, but quickly. Fig. 9 below illustrate the above process.

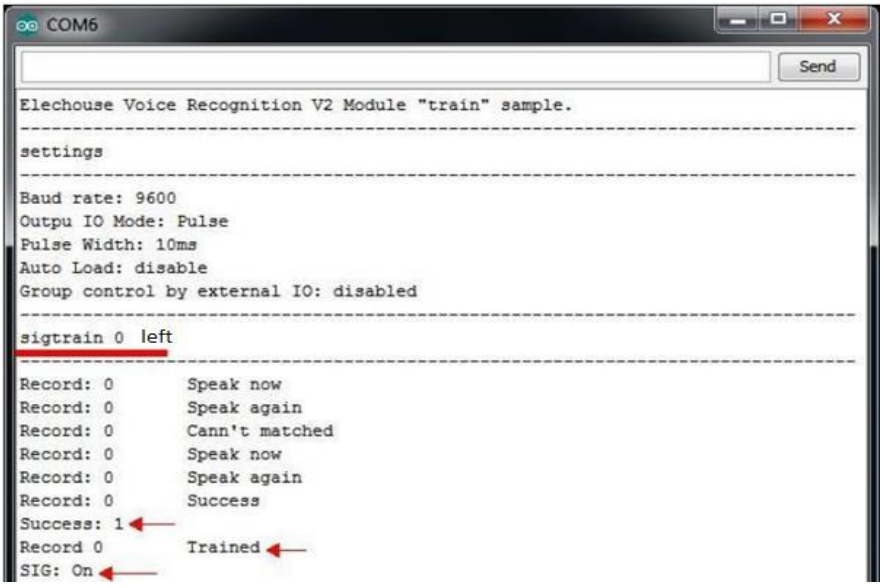

Fig.9: Training of word "left" in the arduino software

g) Train another record. Send sigtrain 1 right. Command to train record 1 with signature "right". Choose the required words to train (it can be any word, meaningful word recommended, may be 'right' here)
h) Send load 0 1 command to load voice. And say your word to see if the Voice Recognition Module can recognize your words.

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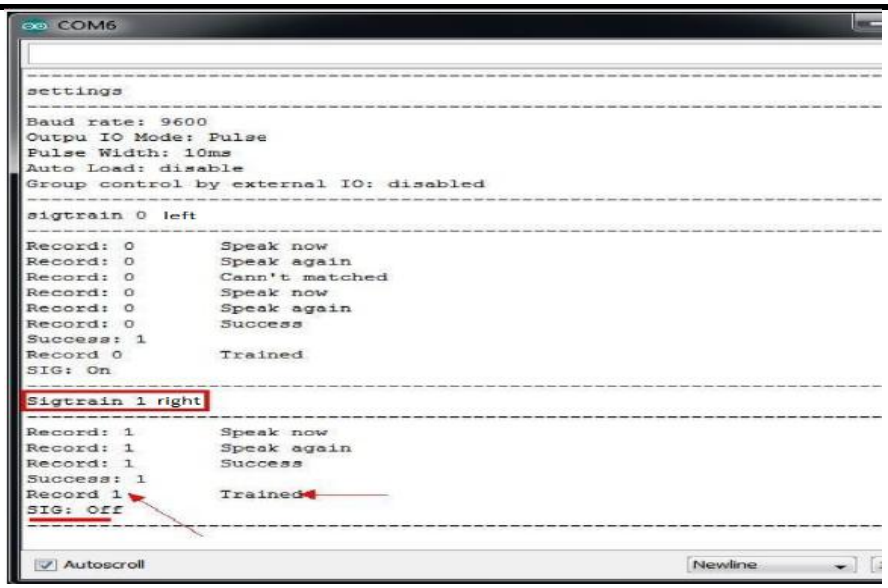

Fig. 10: training of the word "right"

E. Testing Recognition and Fuzzy Rules Logic

Repeat a trained word into the microphone. the word and its number should be displayed on the monitor display.

For instance, if the word "right" was trained as word number1, saying the word "right" into the microphone will cause the number 1 and the word itself to be displayed.

Based on the recognized command from VR3 four signals are to be sent to the drive from transmitter arduino microcontroller. And the overall membership of the neuro-fuzzy inference system will consist of five rules that control the movement of the motors as follows:

If volt in bin1 is > 100 and volt in bin2 is > 100 and volt in bin3 is > 100 and volt in bin4 is < 100, then a digital signal will be sent to turn on the left motor.

If volt in bin1 is > 100 and volt in bin2 is > 100 and volt in bin3 is < 100 and volt in bin4 is > 100, then a digital signal will be sent to turn on the right motor.

If volt in bin1 is > 100 and volt in bin2 is < 100 and volt in bin3 is > 100 and volt in bin4 is > 100, then a digital signal will be sent to turn on both motors backwardly.

If volt in bin1 is < 100 and volt in bin2 is > 100 and volt in bin3 is > 100 and volt in bin4 is > 100, then a digital signal will be sent to turn on both motors forwardly.

If volt in bin1 is < 100 and volt in bin2 is < 100 and volt in bin3 is < 100 and volt in bin4 is < 100, then a digital signal will be sent to turn off the right and left motor.

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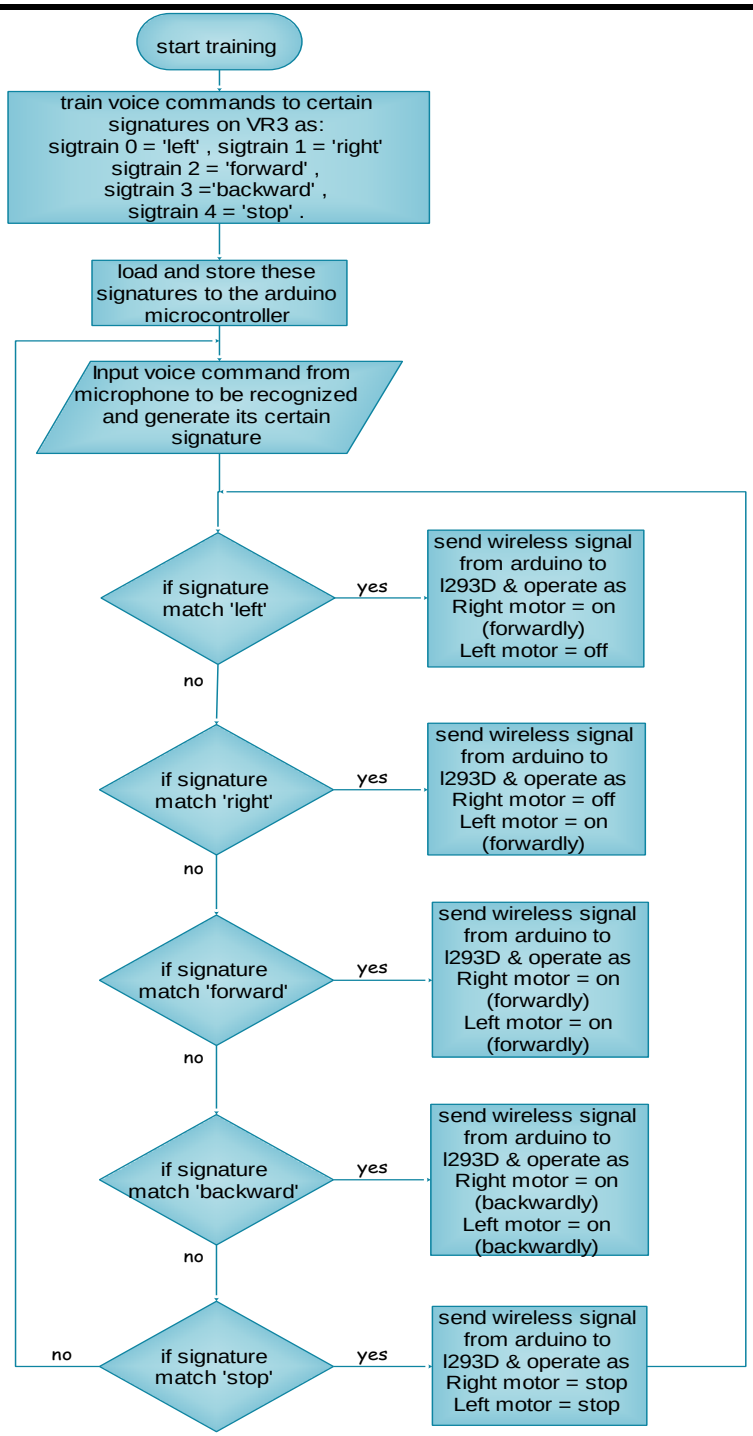

Fig.11: flow chart of the system

Table 2 below shows the used command in our robotic car training and the action that should result from each one

TABLE II. Robotic Car Controlling Commands

Location No	Train Word	Description
0	Left	Right motor on. Left motor off
1	Right	Right motor off. Left motor on
2	Forward	Both motors on forwardly
3	backward	Both motors on/in back direction
4	stop	Both motors off

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III. DISCUSSION THE NATURE OF THE PROBLEMS:

1. Analyzing The Problem:

Speech recognition is the process of finding an interpretation of a spoken utterance; typically, this means finding the sequence of words that were spoken. This involves preprocessing the acoustic signals to parameterize it in a more usable and useful form. The input signal must be matched against a stored pattern and then makes a decision of accepting or rejecting a match. No two utterances of the same word or sentence are likely to give rise to the same digital signal. This obvious point not only underlies the difficulty in speech recognition but also means that we be able to extract more than just a sequence of words from the signal.

The different types of problems we faced in our system have been enumerated below:

1) Differences in the voices of different people the voice of a man differs from the voice of a woman that again differs from the voice of a child. Different speakers have different vocal tracts and source physiology. Electrically speaking, the difference is in frequency. Women and children tend to speak at higher frequencies from that of men.

2) Differences in the loudness of spoken words. No two persons speak with the same loudness. One person will constantly go on speaking in a loud manner while another person will speak in a light tone. Even if the same person speaks the same word on two different instants, there is no guarantee that he will speak the word with the same loudness at the different instants. The problem of loudness also depends on the distance the microphone is held from the user's mouth. Electrically speaking, the problem of difference is reflected in the amplitude of the generated digital signal.

3) Differences in the time Even if the same person speaks the same word at two different instants of time, there is no guarantee that he will speak exactly similarly on both the occasions. Electrically speaking there is a problem of difference in time i.e. indirectly frequency.

4) Problem due to noise: The robot will have to face many problems, when trying to imitate the ability of humans hearing. The audio range of frequencies varies from 20 Hz to 20 kHz. Some external noises have frequencies that may be within this audio range. These noises pose a problem since they cannot be filtered out.

5) Power supply Another important problem which needed to be solved was to provide sufficient current and stable voltage to entire assembly fourth affiliation).

2. Solutions of The Problems

After analyzing the problems, we come out with the solutions which are listed below.

A. Amplitude Variation

Amplitude variation of the electrical signal output of microphone may occur mainly due to:

a) Variation of distance between sound source and the transducer.

b) Variation of strength of sound generated by source.

To recognize a spoken word, it does not matter whether it has been spoken loudly or less loudly. This is because characteristic features of a word spoken lies in its frequency & not in its loudness (amplitude). Thus, at a certain stage this amplitude information is suitably normalized.

B. Recognition of a word

If same word is spoken two times at different time instants, they sound similar to us; question arises what is the similarity in-between them? It is important to note that it does not matter whether one of spoken word was of different loudness than the other. The difference lies in frequency. Hence, any large frequency variation would cause the system not to recognize the word, so its better if the speaker try to imitate the same frequency of that used in training process. In speaker independent type of system, some logic can be implemented to take care of frequency variation. A small frequency variation i.e. features variation within tolerable limits is considered to be acceptable [2].

C. Noise

Along with the sound source of the speech the other stray sounds also are picked up by the microphone, thus degrading the information contained in the signal by using the system in appropriate quit environment.

D. Power supply

As mentioned early one of the important problems which needed to be solved was to provide sufficient current and voltage to entire assembly when interfered together specially the receiver part of the system. Since the current drawn from supply was so much that a 9V battery could not last for a longer period, we used a rechargeable power bank on the receiver circuit and used direct power supply on the sender circuit.

E. Applications

We believe such a system would find wide variety of applications. Because menu driven systems such as e-mail readers, household appliances like washing machines, microwave ovens, and pagers and mobiles etc. will become voice controlled in future

1) The robot is useful in places where humans find it difficult to reach but human voice reaches. E.g. in a small pipeline, in a fire-situations, in highly toxic areas.

2) It can be used to bring and place small objects.

3) Speech and voice recognition security systems.

4) The same system components can be widened and installed in a wheelchair of disabled people which

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make their movement much easier when controlled by voice command.

IV. CONCLUSION

The goals of the study are accomplished successfully. A circuit was constructed around the AD-VR3 module and interfaced with arduino microcontroller to creating a stand-alone model of speech recognition based on neuro-fuzzy system.

The system performance was measured through various experiments and determined to perform with a excellent recognition accuracy for a clear noiseless commands set.

The recognition can further be improved by increasing the recording and training environment.

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Isolation of a Gram Negative Fish Pathogenfrom Moroccan Rainbow Trout Hatcheryin Winter and its Classical Characterization

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***Abstract*—** *Salmonidaquaculture represents one of the most important fish groups in the aquaculture industry (FAO, 2016). However, the success and sustainability of salmonid aquaculture largely depend on disease control. Although Rainbow trout is relatively sensitive to diseases, several bacterial, viral and parasitic diseases have been reported.*

However, only opportunistic pathogens whose infectivity is expressed by a decline in the fish conditions and of its natural defenses, linked to disturbances of the environment or livestock practices. Livestock is the most favorable context for the development of bacterial pathologies, that's why we have too many bacterial pathogenic species for fish; the most serious infections in our latitudes are Aeromonadaceae, Vibrionaceae, Enterobacteriaceae and Flavobacteriaceae (Noga 1996, Austin and Austin 1999, Woo and Bruno 1999).

Moroccan aquaculture has undergone a rapid development and expansion over the last decade, to this end, Rainbow trout (OnchorhyncusMykiss) have been maintained at AinAghbal Fish farm – Azrou-Morocco; for production, livestock and transformation activity and also for commercialization.

The most important bacterial freshwater pathogen affecting salmonid livestock in fish farms in Morocco is the cold-water disease as a result of affection by Flavobactriumpsychrophilum bacteria.

Our study aimed on approving the presence of this bacterium and to characterize it biochemically, enzymatically and also physiologically.

Keywords*— *Moroccan aquaculture, Rainbow trout, Flavobactriumpsychrophilum, bacterial pathologies, freshwater, characterization.

I. INTRODUCTION

The cumulative mortality rates due to bacterial infections were higher, fry syndrome, spine deformities, darkening of skin color, and hemorrhages were observed in larvae after hatching, so, the present study was undertaken to investigate the presence of pathogenic bacteria in eggs in order to control the effects of bacterial contamination on the performance of the early stages of trout grown in hatchery systems, and also in juvenile stage. Bacterial, fungal, viral and parasitic diseases have been commonly reported from both wild and reared aquatic systems all over the world (Noga 1996) and they presentedcrucial considerations for trout production in hatchery systems. Infections result in a high fish morbidity and/or mortality, marketing problems, and associated economic losses (Austin and Austin 2007).

Although Rainbow trout is relatively sensitive to diseases, several bacterial, viral and parasitic diseases have been reported worldwide including Yersiniosis, Furunculosis, Columnaris disease, BCWD and RTFS.

The genus Flavobacterium was described for the first time in (1923) by Bergey et al.The taxonomic position of this bacterium has changed considerably over the past years, and ithas been variously designated as *Flexibactersychrophilus*and *Cytophagapsychrophila*, the most recent positioning being *Flavobacterium psychrophilum* (Bernardet et al. 1996).

Flavobacteium psychrophilum witch is a widely distributed Gram negative bacterium, belonging to this genus,produces an acute septicaemic infection in juveniles and named rainbow trout fry syndrome (RTFS) while in adult salmonids the pathogen commonly produces extensive necrotic lesions and named bacterial cold water disease(BCWD)(Cipriano and Holt 2005), it is

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of a serious importance due to the high fish mortality rate caused by his pathogen and the costs associated with its chemical treatment (Nilsen et al. 2011)

Juvenile fish are primarily affected, with high mortalities in fry. It has been recognized as a worldwide occurring pathogen in freshwater aquaculture, causing substantial economic losses (Madetoja et al.2002). In very young fish, the disease can also be associated with nervous manifestations such as erratic swimming behavior and spiral movements, (Holt et al. 1993).Although outbreaks are more prevalent in winter and spring when water temperature is below 10°C (Nematollahiet al. 2003).

In Morocco, rainbow trout, Onchorynchusmykiss (Walbaum), farming is an important industry with 500 tons produced per year, and infection by F. psychrophilum has been observed in freshwater farms since 2001.

InAinaghbal fish farm, Azrou-Morocco the site of this study the eggs and young fish are incubated in filtered spring water, although this, high mortalities were documented in rainbow trout (Oncorhynchusmykiss) due to systemic bacterial cold-water disease (BCWD) in 2001.During the first month of rearing, losses of up to 72 % were observed in some batches of fish. All of these fish developed systemic BCWD within 1 to 4 wk after hatching. But there is no epidemiological study on F. psychrophilum in Morocco, despite the importance of CWD/ RTFS in local rainbow trout fisheries.

Diseases caused by this pathogen have recently become one of the most crucial problems affecting salmonid culture world wild,the disease occurs in most areas of the world including USA, Canada, Chile, Australia, Japan, Korea and several European countries (Walker and Winton 2010),

According Bernarde and Browman (2006), the adherence to the gills and intestine could be the initial stage of infection by *Flavobacterium psychrofilum*, Nematollahi et al in (2003), give this ability an increasing importance because it is a characteristic of virulent strains, but little is known about the pathogenesis of *Flavobacterium psychrophilum*.

The aim of this study was to characterize F. psychrophilum isolates obtained from CWD/ RTFS outbreaks in Morocco using biochemical, enzymatic and antimicrobial susceptibility testing.

Material and Methods

Fertilized eggs of OnchorynkusMykiss are imported from France. Samples of diseased Rainbow trout, fertilized eggs and fry were collected from a fish hatchery in Azrou – Morocco in 2015 winter. Fries had a body weight between 20 and 100g.

At the time of sampling, the water temperature was noted as well as physicochemical parameters. Sampling and water temperature were the only identifiable stress factors preceding evidence of disease (Elliott 1981). For the samples 15g of fertilized eggs and a total of 30 fries with and without eroded fins and/or tails were examined and taken for microbiological analyses.

The identification of *Fl. psychrophilum* and laboratory diagnosis of the disease it causes istraditionally based on conventional culture on agar media and taxonomic analysis (Kritihi et al. 2017).

a. Isolation and identification

Water samples were collected in sterile flacons, fertilized eggs and fish samples were taken separately from the hatchery in sterilized sampling plastic bags, classified by age, back number and the presence of lesions or damages, they were stored in 4°C and transported directly to the laboratory.

In the laboratory, water samples are filtered in sterile conditions and the filters were putted in petri dishes.

For eggs 5g were measured and made for centrifugation in centrifugation tubes containing 5ml of Cytophaga medium for 4000tr/15min, before been inoculated in 10 ml tubes containing cytophaga brought, the tubes were placed on the incubator at 14°C for up to 10 days.

Fish samples taken from internal organs (liver or kidney), damaged gill tissue and, if present, skin lesions of fries body surface were streaked onto Cytophaga agar plates using sterile loops and aseptic techniques then they were directly streaked onto Cytophaga agar plates witch composed by (0.5 g/l tryptone, 0.5 g/l yeast extract, 0.2 g/l sodium acetate, 0.2g/l beef extract with 9 g/l agar, pH 7.2-7.4) (Anacker and Ordal. 1959) and incubated at 14°C for up to 10 days.

Eroded fins and tails were sampled by scraping the margin of the lesion with a sterile scalpel blade; the collected material was then inoculated onto Cytophaga agar plates and incubated at 15°C for up to 10 days.

After incubation period, yellow-pigmented colonies were chosen and restreaked on the Cytophaga agar to obtain pure isolates.

b. Macroscopic and microscopic identification

After isolation and purification of the suspected colonies a macroscopic characterization of each once was made for confirmation using a magnifying glass.

For the Gram straining the classical method had been followed using a young bacterial culture.

For the motility test a drop of strain's young culture is placed on a coverslip that is encircled with petroleum jelly (or any other sticky material). The coverslip and drop are then inverted over the well of a depression slide. The drop hangs from the coverslip, and the petroleum

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jelly forms a seal that prevents evaporation. Finally the coverslip is placed on a microscope slide, often is used in dark illumination to observe the motility of bacteria Koch (1878).

c. Biochemical characterization

Catalase activity was determined by the coverslip method of Taylor andAchanzar (1972) and by adding several drops of 3 % (v/v); oxidase reaction was determined by DrySlide Oxidase (Difco Laboratories, Detroit, MI, USA). Other biochemical tests were realized using the API 20E and 20NE system ®(BioMereuxVitek Hazelwood, MO). Congo red reaction was tested by the method of McCurdy (1969) using 0.01mg/ml of a congo red solution.

Colonies have been tested for Gram staining, presence of flexirubin type pigment, cytochrome oxidase activity, catalase production and motility (Lorenzen et al. 1997). Strains witch were found to be Gram negative rod shaped, adopting gliding motility, producers of flexirubin type pigment were taken for identification and further characterization.

d. Enzymatic characterization

The ability to hydrolyze elastin and gelatin was studied by streaking each isolate on Cytophaga agar supplemented with 0.1% and 3% (w/v) of elastin and gelatin respectively (Krister and Wiklund. 2015); for the chitin and starch hydrolyze ability 5% of each element was add to the CA. For casein 20 ml of sterilized skimmed milk was add to the CA After incubation at 15 °C for 7 days, a positive reaction was indicated by a clear zone in the surrounding turbid agar medium around the inoculum.

e. Antibiotic susceptibility test

Antibiotic susceptibility test was performed to determine the antibiotic resistant profiles of the isolates using the KirbyBauer disc diffusion method (Bauer et al. 1966). Antibiotic discs (Oxoid, England) of neomycin (30 µg), oxytetracycline (30 µg), chloramphenicol, (30 µg), amoxicillin (10 µg), ampicillin (10 µg), were used for determining the resistance profiles. Briefly, Cytophaga Broth (CB) was used to prepare bacterial suspensions. The turbidity of suspensions was adjusted as Mac Farland 0.5 and 100 µl of aliquots were spread over CytophagaAgar surface. Antibiotic disks were placed on the surface of the inoculated agar plates and then they were incubated at 14°C for 7-10 days. After incubationperiod, the antibiotic inhibition zone diameters were measured, evaluated and noted.

II. RESULTS

A total of 37isolated Gram negative, long and thin bacilli strains were isolated from samples. These isolates were then tested by some biochemical tests such as catalase, cytochrome oxidase, ONPG, H2S andglucides fermentation tests. Only 6 isolates which were found as positive for catalase and weakly positive for cytochrome oxidase, negative for ONPG, H2S Sucreoxidation/fermentation andshowed gliding movement and flexirubin type pigment production were identified as suspicious for being Flavobacteriumspp bacteria, as cited by Nakagawa and Yamasato (1996).

Table.1: Biochemical and Enzymatic characteristics of Flavobactreium psychrophilum strains isolated from Rainbow trout (Onchorhyncusmykiss) in Morocco and other strains from Europe and North America.

	winterisolates						Pacha et al 1986	Bernardet et Kerouault 1989	Lehmann et al 1991	Holt et al 1993
Strains	A1N201	A2N202	A3N203	A4N204	A5N205	A6N209				
Oxidase	P	P	P	P	P	P	N	P	P	N
Catalase	P	P	P	P	P	P	P	P	P	P
Casein	P	P	P	P	P	P	P	P	P	P
Gelatin	P	P	P	P	P	P	P	P	P	P
Chitin	N	N	N	N	N	N	N	N	N	N
Congo red	P	P	P	P	P	P	-	N	N	-
ONPG	N	N	N	N	N	N	-	N	N	-
Lecitin	N	N	N	N	P	N	N	P	P	N
Starch	N	N	N	N	N	N	N	N	N	N
Cit	P	P	P	P	P	P	-	-	-	-
H_2S	N	N	N	N	N	N	N	N	N	N

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Urea	N	N	P	N	N	N	-	-	-	-
Nitrate	N	N	N	N	N	N	N	N	N	N
Sucre O/F	N	N	N	N	N	N	N	N	-	N
G.M	P	P	P	P	P	P	P	P	P	P
Flexirub	P	P	P	P	P	P	-	P	P	P

P: positive character / N: negative character / (-):no data

For the antibiotic resistant profiles of our isolates, all strains were found to be sensitive to oxytetracycline with an inhibition diameter > 8mm and to chloramphenicol with an inhibition diameter > 16mm, but resistant to ampicillin and amoxicillin with a inhibition diameter <2mm for both of them and to neomycin with a inhibition diameter <4mm, disc diameter not include.

Table.2: The antibiotic resistant profiles of the isolates

Strains / ATB	A1N201	A2N202	A3N203	A4N204	A5205	A6209
Néomycine (30µg)	R	R	R	R	R	R
Oxytetracycline (30µg)	S	S	S	S	S	S
Chloramphenicol (30µg)	S	S	S	S	S	S
Amoxiciline (10µg)	R	R	R	R	R	R
Ampiciline (10µg)	R	R	R	R	R	R

III. DISCUSSION

In the current study, we report isolation of Flavobacterium spp from Rainbow trout imported fertilized eggs and fries and from juveniles tanks water.Witch go with the results found by Brown et al, (1997)in their study proving that the causal agent of bacterial coldwaterdisease Flavobacterium psychrophilum istransmitted within salmonid eggs and ovarian fluid, same as *Renibacteriurnsalmonjnarum,* the causal agent of bacterial kidney disease, whichcould survive within salmonid eggs (Evelyn et al. 1984, Barker et al. 1991, Yousif et al. 1994). It is likely that egg transmission is a phenomenon of concern in aquaculture industry.

Data shown in this study might shed light on the potential role of the fertilized eggs importation in spreading Flavobacterium spp infection from an area to another even the difference on climate.

During the last decade, the productivity of the aquaculture industry is much intensified. Currently, it is a major economic activity in many countries (FAO. 2007). Mass production on fish farms can expose fish to stress conditions that can cause infections by pathogens including *Flavobacterium psychrophilum* (Wakabayashi 1991). Bacteria from *flavobacterium* genus are responsible for significant economic losses in salmonid culture (Nematollahi et al. 2003). That has led to increase interest in the rapid and reliable methods for detection and identification of bacterial fish pathogens (Nilsson and Strom 2002). In other side, Michel and al (1999) have reported that in some cases, isolation was not possible from infected tissues due to the presence of viable but non-cultivable cells; this was the case in our study because we got non-separated bacterial culture especially for the affected and eroded fins in fry's samples.

Phenotypically, on the modified Cytophaga agar medium our isolates produced colored colonies varied from bright yellow to orange with 2-3 mm in diameter with thin spreading margins. isolated strains were then identified as *Flavobacterium psychrophilum*spp using conventional techniques, they are Gram-negative, long bacilli, produced flexiruben upon addition of 20% KOH (colonies turned brown orange), motile by gliding, very weakly catalase positive, cytochrome oxidase positive, gelatin test positive, and non-agarolytic.

Bernardet andKerouault (1989) and Holt et al (1993) note that F *psychrophilum* grows best in Shieh's and TYES media which suggests that medium composition is important when testing growth characteristics at the limits of the physiological range for the species, this justified our choice for the first time to work with the TYES medium, in order to limited the study to the isolation of this bacterium.

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For our strains no growth was observed on TSA plates at 15°C or 20°C or in the presence of NaCl concentrations above 1.5% and this is consistent with reports made by Holt et al (1993). Although Bernardet andKerouault(1989) were not able to grow their isolates in this NaCl concentration. The Moroccan isolates showed an optimal growth on 15°C and there was no growth at temperatures above 30°C, same results were found by Bernardet and Kerouault 1989; Lehmann et al. 1991; and Holt et al. 1993.

The phonetic, biochemical and growth characters determined in this study of 6 isolates of Flavobacterium psychrophilum are in good agreement with published data for this taxon (Pacha 1968; Bernardet andKerouault 1989; Lehmann et al. 1991; Holt et al. 1993).

Performing the oxidation and/or fermentation tests using glucose as the only source of carbon revealed that the isolates were negative. They were also not able to use sucrose, starch or glucose in their basal media. Results of BioMerieuxApi 20NE rapid test strip inoculations were consistent with the biochemical reactions of *Flavobacterium psychrophilum* (Cipriano and Holt 2005)

Our isolates have too many different characteristics, besides the sampling origins and seasons, we fond heterogeneity in some biochemical characters, that could be explained by the presence of too many species of *Flavobacterium* bacteria not only one. So to confirm which *Flavobacterium* specie or species are responsible of the huge lost in our hatchery a PCR analysis must be conducted.

Furthermore, it should not be ignored that unconscious use of antibiotics in fish farms may lead to inhibit the bacterial growth for the sensitive species belonging to the banal flora including *Flavobacterium* bacteria. Several studies have been performed to determine the antibiotic resistance profiles of *Flavobacterium* bacteria in various regions all over the world and quite variable profiles have been observed. (Duchaudet al.2018).

The results in the present study also showed that all strains are sensitive to chloramphenicol, some of them to oxytetracycline but they are resistant to ampicillin, amoxicillin and neomycin.

IV. CONCLUSION

In conclusion, we report that bacteria from the *Flavobacterium* genus are isolated from rainbow troutimported fertilized eggs and fries for the first time in a semi-arid country, in North Africa - Morocco, we could identify them biochemically and we still need to identify them by PCR and ARN16S.

Furthermore, the long-term naturel cohabitation between clinically infected and non-infected fries or between the fries and the un-hatched eggs in the same tank or in the same water suggests a potential for the spread of *Flavobacteriumspp* bacteria. Because it is difficult to assess the impact of the water transmission of the infection and its subsequent effects on salmonid fish population in the fish farm in Azou-Morocco. Further work is required to characterize the virulence determinants of the Moroccan isolates and compare them with other virulent strains of *Flavobacterium psychrophilum* from other geographic regions.

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Production Operations Management of Broom Reed Industry in the Philippines

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***Abstract*—** *This study utilized the descriptive method of research. Conducted in municipality of San Antonio province of Nueva Ecija, Philippines. There were 58 participants in the study who are the broom producers in the locality. Structured questionnaire was prepared and served as the main instrument of the study facilitated by an interview of the researchers.*

Majority of the producers are 41-50 years of age, male, married and elementary graduate only. Moreover, majority of their enterprises are single proprietorship and operating for more than 11 years. All broom reed enterprises are classified as micro enterprises having an asset of less than Php 3,000,000 and having employees of not more than 10.

As to the production process, it was identified that the product of all producers are purely manual. There were no advanced equipment that use electricity and computer in operation. There are various simple tools in the production such as clap or locally called "pang-ipit". Surprisingly, all producers are using their own houses only as the place for production meaning no producer invested in a separate area or building for production. As to the procurement of the raw materials, 86% of the producers took their main raw materials within the municipality and some other supplies for production.

Based on the result of the study, the producers can produce 31-60 pieces during peak season and 1-15 pieced per day during normal or off-season. Furthermore, the production is decentralized in 98% of the producers. Indicating that producers split their production processes into various people.

Majority of the producers do not have adequate safety and security measures. They do not have fire extinguishers in the production area considering that the dried tiger grass as the main raw materials is flammable though all of them prohibit smoking in the area. All producers have their own quality inspection of the final output. Quality inspection is usually done by the owner or other member of the family designated also as supervisor. Relative to this, 40% of the producers normally do not have defective units in the production. Majority of the producers have their own waste disposal method through burning of some excess and unusable supplies and materials.

Based on the survey-interview conducted by the researchers, the common problems encountered by the producers are having lack of funds of capital for the production and further investments. They also feel that there is lack of assistance and attention coming from the local government units through different programs, relevant policies and subsidies.

The researchers were able to arrive to a One-Year Strategic Action Plan for the industry. The plan was presented to the local government unit for appropriate actions. Significant programs included are giving technical assistance to the producers in improving their practices in production. Modernization of the production process was proposed to increase the number of the units produced and improve the quality of the outputs. Also, organization of the producers into a cooperative will help them to improve their ability to market and promote their products not only in the municipality but also in the country and eventually internationally. The local government units can also implement interventions by; (1) finding possible financing institutions for the producers, (2) improving the promotion of the industry through different activities that can attract investors and tourists, (3) giving subsidies in the raw materials, (4) expansion of the production area of the tiger grass in the municipality to increase the supply thus will reduce the cost of the raw materials of the producers, and (5) giving tax incentives for the producers.

The researchers also recommend further studies relative to this to understand deeper the industry and identify other problems to be resolved specially in the areas of marketing and organization management. Personal and family values of the producers and employees can also be studied to determine the possible relationship of these factors to the performance of the broom reed enterprises.

***Keywords*— Broom Reed, Local Industry in Philippines, Production Operations Management.**

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I. INTRODUCTION

In the Philippines, the traditional broom called broom reed, "walistambo" in the local language, serves as the most common cleaning tool in the country for a long time. This tool may be simple yet important consideration in every household. This broom reed is made of an indigenous and wild grass called tiger grass (thysaolaena maxima), locally known as "tambo" in the Philippine language. As hedgegrow, the species helped control soil erosion while helping conserve water. As raw material for soft broom production, it provided potential livelihood to upland farmers due to increasing demand for tiger grass-made brooms (PCAARD, 2010).

This wild grass grows as high as 2.5 meters and can thrive at low to medium elevations but can grow faster in higher elevation. Normally, it grows in open areas particularly in logged-over areas, mountain slopes and ravines.

Tiger grass is being propagated by upland farmers in some parts of Benguet Province. Likewise, it grows abundantly in the highland areas of Ifugao and Mt. Province. It can be grown in many types of soils such as clay, sandy clay loam and sandy loam.

In the Philippines, the production of broom reed serves as a main livelihood for many households especially in the municipality of San Antonio province of Nueva Ecija. In fact, the municipality is celebrating an annual festival for walistambo (local name of broom reed) through street dance competition and trade fair. The local government unit had been promoting the commercialization of tiger grass production to boost the broom industry and enhance the identity and pride of the municipality. This project was implemented under the Community Livelihood Assistance Special Program (CLASP) in partnership with local government units and other people's organization (Pinoy Entrepreneur, 2011).

Since the production of broom reed is the main livelihood in the municipality and the authors can see potential for business operation development, the researchers conducted this study to assess the current production operations management practices of broom reed producers in the locality. Also, the study determined the current challenges encountered by the producers to determine also the possible proposed programs for the Development Plan of the industry.

OBJECTIVES OF THE STUDY

This study explored the production operations management of broom reed industry in the Philippines. Specifically, this study sought to identify the following:

1. Profile of the Producers;
2. Profile of the Enterprises;
3. Production Management Practices;
4. Internal And External Problems Encountered by the Producers; and
5. Programs for the Strategic Action Plan for the Industry.

II. METHODOLOGY

The descriptive design was utilized to explore the production operations management of 58 broom reed enterprises from the different barangays in San Antonio, Nueva Ecija, Philippines. The researchers used two probability samplings to identify the respondents, specifically cluster random sampling to identify the barangays to include then stratified random sampling. Structured questionnaire served as the main instrument of the study facilitated with interviews to the respondents.

III. RESULTS AND DISCUSSION

3.1. Profile of the Owner

Table.1: Distribution of Respondents According to Age

Age	Frequency	Percentage
Below 20 years old	2	3%
21–30 years old	8	14%
31–40 years old	13	23%
41–50 years old	24	41%
51–60 years old	9	16%
61 years and above	2	3%
TOTAL	**58**	**100%**

The table above shows that majority of the respondents is in the age bracket of 41-50 years old. Whereas, 23% are in the age bracket of 31-40 years old, 16% are belong to 51-60 years old, 14% are in 21-30 years old.

Most of the respondents engaged in the manufacturing of walis–tambo belonged to the generation of baby boomers where these were people who wanted to build a perfect career and stability in life. Furthermore, for them experience matters and that came with age.

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Table.2: Distribution of Respondents According to Gender

Gender	Frequency	Percentage
Male	49	84%
Female	9	16%
TOTAL	**58**	**100%**

The table above shows that 49 out of 58 respondents were male which was higher than the total female respondents. This means that more entrepreneurs who established their own business were men with chances of 84%.

The result also shows that most of the people who wanted to engage in such businesses were men. It can be interpreted as that men have more specialization in dealing with the works required in managing this kind of industry.

Table.3: Distribution of Respondents According to Marital Status

Status	Frequency	Percentage
Single	10	17%
Married	48	83%
TOTAL	**58**	**100%**

The Table 3 shows the marital status of the respondents. The result shows that majority of the respondents are married having a percentage of 83% while the remaining 17% are single.

Table.4: Distribution of Respondents According to Educational Attainment

Educational Background	Frequency	Percentage
Elementary graduate	32	55%
High School Graduate	17	30%
College Undergraduate	6	10%
College Graduate	3	5%
TOTAL	**58**	**100%**

The table above indicates the highest level of education the broom reed enterprise owners had obtained. Majority of the respondents who have been interviewed were elementary graduates with a frequency of 32%, and with a percentage of 55%. This implies that engaging in the industry does not require any educational qualifications and particular college degree.

3.2. Profile of the Enterprise

Table.5: Distribution of Respondents According to Business Ownership

Type of Ownership	Frequency	Percentage
Single Proprietorship	47	81%
Partnership	11	19%
TOTAL	**58**	**100%**

Table 5 shows the frequency and percentage of the type of ownership of broom industry in San Antonio. Among the 58 respondents, 81% were single proprietorship and 19% were partnership. The result shows that most of the broom producers were single proprietorship where the number of owner was only one (1). It was for the reason that single proprietorship was the easiest to organize.

Table.6: Distribution of Respondents According to Years of Existence

Years of Existence	Frequency	Percentage
1-5 years	2	3%
6-10 years	5	9%
11 years above	51	88%
TOTAL	**58**	**100%**

Table 6 shows the frequency and percentage of the years of existence of broom industry in San Antonio. Among the 58 respondents, 88% have been operating for more than 11 years, nine percent (9%) are already existing from 6-10 years in the industry and three percent (3%) operating for 1–5 year. It indicates that most of the broom reed manufacturers were operating for more than eleven years and expecting to operate more than the result of the study.

Table.7: Distribution of Respondents According to Number of Workers (Peak Season)

Peak Season	Frequency	Percentage
1-5	41	71%
6-10	15	26%
11-15	2	3%
TOTAL	**58**	**100%**

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Table 7 shows the number of workers during peak season. Seventy-one percent (71%) of the producers employs 1-5 workers, 26% employs 6-10 workers and three percent (3%) employs 11-15 workers. Result shows that most of the broom reed producers employed 1-5 workers during peak season where the demand on the product was higher than the normal season.

Table.8: Distribution of Respondents According to Number of Workers (Off- Season)

Off Season	Frequency	Percentage
Less than 5	50	86%
6-10	8	14%
TOTAl	**58**	100%

Table 8 shows the number of workers during off-season. Eighty-six percent (86%) of the producers employed less than 5 workers, and 14% employ 6-10 workers. Furthermore, the result shows that 86% of the broom reed producers employing less than 5 workers during off-season where the demand on the product is lower than the normal.

Table.9: Distribution of Respondents According to Size of the Enterprise

Size of the Enterprise	Frequency	Percentage
Micro Enterprises (Assets of Less than Php 3,000,000)	58	100%
Small Enterprises (Assets of Php 3,000,001 to Php 15,000,000)	0	0
Medium Enterprises (Assets of Php 15,000,001 to Php 100,000,000)	0	0
Large Enterprises (More than Php 100,000,000)	0	0
TOTAL	**58**	**100%**

The Table 9 shows the size of the broom reed enterprises according to the size. The classification used was based on the Republic Act 9501 or the Magna Carta for Micro, Small and Medium Enterprises of the Philippines.

The table shows the size of the enterprise as of August 2017 where all of the respondents or owner was belong to Micro Enterprises which the total of the assets were less than Php 3,000,000.00.

3.3. Production and Operations Management Practices

Table.10: Methods of Production

Methods of Production	Frequency	Percentage
Purely Manual	58	100%
Partially Mechanized	0	0
Fully Mechanized	0	0
Others	0	0
TOTAL	58	100%

The above table represents the methods of production used by broom reed enterprises in the locality.It shows that the method of production of broom reed producers was purely manual, they are not using any kind of electronic machines or tools to produce their outputs.

Table.11: Tools Used in Production

Tools Used	Frequency	Percentage
Balibol	22	38%
Dangat	28	48%
Panuot	55	95%
Pang-ipit	58	100%
Others	0	0
TOTAL	**58**	**100%**

The table 11 shows the tools used in making broom reed. All the respondents were using pang-ipit, 95% were using panuot, 48% used dangat and only 38% usedbalibol. This means that pang-ipit was the most commonly used tool of all the makers of broom reed.

Table.12: Place of Production

Place of Production	Frequency	Percentage
Owner's home	58	100%
Separate owned production building	0	0
Leased space or building	0	0
Others	0	0
TOTAL	**58**	**100%**

The table below shows the place of production being utilized by the producers. All producersThe table 12 shows the place of production in producing broom reed. All of the producers used their home as a place of production. All of the owners used their vacant space in their home like garage and terrace to produce broom reed.

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Table.13: Procurement of Raw Materials Panicles

Panicles	Frequency	Percentage
Within San Antonio	50	86%
Within the Province	0	0
Within the Region	0	0
Outside the Region	8	14%
TOTAL	**58**	**100%**

The table above shows that out of 58 respondents, 86% of them took their main raw materials in producing broom reed which was panicles from San Antonio, while the remaining fourteen 14% came from other place like Baguio and Bicol.

Table.14: Procurement of Raw materials Bikal/Tabla

Bikal/Tabla	Frequency	Percentage
Within San Antonio	21	36%
Within the Province (except San Antonio)	0	0
Within the Region	12	12%
Metro Manila	1	2%
Others	29	50%
Total	**58**	**100%**

The table above shows that out of 58 respondents, 36% of them took their raw materials called bikal/tabla from San Antonio, six percent (6%) came from Bulacan and the another six percent (6%) came from Bataan, the other two percent (2%) came from Metro Manila and Bicol while the remaining 50% were from other places. It means that majority of raw materials called Bikal/Tabla came from other places like Cavite and Laguna.

Table.15: Procurement of Raw Materials Sticker

Plastic/Straw	*Frequency*	*Percentage*
Within San Antonio	*55*	*95%*
Within the Province	*0*	*0*
Within the Region	*0*	*0*
Metro Manila	*3*	*5%*
Others	*0*	*0*
TOTAL	*58*	*100%*

Table 15 shows the procurement of sticker as a raw material in making broom reed. Ninety–five percent (95%) get stickers in San Antonio and the remaining five percent (5%) acquired in Metro Manila. The result shows that most of the producers obtained stickers in San Antonio.

Table.16: Procurement of Raw Materials Plastic/Straw

Plastic/Straw	Frequency	Percentage
Within San Antonio	55	95%
Within the Province	0	0
Within the Region	0	0
Metro Manila	3	5%
Others	0	0
TOTAL	58	100%

The table 16 shows that out of 58 respondents, majority of them that has a frequency of 55 and with a rate of 95%, producers took the raw materials called plastic or straw within San Antonio, while the remaining five percent (5%) were came from Metro Manila. So it means that majority of the respondents obtained their raw materials called plastic in San Antonio.

Table.17: Number of Brooms Produced per Day (Peak Season)

Peak Season	Frequency	Percentage
1-30 pieces	22	38%
31-60 pieces	25	43%
61-90 pieces	1	2%
91-120 pieces	0	0
121-150 pieces	10	17%
TOTAL	**58**	**100%**

This table shows the number of broom produced per day during peak season. Forty-three percent (43%) of the producers produced 31-60 pieces per day, 36% produced 1-30 pieces, and 17% produced 121-150 pieces. It implies that most of the producers, produced 31-60 pieces a day, it was good enough to achieve the desired demand during peak season.

Table.18: Number of Brooms Produced per Day (Off-Season)

Number of Production Output	Frequency	Percentage
1-15 pieces	33	57%
16-30 pieces	21	36%
31-45 pieces	0	0

https://dx.doi.org/10.22161/ijaems.5.1.9 *ISSN: 2454-1311*

46-60 pieces	0	0
61-75 pieces	1	2%
76-90 pieces	2	3%
91-105 pieces	0	0
106 pieces and above	1	2%
TOTAL	**58**	**100%**

This table shows the number of broom produced per day during off season. Forty-three percent (43%) of the producers produced 31-45 pieces per day, 36% produces 1-30 pieces and 17% produces 121-150 pieces. It indicates that most of broom reed producers produced 31-60 pieces; it was enough to fulfil the demand during off season.

Table.19: Production Utilization

Production Utilization	Frequency	Percentage
Centralized	1	2%
Decentralized	57	98%
TOTAL	58	100%

Table 19 describes the production utilization of broom reed producers. Ninety-eight percent (98%) of them have decentralized production while the remaining two percent (2%) have centralized production.

The result shows that the production of broom reed producers was decentralized where the managerial approach of dispersion of authority throughout to enable the workers at all levels play assigned roles optimally (Office Management and Essential Business Correspondence).

Table.20: Security and Safety Measures

Security and Safety measures	Frequency	Percentage
Presence of fire extinguishers	2	3%
Wearing of masks in the production area	3	5%
First aid kit	1	2%
Security guards	0	0
No smoking policy	52	90%
TOTAL	**58**	**100%**

This table shows the frequency and percentage of security and safety measures implemented by broom reed producers. Ninety percent (90%) have no smoking policy, five percent (5%) implemented wearing of mask in the production area, three percent (3%) have presence of fire extinguishers and two percent (2%) have first aid kit. The result shows that most of the broom producers have "No Smoking Policy", which was better to this kind of business because most of the raw materials used in production were prone to fire.

Table.21: Standardization of Output/Product

Standard of Output/Product	Frequency	Percentage
The product has standards	58	100%
The product has no standards	0	0
TOTAL	58	100%

This table represents the standardization of output/product of broom reed producers where all of the producers have standards to their products which was better to all business not even like this kind of business but of course to other businesses, because for the researchers, standard or quality of the product was the image of the business, and this was the way on how to satisfy the needs and wants of customers.

Table.22: Average Spoiled and Defective Brooms per Day

Average Spoiled And Defective Brooms Per Day	Frequency	Percentage
None	23	40%
1-5 pieces	20	34%
6-10 pieces	4	7%
11-15 pieces	8	14%
16-20 pieces	3	5%
TOTAL	**58**	**100%**

This table shows the number of average and spoiled defective brooms per day. Forty percent (40%) had no defective units, 34% have 1-4 pieces, 14% had 11-15 pieces, seven percent (7%) have 6-10 pieces and five percent (5%) have 16-20 pieces of defective units per day. It indicated that majority of the producers which was 40% of broom producers have no spoiled and defective output/product produced per day which was better because it means that in this kind of business, every materials used have importance.

Table.23: Waste Management

Waste Management	Frequency	Percentage

https://dx.doi.org/10.22161/ijaems.5.1.9 *ISSN: 2454-1311*

Have own waste disposal method	55	95%
Waste collected by garbage collector	3	5%
TOTAL	**58**	**100%**

This table shows the waste management of broom reed producers. Ninety-five percent (95%) of them have their own waste disposal method and five percent (5%) have their waste collected by garbage collector. This indicates that 95% of the broom reed producers have their own waste disposal method which was enough to prove that the respondents were knowledgeable on how to contribute to the Clean and Green Program.

3.4. Problems Encountered in the Operation

The following results are the identified internal and external problems in the operation of the broom reed enterprises. Problems ware rated using likert-scale whereas one is the lowest and five is the highest.

Table.24: Internal Problems Encountered

Internal Problems Encountered	Weighted Mean	Verbal Interpretation
1. Lack of funds	4.63	Always
2. Lack of strategic marketing plan	3.54	Very Often
3. Lack of upgraded equipments and machines	2.82	Often
4. Lack of management expertise	3.23	Often
5. Values and attitude of the workers	1.61	Sometimes
6. Limited supply	2.27	Sometimes
7. Small production area	3.25	Often
8. Lack of trained workers	2.02	Sometimes
9. High rate of defective or spoiled output	1.43	Never
10.Waste disposal and management	1.34	Never

Table 24 shows the internal problems encountered by broom reed producers. The respondents always encountered lack of funds. They also encountered lack of management expertise very often. They often lack of strategic marketing plan and upgraded equipments and machines as well as the small production area. Sometimes, they encountered limited supply due to limited funds. Furthermore, they never encountered problems about the values and attitude of the workers, lack of trained workers, high rate of defective or spoiled output and waste disposal and management.

This means that broom reed producers always encountered internal problem such as lack of funds which has a huge impact to the business since funds was one of the major reasons why businesses exist.

Table.25: External Problems Encountered

External Problems Encountered	Weighted Mean	Verbal Interpretation
1. Seasonal demand	2.82	Often
2. Lack of assistance, programs and policies from the LGU	4.55	Always
3. Unstable prices of raw materials	3.48	Often
4. High level of competition	3.54	Very Often
5. Predatory pricing by competitors	2.96	Often
6. Fragmented market	2.95	Often
7. Power interruptions	1.11	Never
8. Limited supplies of raw materials during peak season	2.32	Sometimes
9. Lack of manpower especially during peak season	3.36	Often
10.Absence of broom producers cooperatives or organizations	3.68	Very Often

Table 25 shows the external problems encountered by broom reed producers. The respondents always encountered problems like lack of assistance, programs, and policies from the Local Government Unit (LGU). The respondents very often encountered high level of competition as well as lack of manpower especially during peak season. They often run into seasonal demand, unstable prices of raw materials, predatory pricing by competitors, fragmented market and absence of broom producers cooperatives or organizations. Sometimes, they encountered limited supplies of raw materials during peak season. Moreover, they never encountered problems with power interruptions.

The result shows that broom reed producers always encountered external problem such as lack of assistance,

https://dx.doi.org/10.22161/ijaems.5.1.9 ISSN: 2454-1311

programs, and policies from the Local Government Unit (LGU).

IV. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

4.1. Summary of Findings

Majority of the producers are 41-50 years of age, male, married and elementary graduate only. Moreover, majority of their enterprises are single proprietorship and operating for more than 11 years. All broom reed enterprises are classified as micro enterprises having an asset of less than Php 3,000,000 and having employees of not more than 10.

As to the production process, it was identified that the product of all producers are purely manual. There were no advanced equipment that use electricity and computer in operation. There are various simple tools in the production such as clap or locally called "*pang-ipit"*. Surprisingly, all producers are using their own houses only as the place for production meaning no producer invested in a separate area or building for production. As to the procurement of the raw materials, 86% of the producers took their main raw materials within the municipality and some other supplies for production.

Based on the result of the study, the producers can produce 31-60 pieces during peak season and 1-15 pieced per day during normal or off-season. Furthermore, the production is decentralized in 98% of the producers. Indicating that producers split their production processes into various people.

Majority of the producers do not have adequate safety and security measures. They do not have fire extinguishers in the production area considering that the dried tiger grass as the main raw materials is flammable though all of them prohibit smoking in the area. All producers have their own quality inspection of the final output. Quality inspection is usually done by the owner or other member of the family designated also as supervisor. Relative to this, 40% of the producers normally do not have defective units in the production. Majority of the producers have their own waste disposal method through burning of some excess and unusable supplies and materials.

Based on the survey-interview conducted by the researchers, the common problems encountered by the producers are having lack of funds of capital for the production and further investments. They also feel that there is lack of assistance and attention coming from the local government units through different programs, relevant policies and subsidies.

4.2. Conclusion

The industry of broom reed in the Philippines serves as a main livelihood for many families especially in the municipality of San Antonio, Nueva Ecija. From the traditional wild grass, tiger grass, filipinos developed a useful cleaning tools for every household. Since then, different efforts had been made to support the producers. The local government unit of San Antonio, use the broom reed, locally known as walistambo", as an identity or trademark for the municipality. But this study shows that there are areas that need to be improved and problems that need to be addressed.

Most of the producers are still infant and classified as micro enterprises having assets of not more than Php 3,000,000. Also, they do not have enough facilities for the production and they are not able to hire additional employees to increase the production. Furthermore, small production can be attributed to the method that the producers are currently using. All of them are purely manual in producing broom reed. If they can improve the production process by adding advanced equipment, production output can definitely increase. Producers are also vulnerable to different problems, internally and externally. Just like other micro enterprises, broom reed producers can also encounter insufficiency in funds and capital.

For these reasons the researchers were able to arrive to different programs for a One Year Strategic Development Plan for the industry. The development plan was submitted to the local government unit of San Antonio for their appropriate actions.

PROPOSED ACTION PLAN FOR THE INDUSTRY

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A ONE YEAR STRATEGIC ACTION PLAN FOR WALIS–TAMBO INDUSTRY IN SAN ANTONIO, NUEVA ECIJA

Main Objective: To strengthen the industry of walis–tambo in San Antonio, Nueva Ecija from the production to distribution.

PLANS	OBJECTIVES	ACTIVITIES/STRATEGIES	PERSONS/ AGENCIES INVOLVED	TARGET IMPLEMENTATION DATE
Improve the promotion of the walis-tambo made in the municipality.	To improve the target market awareness on the product of the municipality	1. Use the name of the San Antonio in the sticker of the brooms rather than Baguio City 2. Encourage sales promotions such as quantity and trade discounts to penetrate the target market to buy in large quantity	Manufacturers and LGU	March 2018
Organization of Multi-Purpose Cooperatives in the Municipality	To improve the production and distribution of each manufacturers. To control the pricing, design, and distribution of the manufacturers.	1. Formation of the walis-tambo multi-purpose cooperatives in the municipality 2. Encourage manufacturers to join the cooperatives	LGU, Manufacturers , Municipal Agricultural Office	March 2018
Strengthening the annual walis-tambo festival of the municipality	To promote the industry and the municipality.	1. Creating festival-related programs featuring walis-tambo such as street dance competition, trade fairs, etc.	LGU, Manufacturers	October 2018
Standardization of the products	To standardize the output of the producers to control spoilage and defective units.	1. Setting standards on weight, size, height, and width of the products.	LGU, DTI, and Manufacturers	March 2018
Price control for the manufacturers	To control the pricing for the manufacturers to avoid predatory pricing.	1. Setting price floor and price ceiling for the products.	DIT, LGU, and Manufacturers	March 2018
Free trainings for the out-of-school youth and unemployed individuals in the production of walis-tambo	To solve the manpower shortage of the manufacturers especially during peak season. To avoid unethical practices of the manufacturers related to human resources such as pirating.	1. Giving free trainings in the production of walis-tambo to out-of-school youth and other individuals in the municipality.	LGU, DTI, Manufacturers	May 2018
Financing programs for the manufacturers	To provided financing services for the manufacturers which considered as one of the major problem of the industry	1. Providing financing assistance for the manufacturers from the LGU and different financing institutions	LGU, other financing institutions	March 2018

https://dx.doi.org/10.22161/ijaems.5.1.9 *ISSN: 2454-1311*

Improvement of the method of production	To improve method of production from manual to mechanize thus improve the quantity and efficiency of the production	1. Conduct a research studies related to the production, machines and equipments. 2. Giving financial subsidies from the LGU to support the project	DOST, DA, LGU and other financing institutions	March 2018
Product development	To improve the product quality and design thus improve the product competitiveness.	1. Conduct a product development study to improve the quality and design of the products 2. Giving seminars and trainings to manufacturers for the implementation of the results of the study	DTI, NEUST, and LGU	March 2018

This action plan was based on the identified problems of the industry and the present production management practices of the manufacturers. Generally, plans need collaborative effort of manufacturers, Local Government Unit of San Antonio, DTI and other financing institutions. These plans and strategies will further improve the present condition of the industry and can provide employment for unemployed citizens and out–of–school youth of the municipality.

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Popper's Piecemeal Engineering and Social Reform in Africa

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Abstract— *One of the most important themes of Popper's political thought is his idea of piecemeal social engineering. Karl Popper's piecemeal engineering is intended primarily to detect social problems and assess the results of societal policies with the aim of solving them gradually. Popper thus understands his piecemeal engineering as a requirement for social transformation. He advocates this view over and against utopian social planning. In discussing Poppers piecemeal engineering as a model for achieving necessary major social and political change, this paper considers the political philosophy aspect of Popper's philosophy as it relates to his notion of piecemeal engineering. Here Popper emphasizes openness of society. But what is of particular interest to us is the question of the scale and speed of social change that is needed in a society, particularly as it concerns less developed nations. Given the scale of socio-economic and political change needed in less developed nations, we contextualize this study to Africa using the critical and analytic methods in philosophy. Popper develops thoroughgoing arguments that open democratic societies are far superior to closed totalitarian regimes that Marxism heralds. No doubt, Popper may be right in his criticism of historicism. Yet for all of this, we are concerned about what we see as a defect in Popper's political philosophy, namely how one can truly make use of Popper's political philosophy to get fully informed about legitimate political aspiration for one's part of the world. The point is that science, unlike the political ideals for societies, is not meant to reflect cultural difference. Popper's insistence that social engineering must proceed piecemeal therefore seems praiseworthy only in an already deeply civilized society, but in disrupted and corrupted circumstances, such as those in some parts of Africa, insistence on merely piecemeal social engineering is hard to defend. This paper rather argues that what it calls "piecemeal-holistic political reform" is more likely to bring about the desired social transformation in Africa and is a defensible approach that is not vulnerable to Popper's arguments against utopian social engineering.*
Holism—Engagement in large-scale social planning.

Keywords— Piecemeal Engineering, Social Reform.

I. INTRODUCTION

Karl Popper in his *The open Society and its Enemies,* sought among other things to theorize on how best alterable socio-political order can be changed peacefully without tempering with the established traditional structures of the society. In an open society, Popper argued, "policies and institutions are modified by continual monitoring of their effects, and in the light of their ability to solve the problems they are supposed to solve"[1]. Thus, in the social science the application of the engineering or technological approach in solving social problems imposes a discipline on our speculative inclination, which may lead us into the region of metaphysics. To avert this problem, the approach compels us to submit our theories to definite standards of clarity and practical
testability.

Prima facie, the engineering approach implies the adoption of our activist attitude towards social order – identifying and solving the societal interests one after the other. However, Human interests in social groupings are multifarious hence the difficulty to identify one interest at a time. There is also, as Corvi observes, the difficulty in applying the scientific methods of the natural sciences in explaining and predicting social phenomena,[2] since social behaviour defies causal laws and the exactness associated with the natural science.

Karl Popper argues that piecemeal social engineering is the gateway to social reforms. According to him, it is through criticisms and a piecemeal approach that we discover result of a particular social policy or action.[3] This means that the piecemeal social engineer attempts to solve his problem in a piecemeal manner knowing the appalling consequences of an unexpected result; he never attempts to solve his problem in a holistic manner. Indeed, Popper argues for piecemeal engineering on the ground that it involves self-criticism, tactfulness and certainty and is therefore more scientific in character, unlike the holistic engineering which he believes lacks self-criticism and involves much of speculation and

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often leads to unexpected surprises.[4] Popper's piecemeal social engineering is, thus, meant to promote peaceful reform and social stability as it rejects violent holistic social change.

Admittedly, it is true that a violent public approach to socio-political issues often leads to unforeseen mistakes, as was the case with the first Nigeria military coup d'etat of 15th January 1966.[5] The French Revolution of 1789, however, has shown that violent holistic change is sometimes inevitable in a deviant government.[6] Therefore, the truth of the matter is that although piecemeal social engineering is more relevant and practical in the contemporary period than the holistic redesign of the society with its attendant problems, it is more of a fiction to think that Popper's theory is absolute in the face of a government of extreme corruption, tyranny and injustice as is the case in many contemporary African countries.

Furthermore, Oseni Taiwo Afisi rightly noted that the political ideals for societies is a reflection of cultural differences.[7] This is unlike science which does not necessarily reflect cultural differences and this is what Oseni means when he says that, 'that which is ideal in the struggle to produce objective knowledge of nature is more reliable to be culturally universal than that which is ideal within the struggle to optimize power relations between people.'[8] The point here is that cultural differences can make a difference to political ideals but not to scientific ideals.

The liberalism of Karl Popper is individualistic and not every culture is individualistic. Indeed, there are special cultural behaviors in some part of Africa such as Nigeria that, again, we believe underwrite confidence that faster, sweeping political change, if tried, could work more reasonably. We will, therefore, argue in this paper that Popper overlooked important problems with certain kinds of piecemeal engineering and that what we now call "piecemeal holistic political reform" is a defensible approach that is not vulnerable to Popper's arguments against utopian social engineering.

II. THE IDEA OF PIECEMEAL SOCIAL ENGINEERING

In his *The Open Society and Its Enemies*, Karl Popper examined the application of the critical and rational methods of science to the problems of the open society. In this respect, he made a crucial distinction between the principles of democratic social engineering (what he called piecemeal social engineering) and utopian social engineering. Popper writes, "The piecemeal engineer will, accordingly, adopt the method of searching for, and fighting against, the greatest and most urgent evils of society, rather than searching for, and fighting for, its greatest ultimate good."[9] According to Popper, the difference between piecemeal social engineering and utopian social engineering is succinctly stated thus:

It is the difference between a reasonable method of improving the lot of man, and a method which, if really tried, may easily lead to an intolerable increase in human suffering. It is the difference between a method which can be applied at any moment, and a method whose advocacy may easily become a means of continually postponing action until a later date, when conditions are more favorable. And it is also the difference between the only method of improving matters which has so far been really successful, at any time, and in any place, and a method which, wherever it has been tried, has led only to the use of violence in place of reason, and if not to its own abandonment, at any rate to that of its original blueprint.[10]

To make this work more focused and precise, the work of Oseni Taiwo Afisi titled *Karl Popper's Piecemeal (or many pieces at once) Social Engineering* is reviewed in what follows as a guide to our present work. It is nevertheless the subject matter of this paper. According to Oseni, the piecemeal engineering approach is the introduction of modest changes to address specific problems, and to adapt to progressively modified changes and policies in response to the observed consequences of those interventions.[11] In his view, it is a small scale intervention to deal with social issues, and to see whether they are producing their intended effects, and to find ways of mitigating any unintended consequences. Therefore, in line with Popper's theory of falsifiability, piecemeal social engineering is a trial and error approach to learning that seeks to refine interventions based on that learning.

Popper's political philosophy is interwoven with his philosophy of science. For as Ackermann observes, Popper believes that with falsification, conjecture and refutation, anyone may criticize and contribute, and we can learn from one's mistakes through piecemeal engineering.[12] Also, through this approach, we can eliminate errors and make better social reforms than can be done by utopian/large scale social planning. Based on this understanding, piecemeal engineering is claimed to provide a practical underpinning for a scientific–experimental intervention in society involving a process of social learning.

Now, the scientific approach to Popper's idea of piecemeal engineering tries to demonstrate how the method of changing few variables in a piecemeal manner can help in recognizing the consequences of the changes we have produced. The idea is that piecemeal engineering involves a

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process of changing few variables in a manner of error elimination, trial and error, and this would function as experiments through which theoretical assumptions could be tested. For as Oseni observed, with changing only a few variables we can know the possible effects of the changes made. If, on the other hand, we manipulate several variables at the same time, since the consequences will be a joint outcome of those multiple changes, it will be extremely difficult to tell the role of each factor in producing these consequences, of which some will probably be undesired.[13]

Oseni observes that for Popper, the way to disentangle causes and effects is to avoid undertaking reforms of a too greater complexity,[14] which implies that it is always possible to know the effect of the changes we have introduced in social reform. This is certainly one reason why Popper rejects Marxian social reform that proposes a sweeping change. Hence, Oseni says that "In Popper's estimation, by recommending a sweeping social change, it would be hard to determine exactly which aspect of the intervention is having the most influence – if really our concern is with understanding causes and effects. So, without disentangling causes and effects, one might confuse the issue of social transformation with the question of which kind of intervention would seem most likely to achieve the desired end."[15] Therefore, to achieve a desirable end is to approach social problems piecemeal so as to avoid any poorly considered intervention in a sweeping grand scale manner.

Oseni, however, argues that the phenomenon of piecemeal engineering which is construed of in terms of performing minor reform or making few changes at a time is not mostly appropriate for issues of societal concern. In fact, he describes piecemeal engineering as snail-pace ideology which is grossly inadequate to address the question of social reform in Africa.[16] This, according to him, is because the ideology is inadequate to handle, for instance, the recurring problems of poverty, injustice, electoral fraud, unemployment, diseases, corruption, police brutality, bad leadership, poor development of science and technology, poor education, and underdevelopment that characterizes most democratic societies of developing African nations.

Oseni then concludes that appropriate solutions to societal issues may depend on the social condition of every society, insisting that a radical approach might, therefore, be applicable to radical conditions.[17]He observes that Popper confused science with politics when he asserts that piecemeal social engineering is characterized by the trial and error model on which falsification of scientific theories are founded – "but there is certainly no guarantee that scientific theories can pass also as theories of political philosophy."[18]

It should be noted that what Popper criticizes as historicism is the basic assumption in the field of the social sciences that it has the possibility of certitude concerning sweeping historical prophecies of societal developments with certainty. This, of course, is a remarkable fit of achievement. But, as Oseni rightly observes, he misses the point at the level of his introduction of piecemeal social engineering as the solution to holism or historicist ideas. He writes:

Granted that controlled variables are possible in scientific method of conducting research and acquiring knowledge, it is extremely difficult, if not impossible, to control or manipulate people or events of societal phenomena. In other words, there are no standard techniques in coordinating and organizing society.[19]

Although Oseni agrees with Popper that piecemeal engineering is a requirement for social learning and social transformation as it is intended primarily to detect social problems, and assesses the results of public policies aimed at solving them in bits and pieces, he presented a modified position to Popper's and argues that social reforms often require

"many-pieces-at-a-time" social engineering. He contends that his "many-pieces-at-a-time" social engineering is superior to Popper's 'piecemeal engineering' in the context of African societies on the ground, among others, that piecemeal social engineering in Popper's conception seems too slow to have significant consequences on radical institutional changes; that since it would require a significant change (cause) to achieve noticeable consequences (effect) in social relations, it would be difficult to see what effect small piecemeal changes can have in achieving noticeable consequences in changing society; and that while Popper's piecemeal social engineering only seems most sensible where societies are already deeply developed, societies that are less developed require faster, sweeping political change than can be achieved in the bits and pieces fashion which Popper advocates.[20]

III. EVALUATION OF PIECEMEAL SOCIAL ENGINEERING IN THE LIGHT OF SOCIAL REFORMATION IN AFRICA

In his criticism of "historicism" Popper contrasted two kinds of predictions. In the one case we are told about an event which we can do nothing to prevent – a prediction which Avery referred to as a 'prophecy.'[21] Opposed to these are predictions of the kind which we can do something to

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prevent – prediction we may describe as technological predictions since predictions of this kind form a basis of engineering.

Popper thus contends that there are two basic different ways in which social engineers can use the results of a technological social science to reform social institutions and this led him to his distinction between two kinds of social engineering".[22] Just as the main task of the physical engineer is to design machines, remodel and service them, the task of the piecemeal social engineer is to design social institutions and to reconstruct and run those already in existence. Holistic or utopian social engineering, as opposed to piecemeal social engineering, aims at remodeling the 'whole of society' in accordance with a definite plan or blueprint.

From the above, it follows that the distinction between the piecemeal and the utopian types of social engineering stems from the fact that "the utopian approach flows from an insistence on determining one's ultimate political goal, ideal state, before taking any practical action,"[23] whereas the piecemeal approach "flows from the insistence on attempting to locate and eradicate the greatest and most urgent social evils".[24] Utopian social engineering, Popper further claimed, requires the centralized rule of a few, the suppression of dissent and, ultimately, the use of violence instead of reason to settle the disputes that arise in the pursuit of the ultimate goals of the engineers; while on the contrary, piecemeal social engineering allows democratic action, the tolerance of dissent and the use of reason and compromise to settle political disputes".[25]

Especially detestable to Popper were the brutal methods that he associated with utopian engineering. The "canvas cleaning" approach to the reconstruction of society that he perhaps found in Plato's Republic seemed to him a terrible foreshadowing of the horrors inflicted upon millions of human beings by the totalitarian regimes of the twentieth century.Attempting to wipe the slate clean and redraw an entire society from scratch, based on a blueprint drawn up by visionaries, is not what he deemed a rational kind of social engineering as, according to him, it can only lead to disaster.[26] He purports that even with the best intentions of making heaven on earth it only succeeds in making it hell – that hell which man alone prepares for his fellow-men. Now, we believe there are some important problems with Popper's analysis of social engineering and his criticism of utopian social engineering. The first problem is that Popper confused the question of the presence or absence of a set of "utopian" principles to guide political reform with the scope of a given effort at reform or of a given stage of reform. It is true that he allowed the possibility that piecemeal social engineers might be guided by a utopian vision.[27] As Avery rightly observed, the politician who adopts this [piecemeal] method may or may not have a blueprint of society before his mind, he may or may not hope that mankind will one day realize an ideal state, and achieve happiness and perfection on earth.[28] But he will be aware that perfection, if at all attainable, is far distant and that every generation of men, and therefore also the living, have a claim. He seems, however, not to have realized what an important concession to utopianism this is. If piecemeal engineers can be guided by the vision of an ideal society then it is possible for a group of them to have exactly the same utopian vision for the whole of society as a different group of social engineers whom Popper would label "utopian."

It may seem preferable to stick with the label "holistic" for the latter group since the words "piecemeal" and "holistic" seem to capture better the distinction that Popper had in mind. Unfortunately, however, the word "holistic" also has drawbacks in this context since both groups of reformers may have a vision for the whole of society and either group can be distinguished from reformers who seek to make one specific reform in order to eliminate one identifiable source of human suffering. The difference between the two groups of social engineers is not a difference in the vision that inspires their reform. The difference is in the way in which the two groups plan to implement their reforms. One group proposes to construct a new society from scratch, as it were, and the other proposes to change the existing society one step at a time. We can hardly fault Popper for criticizing the brutal methods of some social engineers but it seems to us misleading to call their approach "utopian" or even "holistic." It is better, as Avery suggests, to label the two types of social engineering "revolutionary" and "evolutionary."[29] This would help avoid confusing two entirely different issues: the scope of a given effort at (or stage of) reform and the scope of the vision that inspires the reformers.

Furthermore, Popper overlooked an important problem with the kind of piecemeal approach to reform that he favored. He acknowledged that even the most carefully considered reform may have unintended (and undesirable) consequences.[30] It seems to us, however, that piecemeal reform designed to cure one specific ill, to reduce or eliminate one area of human suffering, can very easily create unanticipated problems in other areas. In fact, Quine purports that one of the benefits of theories about the whole (or at least a large portion) of society is that they can tell us when changes in one area are likely to create problems somewhere else.[31]

https://dx.doi.org/10.22161/ijaems.5.1.10 *ISSN: 2454-1311*

Therefore, we contend that there is an approach to political and social reform in Africa that one may call "piecemeal-holistic reform" which can be useful in social reform is Africa and which can be defended against the criticisms that Popper leveled against utopian social engineering. Piecemeal-holistic social reformis an evolutionary or gradualist approach that resembles Popper's piecemeal social engineering in that it proceeds step by step and does not attempt to rebuild the whole of society from scratch or abolish all undesired institutions at once yet it does not have to proceed one step at a time. Rather than unproductive and time-wasting one-step-at-a-time piecemeal engineering, piecemeal-holistic engineering can tackle several societal issues at once without necessarily attempting to rebuild the whole of society from scratch or abolish all undesired institutions at once. Piecemeal-holistic reform can be in the private sector or the public sector.

Popper regarded a revolutionary attempt to restructure society through large scale social planning as a consequence of historicism, and he rejected it, instead advocated piecemeal social engineering as a model for social reform. In this view, significant inspiration can be drawn from the conservatism that the piecemeal approach signifies. As a method of changing society, Popper's piecemeal social engineering involves performing small scale reforms aimed at determining how public policies can produce maximum social benefits when the principle of negative utilitarianism is applied: the view that the aim of public policy is the alleviation of suffering rather than promotion of happiness. Negative utilitarianism requires us to promote the least amount of evil or harm, or to prevent the greatest amount of suffering for the greatest number. Popper's idea is that governments should respond piecemeal to recognized social ills – to whatever is widely acknowledged to be harmful to the people. On the contrary, our proposed piecemeal-holistic reform is targeted at promotion of happiness and elimination of all evils and harms in the society albeit gradual approach – tackling many problems at once.

By advocating piecemeal social engineering, what Popper aims to avoid is the totalitarian woes that historicism and utopian social engineering lay upon social reform. Utopian or large scale social planning, Popper claims, requires the centralized rule of a few, the suppression of dissent and, ultimately, the use of violence instead of reason to settle the disputes that arise in the pursuit of the ultimate goals of the large-scale planners. Piecemeal social engineering, on the other hand, gives room for democratic ideals, the tolerance of dissent and the use of reason and compromise to settle political disputes.

With Popper's arguments which clearly set apart piecemeal social engineering from utopian social engineering, it seems to us that Popper is right that the open society, where piecemeal social transformation holds sway, is far superior to tribal or closed totalitarian regimes. To Popper, tribal or closed societies very often base their social transformation agenda upon utopian social engineering of remodeling the whole of society at one sweep. This view, according to Oseni, underwrites Popper's anti-utopianism and his negative utilitarianism.[32] With the principle of negative utilitarianism, Popper's aim is that the amelioration of suffering of the citizenry can be better achieved through a bits and pieces approach. This is why he favoured changes in piecemeal fashion backed by a trial and error method to avoid the unforeseen side effects of any large scale change.

Although, Popper's approach signifies a careful setting down and articulation of clear goals in the social transformation process, the viability of piecemeal social engineering as a means of social reform is questioned. Unlike in natural science where there is the possibility of controlling and manipulating as few variables as possible, it is quite a difficult task to have adequate social science knowledge to inform us of a major and simultaneous experimentation and to be able to monitor all causes and effects as a result of the complexities of social relations.

Thus, Oseni rightly noted that, "Popper's theory poses a difficulty in monitoring the causal nexus in social relations, particularly because of complexities in social interaction as well as the difficulty of seeing the consequences of small institutional changes when what is required for social reform depends on the magnitude of the situation."[33] For as a result of the complexities of social interaction, the magnitude of the situation in Africa often requires that social reform be undertaken in a more radical manner. This radical social engineering, Oseniobserves, is plausible when we consider that the causal nexus in social relations depends on the logic of the situation or the existence of real social-causal mechanisms linking cause to effect.[34] In other words, since social cause and effect is determined by how people's behaviour affects the course of events, then the degree of social reforms would be determined by the consequences of social situation.

The modification we make to Popper, therefore, is to argue that social reform/engineering is not necessarily piecemeal in the Popperian sense but can be piecemeal-holistic social reform/engineering depending on the nature of the circumstances; and that from what have been said only the later can bring about true social reform in Africa. The situation, context, or circumstance in African can be used to justify the concept of piecemeal-holistic social engineering.

https://dx.doi.org/10.22161/ijaems.5.1.10 *ISSN: 2454-1311*

The situation analysis can allow social reform to be considered in terms of the magnitude of the case or reforms needed at every point in time. It is necessary that one analyses the situation that makes an agent act the way they act before one passes value judgments. Basically, the magnitude of the case would determine the scale and the speed of social engineering that is required. In this respect, we contend that Popper's approach cannot be applicable to many parts of Africa without some adjustments.

Although, Popper was emphatic that social institutions should only be altered in a piecemeal fashion so as to avoid the perils of a holistic reconstruction of a society in one sweep, he seemed not to consider that a case may require a more drastic social reform. Clearly, with the description of piecemeal social engineering that Popper gave in *The Poverty of Historicism*, it appears that as a backdrop to his work on piecemeal social engineering, there is an assumption about the kind of society in which the people whom he was addressing lived. Oseni makes this observation clear as he quotes Shearmur In a lecture, "Freedom: A Balance Sheet" Popper asserted that "Western democracies are the best of which we have knowledge...Never before was there a society in which common men were so much respected as in ours, in which there were so few who are downtrodden and insulted."[35]

From here, it is reasonable to admit that piecemeal social engineering only seems most sensible where societies are already deeply developed and ideals of moderate liberal political thought are well established. It also appears that the pre-conditions of applying piecemeal social engineering are that the society itself would be liberal and economically developed. The assumption here is that since the society that Popper is addressing is already developed, all that is required is the making of small adjustments and readjustments which can be continually improved upon. Consequently, if we accept this assumption that piecemeal social engineering works better in a society that is already significantly developed, it therefore implies that the piecemeal social engineering approach may not accommodate the worst-off/most impoverished and corrupt kinds of society even if they are liberal. By this estimation, piecemeal social engineering may be best suitable only for developed societies, and appears to ignore the challenges to social transformation facing less developed societies.

IV. CONCLUSION

In the foregoing, this research has carefully examined Karl Popper's theory of piecemeal social engineering with a view to ascertaining its implications on the increasing quest for socio-political reformation in Africa. Arguably, the characteristic approach of the piecemeal engineer is that even though he may perhaps cherish some ideals which concern society as a whole, he does not believe in the method of redesigning it as a whole. Whatever his ends, he tries to achieve them by small adjustments and readjustments which can be continually improved upon and unintended consequences monitored.

We noted, however, upon critical examination, that Popper's one-at-a-time piecemeal social engineering may be best suitable only for developed societies, as it appears to ignore the challenges to social transformation facing less developed societies. Appropriate solutions to societal issues may depend on the social condition of every society; and a radical approach might be applicable to radical conditions. The present socio-political realities in Africa do not admit the applicability and tenability of Popper's theory in the people's quest for change. It is inadequate to handle, for instance, the recurring problems of poverty, injustice, electoral fraud, unemployment, diseases, corruption, police brutality, bad leadership, poor development of science and technology, poor education, and underdevelopment that characterizes most democratic societies of developing African nations.

This, however, does not imply our wholesale rejection of piecemeal social engineering. We argued that criticisms of Popper's theory can be addressed through making suitable modifications. They can be addressed when we deconstruct the concept of piecemeal social engineering and begin to consider the making of many changes at once. This many-pieces-at-a-time approach to social reform is what we referred to as *piecemeal-holistic reform* and as we have shown, it will avoid the difficulties Popper's piecemeal engineering encounters in social transformation in Africa. There is much, we believe, that today's classical liberals can learn about political reforms from Karl Popper but we should consider his approach critically with the idea that although we do not need to reject it wholesale, we do need to improve upon it.

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Green Marketing Strategies of Restaurants in Nueva Ecija, Philippines

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***Abstract*—** *Businesses today have been quick to adopt environmental management practices and implement green marketing strategies that focus on transforming such businesses to become eco-friendly entities.*

This research aimed at finding out how restaurants in Nueva Ecija use the concept of green marketing, and it examined its significant impact in their present undertakings. Furthermore, this research analyzed the green marketing strategies used by the restaurants and noted the challenges coupled in the implementation of such strategies.

The respondents of the study were the owners/managers of fifteen (15) restaurants in Nueva Ecija. Survey questionnaire was the main instrument used by the researcher in conducting this study. The study revealed that the main reason for restaurant owners/managers on adopting green marketing strategies is to show their corporate social responsibilities. The top green marketing strategies practiced by the restaurants are the use of paper boxes in take-out orders and the minimal use of straws and plastic cups.However, the top challenge encountered by the restaurant owners/managers in adopting green marketing is primarily on the costs involved in implementing such strategies. The researcher recommended that each restaurant management should have a comprehensive marketing plan towards the effectiveness of implementing green marketing strategies.

Keywords*— *Environment, Green Marketing and Green Marketing Strategy

I. INTRODUCTION

Conserving environment has increasingly becoming an issue in the business world and more and more companies are getting attentive. Taking care of the environment is seen by the companies as a responsibility not imposed by outside forces but dictated by conscience as the best practice of giving back to society, people and communities. Companies now have begun to adopt the concept of Green Marketing as their strategies in doing their endeavor and as value addition that might offer them competitive advantage in business arena.

Green Marketing refers to the holistic marketing concept that focuses on transforming such business to become eco-friendly entity. It turns businesses' production/operations, marketing, consumption and disposal of products happen in a manner that is less destructive to the environment (Satpal, 2013). According to Domingo (2018) marketing plays a very important role in the organization's success; it is a must to every organization to consider strategizing their different marketing practices. Thus, utilizing green marketing, as another marketing strategy is timely and relevant in promoting businesses today.

Restaurants in Nueva Ecija simply start to embrace the transformation and gear forward to achieve a greener image. Restaurant owners do not only exert too much effort in managing business finances, providing mouth-watery foods and making more delighted customers. Today, they are also focused on performing their social responsibilities through the implementation of green marketing.

This research aimed at finding out how restaurants in Nueva Ecija use the concept of green marketing and examined its significant impact in their present undertakings. Furthermore, this research analyzed the green marketing strategies used by the restaurants and noted the challenges coupled in the implementation of such strategies.

The outcome of this paper may trigger the minds of restaurant managers to give an idea for improving their green marketing strategies which will give them a way to be better and more effective in implementing their green marketing strategies.

II. METHODOLOGY

The respondents of the study were the 15 owners/managers of selected restaurants in Nueva Ecija. Survey questionnaire was the main instrument used by the researcher in conducting this study. Researcher used structured questionnaire and a five point likert scale for assessing the green marketing strategies of the restaurants.

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Table.1: Responses

Ranges	Reasons for Using Green Marketing, Benefits, Challenges and Coping Mechanism	Green Marketing Strategies
4.21-5.00	Strongly Agree	Always
3.41-4.20	Agree	Often
2.61-3.40	Moderately Agree	Sometimes
1.81-2.60	Disagree	Seldom
1.00-1.80	Strongly Disagree	Never

III. RESULTS AND DISCUSSIONS

Table.2: Reasons for Adopting Green Marketing Strategies

Reasons	WM	VI	Rank
1. Opportunities or competitive advantage	4.20	A	2
2. Corporate social responsibilities	4.33	SA	1
3. Government pressure	3.87	A	3.5
4. Competitive pressure	3.87	A	3.5
5. Cost or profit issues concerns	3.53	A	5

As to the reasons for adopting green marketing strategies, restaurant owners/managers are motivated to use the green marketing strategy to show their corporate social responsibilities. Restaurants believed that they have a moral obligation to be more socially responsible.

Table.3: Benefits of Green Marketing

Benefits	WM	VI	Rank
1. Green marketing can enhance consumer's environmental awareness of green products.	4.33	SA	5.5
2. Through green marketing, the restaurants can obtain a green reputation and brand image and, it can attract a new and larger client base.	4.27	SA	8.5
3. Having good environmental credentials can provide a competitive edge when tendering for contracts.	4.33	SA	5.5
4. It can gain public approval and can cut costs by using green marketing.	4.27	SA	8.5
5. It helps in enjoying competitive advantage.	4.53	SA	1
6. Advertising green initiatives effectively can acquire a greater market share.	4.40	SA	3
7. Including green marketing practices in overall corporate message can attract new customers.	4.33	SA	5.5
8. Portraying an environmental-friendly business image through advertising and sales promotion can keep loyal stakeholder groups.	4.47	SA	2
9. Using green marketing for positive positioning can project a corporate social responsibility image.	4.33	SA	5.5

As to the benefits, green marketing, indeed, helps restaurants in accessing the new markets and enjoying competitive advantage.

Table.4: Green Marketing Strategies Used by Restaurants in Nueva Ecija

Strategies	WM	VI	Rank
1. Using paper boxes and paper bags in take-out orders	4.33	A	1.5
2. Minimizing the use of straws and plastic cups	4.33	A	1.5
3. Issuing napkins that are from recycled papers (brown tissue)	3.60	S	7
4. Using reusable utensils rather than disposable ones	4.07	O	4
5. Giving freebies/items to promote the conservation of environment.	3.47	O	8
6. Giving eco bags for free	3.40	S	9
7. Serving proper portion of food to reduce food waste	4.20	O	3
8. Non-smoking policy (non-smoking within property) for indoor air quality	3.87	O	5.5
9. Placing green live plants for the quality of indoor air	3.87	O	5.5

As to green marketing strategies, restaurant owners/managers initiated the use of paper boxes in take-out orders and the minimal use of straws and plastic cups.

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This is due to the implementation of Ordinance No. 015-2012 of the city government of Cabanatuan, in Nueva Ecija, by which non-biodegradable plastic bags are banned; thus, people shall have to use eco-bags or baskets. The measure also prohibited selling, giving and offering plastics in establishments like restaurants and the likes (Galang, 2013).

Table.5: Challenges Faced by the Restaurant Owners/Managers in Implementing Green Marketing.

Challenges	WM	VI	Rank
1. Majority of the people are not aware of the benefits of green marketing.	4.33	S A	2.5
2. Product packaging requires a recyclable and renewable materials or elements which are expensive.	4.33	S A	2.5
3. People often perceive that green marketing is just a gimmick.	4.13	A	6.5
4. Not all environmental labels are used and interpreted correctly.	4.27	S A	5
5. Green marketing depends on technology and requires a huge investment in Research and Development.	4.13	A	6.5
6. There are no concrete green marketing plan.	4.33	S A	2.5
7. There is an increasing number of competitors using green marketing strategies	4.07	A	8
8. There is an inconsistency of the implementation of green marketing strategy.	4.33	S A	2.5

This table shows that the main challenges of green marketing are (1)majority of the people are not aware of the benefits of green marketing; (2)product packaging requires a recyclable and renewable materials or elements which are expensive; (3) there is no concrete green marketing plan; and (4) there is an inconsistency of the implementation of green marketing strategy.

IV. CONCLUSIONS AND RECOMMENDATIONS

The study revealed that restaurant owners/managers in Nueva Ecija are motivated to adopt green marketing strategies to exhibit their corporate social responsibilities. Number one benefit of green marketing strategy is to gain competitive advantage over its competitors. In addition, the top green marketing strategies used by the restaurants are the use of paper boxes in take-out orders and the minimal use of straws and plastic cups. Meanwhile, top challenges encountered by the restaurant owners/managers in implementing green marketing are primarily on the costs involved in implementing green marketing strategies; no concrete green marketing plan; and inconsistency of the implementation of green marketing strategy. Thus, it is recommended that each restaurant management should have a marketing plan integrating the green marketing strategies. The effectiveness of their green marketing strategies should be evaluated by the management of the restaurants. Furthermore, another study prior to the effectiveness of green marketing strategies should be conducted.

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Marketing Strategies of Selected Water Refilling Stations in Nueva Ecija, Philippines

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Abstract**—** *The study presented the marketing strategies of selected water refilling stations in Nueva Ecija. The study aimed to assess different marketing strategies with focus on product offering, pricing and promotion of the water refilling stations along with getting the satisfaction of the customers with the strategies. The descriptive method of research was utilized and the normative survey technique was used for gathering data. The study revealed that most of the water refilling stations used similar marketing strategies. In addition, lack of budget hinders the water refilling stations for having good marketing strategies. Furthermore, customers are satisfied with the product offering and pricing except to the promotional activities of the water refilling stations.*

Keywords**— *Marketing, price, product, promotion, water refilling stations***

I. INTRODUCTION

Not all water is safe to drink. Water in lakes and rivers can be polluted. It can have harmful chemicals or germs that cause disease. Long ago, many people living in cities got sick or died from drinking dirty water. People still get sick from drinking polluted water. Many poor people still do not have pure drinking water. Scientists have learned how to clean, or purify, drinking water. With the advent of modernization, man learned to develop technology on how to produce clean drinking water. These technology were introduced and later on commercialized and became a fast growing industry. The demand at the water refilling stations is now increasing. In Nueva Ecija, more number of water refilling stations are now operating with some of them operate other stations in nearby municipalities.

A water refilling business is one of the most popular ventures for those with little experience as an entrepreneur because it is simple to operate and has a steady demand (businesscoachphil.com, n.d.) With the growing competition, these water refilling stations must pay attention on their marketing strategies since customers are influenced with the promotion, price and their product offering.

According to Domingo (2018) marketing plays a very important role in the organization's success; it is a must to every organization to consider strategizing their different marketing practices.

The objective of this research is to explore marketing strategies in the industry in terms of product offering, pricing, and promotion along with the customers' satisfaction with such practices.

Information on water refilling stations' marketing strategies is available through both industry and academic publications but these sources offer a limited depth of understanding. Numbers of studies about companies marketing strategies have already been conducted. Despite of its growing importance, water refilling station businesses' marketing strategies remains an under researched area. A study that addresses this research gap is therefore necessary hence; the need for this study was realized.

II. METHODOLOGY

The questionnaire served as the instrument for collecting data. Owners of water refilling stations in were taken as respondents. Fifty customers who were at stations during the data gathering period comprised the customer respondents.

III. RESULTS AND DISCUSSIONS

1. Marketing Strategies

1.1 Product Offering

Table.1: Marketing Strategies of Water Refilling stations in terms of Product Offering

PRODUCT OFFERING	Weighted Mean	Description
1. Quality and safe drinking water	5	Always
2. Variety of water products	3.6	Very Often
3. Advanced technology-based equipments in water processing	4	Very Often
4. Prompt courteous service	4	Very Often

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5. Provides customer information service	2.8	Often
6. Sanitation and cleanliness of the area and their surroundings	5	Always
7. Proper arrangement facilities	4	Very Often
Average weighted mean	4.06	Very Often

Consideration number 1 and 6 got a weighted mean of 5.00 and rated "Always". This denotes that they considered offering quality and safe drinking water to their customers as well as maintaining the sanitation and cleanliness inside their stations.

Consideration number 5 got a weighted mean of 2.08 and rated "Often". This denotes that they often provide customer information.

These are the main factors they considered in the operation of the business in order to attract and retain loyal customers. In the study conducted by Aguilar, et.al (2007), also proved that the two most common used marketing mix by the selected water-refilling stations in Mandaue City Cebu is product and place. They used often the brands of the product as marketing strategy.

1.2 Pricing

Consideration number 1 and 4 got a weighted mean of 4.80 and consideration number 5 got a weighted mean of 4.60 were rated "Always". This denotes that the management of the water refilling stations priced their water products based on cost and competitors along with considering the giving of discounts. As to the internal factors affecting their pricing decision, consideration number 1 and 3 got a weighted mean of 5.00 and 4.80, respectively and rated "Always". The results show that they consider profit and cost as internal factors in pricing.

Table.2: Marketing Strategies of Water Refilling stations in terms of Pricing

PRICING	Weighted Mean	Description
The management uses the following means of pricing		
1. Based on cost	4.8	Always
2. Based on demand	4	Very Often
3. Psychological (e.g. P 991.95,P399)	3.2	Often
4. Discount	4.8	Always
5. Based on the price of competitors	4.6	Always
Internal factors affecting pricing decision		
1. Profit	5	Always
2. Available offer	3.6	Very Often
3. Cost	4.8	Always
External factors affecting pricing decision		
1. The market and demand	4	Very Often
2. Competitors price and offer	4.46	Always
Average weighted mean	**4.35**	**Always**

As to external factors affecting their pricing decision, competitors' price is the major consideration with a weighted mean of 4.46 and rated "Always".

2.3 Promotion

As to factors observed to capture and maintain customers' loyalty, considerations 1 and 3 got a weighted mean of 5.00 and rated "Always". This implies that giving discount as well as simple greeting would keep and win loyal customers.

Table.3: Marketing Strategies of Water Refilling Stations in terms of Promotion

Promotion	Weighted Mean	Description
Factors observed to capture and maintain Customers' loyalty		
1. Giving customers' discount	5	Always
2. Providing additional assistance like free delivery	3.8	Very Often
3. Greeting customers and being friendly	5	Always
4. Giving souvenirs and gifts	1.2	Never
The management uses the following promotion practice		
1. Advertising	1.8	Never
2. Sales promotion (giving freebies)	3.2	Often
3. Public relation	1	Never
4. Publicity	1.2	Never
Ways of advertising		

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1. Local radio	1	Never
2. Local newspaper	1	Never
3. Brochures distributed	1	Never
4. Billboard/tarpaulin nearby	3.4	Often
Average weighted mean	**2.38**	**Sometimes**

As to their promotional practice, they often use sales promotion as promotion practice. Sales promotion got a weighted mean of 3.20. Meanwhile, the management of the stations never consider advertising, print media, public relation and publicity as a promotion practice.

As to their advertising practice, they often use billboards/tarpaulins. Billboards/tarpaulins got a weighted mean of 3.40. Meanwhile, the management of the stations never consider local radio, newspapers and brochures as advertising practices.

Owners/managers expressed that they give much thought and time to promotions since they are very important for their organization's success. The reason why they spend time to craft an innovative promotion strategy is to capture the attention of existing and prospective customer.

2. Marketing Problems encountered by the Water Refilling Stations

Table.4: Marketing problems encountered by Water Refilling Stations

Problems	Weighted Mean	Description	Rank
1. Budget	5	Always	1
2. Lack of transportation and communication utilities	3.6	Very Often	3
3. Lack of facilities	3	Often	5
4. Outdated equipments	3.2	Often	4
5. Insufficient number of employees	3.8	Very Often	2
Average weighted mean	**3.72**	**Very Often**	

Budget is the major problem considered by them. Budget got a weighted mean of 5.00 and rated "very often". According to the owners, they do not have enough budgets for their promotions and upgrading their equipments or purchasing more advance technology for providing more quality water products to their customers.

3. Customers' Satisfaction

Table.5: Customers' Satisfaction

Customer Satisfaction	Weighted Mean	Description
On Product Offering		
1. Quality of product	3.9	Much Satisfied
2. Quality of service	3.5	Much Satisfied
3. Variety of products	4.18	Much Satisfied
4. Cleanliness	4.08	Much Satisfied
5. Accommodation	3.96	Much Satisfied
Average weighted mean	**3.92**	Much Satisfied
Pricing		
1. Price of products	3.44	Much Satisfied
2. Acceptance to the price	3.98	Much Satisfied
Average weighted mean	3.71	Much Satisfied
Promotion		
1. The use of radio advertising	1	Not Satisfied
2. The use of discounts as a promotion strategy	2.02	Moderately Satisfied
3. The use of local newspaper	1	Not Satisfied
4. The use of billboard(s)/tarpauli n	2.58	Satisfied
5. The use of brochures given to customers	1.32	Not Satisfied
Average weighted mean	1.58	Not Satisfied
Grand weighted mean	**3.07**	**Satisfied**

In terms of product offering, customers were all much satisfied with the quality of products and services, as well as to the cleanliness and accommodation. Product offering got a weighted mean of 3.92 and rated "Much Satisfied".

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In terms of pricing, customers were also much satisfied with the prices of products. Pricing got a weighted mean of 3.71 and rated "Much Satisfied".

In terms of promotion, customers were moderately satisfied with the discounts given by the stations and got a weighted mean of 2.02, while billboards/tarpaulin received "satisfied" rating from the customers with a weighted mean of 2.58. Other promotional tools such as radio, news papers and brochures/leaflets received "not satisfied" rating from the customers. This might because the stations never have these tools.

Overall, the above results show that customers are satisfied with the product offering, pricing and promotional activities of the water refilling stations with an overall weighted mean of 3.07.

IV. CONCLUSIONS AND RECOMMENDATIONS

The study revealed that most of the water refilling stations used similar marketing strategies. The lack of budget hindered the water refilling stations for having good marketing strategies. Meanwhile, customers are satisfied with the product offering and pricing except to the promotional activities of the water refilling stations. Thus, the water refilling stations must consider marketing strategies, especially on promotion. They should also allot budget for their marketing programs. Furthermore, they could provide additional services like free delivery and the likes.

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Traffic Stream Relationships of Two-Lane Highways: A Case of Akure-Ondo Road in Southwest Nigeria

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Abstract *— In the design and planning process of highway infrastructure, speed-flow-density relationships are useful tools for predicting the roadway capacity, determining adequate level-of-service of traffic flow and travel time for a given roadway. The speed-flow-density relationships currently used for transportation studies in Nigeria is derived from the Highway Capacity Manual, which does not reflect the true traffic situation on two-lane roads in Nigeria. Developing cost effective tools for describing these relationships in the context of a developing country like Nigeria is imperative.*

The aim of this study was to develop models to describe the relationship between traffic flow, speed and density on Akure-Ondo two-lane highway in southwest Nigeria. Moving observer technique was employed to collect traffic stream data over a stretch of 5km on the study segment during periods of uniform flow on weekdays. To describe the traffic stream relationships, two approaches namely: related and nonrelated traffic stream models were developed. The nonrelated traffic stream models gave inaccurate relationships while the related traffic stream modelling approach performed well at describing speed-flow, flow-density and flow-speed relationships with R^2 values 0.62, 0.75, and 0.80 respectively. The relationships developed from related traffic stream models estimated maximum flow on the study segment as 330 veh/h at an optimum density of 4.44 veh/km. The speed at maximum flow was estimated as 74.5km/h, while the free flow speed was estimated as 149.027km/h.

Keywords—Capacity, Moving observer technique, Traffic stream models, Two-lane highway.

I. INTRODUCTION

Speed-flow-density relationships are the most useful tools in the highway design and planning process. They are useful in predicting the road capacity, in determining the adequate level-of-service of traffic flow and in determining travel time for a given roadway [1]. Improving the level of service of highway facilities contributes positively to socio economic development especially in a developing country like Nigeria where the major means of transportation is road.

Traffic flow can generally be described in terms of three parameters: mean speed (v), traffic flow rate (q), and the traffic density (k) [2;3]. The three parameters are related to each other by the equilibrium relationship:

$q = vk$ (1)

The speed and the density describe the quality of service experienced by the traffic stream while the flow rate measures the quantity of the stream and the demand on the highway facility [4; 5].Flow, speed and density are the major macroscopic traffic stream characteristics. Flow rate is a variable that quantifies demand. It is the number of vehicles that desire to use a given facility during a specific time period. Speed is an important measure of effectiveness defining levels of service for many types of facilities. Density is a critical parameter for uninterrupted flow facilities because it characterizes the quality of traffic operations[6]. The relationships between these three variables are called traffic stream models. Macroscopic stream models represent how the behavior of one parameter of traffic flow changes with respect to another.

Over the years researchers have developed various methods such as tally count, pneumatic tube, point detector, radar, video camera and ultrasonic for measuring these basic traffic flow parameters [7; 8].Recently, there has been increased interest in moving observer method of collecting traffic stream data which has the advantage of recording the flow, travel time and mean speed simultaneously. This technique is explained further in section 2.2.

The operational characteristics of flow in a traffic stream are described by two flow regimes namely: free-flow and congested flow [9]. The highway facility under study is operating under a free-flow condition and the effect of small and local disturbances in the temporal and spatial patterns of the traffic stream are insignificant.

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Development of mathematical relationships among the primary elements of a traffic stream: flow, speed and density; helps traffic engineers in planning, designing, and evaluating the effectiveness of implementing traffic engineering measures on a highway system[10]. Over the years, several researchers in the field of transportation have developed models to explore these relationships. Greenshields assumes that under uninterrupted flow conditions, speed and density are linearly related[11].

The general model connecting speed and density which is a linear model proposed by Greenshields is of the form:

$$V = Vf - \frac{Vf}{Kj}k \qquad (2)$$

Where: V is the space mean speed; *Vf* is space mean speed for free flow conditions; *k* is density and *Kj* is jam density.

Greenberg assumes that speed-density relationship is logarithmic rather than linear while Underwood assumes that speed-density relationship is exponential [12]. The relationship between speed and density using the moving observer technique for data collection in Dhaka, Bangladesh was explored by [13]. Three classical speed-density models: greenshields, Greenberg and underwood were fitted in the graphical representation of speed-density relationship and the corresponding parameters determined using statistical software. Sensitivity analysis and statistical significance tests of the models were compared with the moving observer data. The relationship between flow, speed and density for urban roads in Fallujah city in Baghdad was studied by [14].Reference [15] developed single regime models that describe the relationships between; speed, density and flow rate parameters of uninterrupted urban flow on elevated roads in Cairo, Egypt. Data on traffic characteristics such as flow rate, speed, density and headway were collected using video camera on 60m long section.Among the various methods for collecting traffic data, moving observer technique as described by [16] is of interest in this study.

In a developing country like Nigeria where demographic and economic factors have placed an unprecedented demand on highway facilities, it is essential to understand the relationship between traffic stream parameters. The problems of poor lane discipline, heterogeneous traffic, high percentage of heavy vehicles and safety issues particularly on two-lane highways justifies the modelling of traffic stream parameters. A high percentage of the Nigerian road network is made up of two lane highways linking major cities such as the Akure – Ondo road under study. Many of these highways are under the management of local and state governments with inadequate economic resources. It is therefore important to develop cost effective tools to explore the relationship between traffic stream parameters on two lane highways in Nigeria in other to improve the performances of these facilities. Whereas [17; 18] have modelled operating speed and headway characteristics of two-lane highways in Nigeria, little has been documented on modelling the relationship between traffic stream parameters and this makes this study important.

In this study, a two lane highway linking Akure (Ondo state capital) and Ondo town in southwest Nigeria was selected for study. Moving observer technique was employed in the collection of traffic flow and mean speed data from which the density was calculated using the fundamental traffic flow relationship (1). The field data was analyzed and traffic stream models developed to explore the relationship between flow, speed and density. Boundary conditions (maximum flow rate, optimum density, optimum speed and free flow speeds) were estimated from the models developed. The performance of the models developed was evaluated using Coefficient of determination R^2.

II. METHODOLOGY

The data collection procedure and preparation for analysis is explained in this section. Traffic volume, travel time and average speed data were collected simultaneously using the moving observer technique. The collected data was processed and made suitable for statistical analysis.

2.1 Selection of Study Section

The first step in the collection of traffic data was the selection of road for study. Akure-Ondo two-lane highway (Fig. 1) was selected for this study because of its importance to the socioeconomic development of Ondo state. Additionally, the road segment has an appreciable traffic volume operating under free flow conditions and suitable for traffic flow studies. The second step was the selection of study section from which traffic data were collected. A 5km section between Bolorunduro junction and Owena market located at longitude $7^0$16' and $7^0$19'E and latitude $4^0$96' and $5^0$02'Nwas selected for further studies.

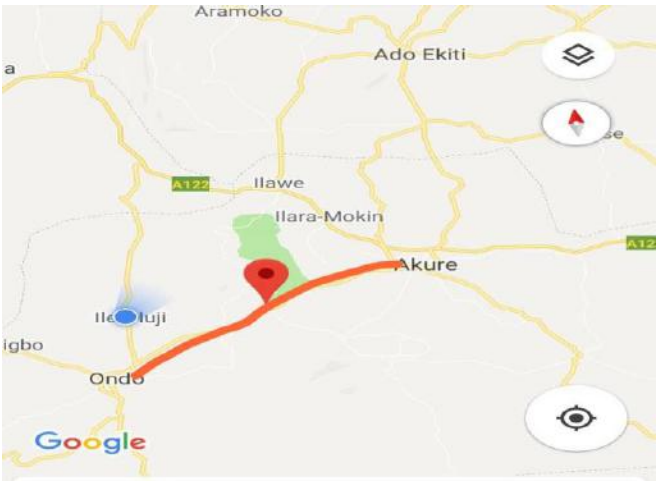

Fig.1: Location of Study section on Google Map.

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2.2 Data Collection

Moving observer technique as described in the Manual of Transportation Engineering Studies [16] was employed for the collection of traffic flow rate, mean speed and travel time.

For a complete description of traffic stream modeling, one would require flow, speed and density. Obtaining these parameters simultaneously is a difficult task if we use separate techniques. Since we have a fundamental equation of traffic flow, which gives the flow as the product of density and space mean speed, if we knew any two parameters, the third can be computed. Moving car or moving observer method of traffic stream measurement has been developed to provide simultaneous measurement of traffic stream variables. This method was first proposed by [19] as a method of estimating the average flow and travel time of traffic moving in one or the other direction on a freeway segment. The method was founded upon the measurements made by the moving observer in a test vehicle embedded in the traffic. The observer travelled in a test car in the direction of the stream considered with the flow while counting the number of vehicles overtaking and the number of vehicles passed. Travel is also made against the flow in the other direction, to record the number of opposing vehicles faced in the opposite direction during the trip. In both travel directions, the trip time of the test car is recorded. Additionally, the length of the road segment is known. These measurements are then used in calculating the speed-flow relationship for the road segment in the direction of interest. Several runs are conducted to increase the accuracy.

The following information for each run was recorded by the observer in the test vehicle.

1. The number of vehicles overtaking the test vehicle.
2. The number of vehicles overtaken by test vehicle.
3. The number of vehicles encountered, while travelling opposite to the direction of interest.
4. The segment length and trip time of the observer in both directions, with and against traffic flow.

The advantages of using the moving observer technique as stated by [19] are as follows:

1. The observer can collect the information on speed and flow simultaneously.
2. The observer can measure travel time along the length of the road segment and also the flow rate and the average speed of vehicles.
3. The amount of man power and hours needed to attain a high level of accuracy is less for the moving observer method compared to other methods, thus making it less expensive.
4. Vehicles can be grouped and flow rate can be estimated for each group.

The section chosen for this study is located on Akure – Ondo two lane highway located in Ondo state in southwest Nigeria. The geometric features of the study section are consistent with high traffic flow to increase confidence in the result.

Traffic data were collected in different times of the day and different days of the week to represent all conditions of traffic flow from Monday 5th, 2018 to Sunday 11th, 2018.The weather condition was good and the pavement dry. A segment of 5km was used for data collection. A total of twenty runs were performed on the test segment in order to achieve a proportional error of 0.05 [20]. In the test car, real time traffic events were captured by the observer using a video recorder over the entire period of study in other to minimize human error.The recorded traffic datawere saved on a computer system for further processing and analysis.

2.3 Data Processing

The collected data from the video recorder were gathered in excel, and then processed to obtain the three macroscopic traffic stream parameters: flow rate, mean speed and density.

To calculate the hourly flow rate, the following equation was used:

$$q = \frac{Mw+Ma}{Tw+Ta} \qquad (3)$$

Where:

q is flow rate, Mw is difference between vehicles overtaking observer vehicle and vehicles overtaken by observer, Ma is vehicles moving against the traffic flow opposite the direction of interest, Tw is travel time to traverse the study segment with traffic, and Tais travel time to traverse the study segment against traffic.

Mean speed was calculated using the following equation:

$$u = \frac{L}{[Tw - \frac{Ma}{q}]} \qquad (4)$$

Where:

U is mean speed and L isthe length of study segment (km),

Density was calculated using the fundamental traffic flow relationship (1).

The descriptive statistics of the fundamental traffic flow parameters are presented in Table 1.

2.4 Data Analysis

Statistical analysis was performed on the traffic flow parameters to describe the observed patterns. The relationship between flow rate, mean speed and density was developed using two approaches namely: developing nonrelated traffic stream models and developing related traffic stream models as described in the following section.

https://dx.doi.org/10.22161/ijaems.5.1.13 *ISSN: 2454-1311*

2.4.1 Development of Nonrelated Traffic Stream Models

The relationship between the traffic stream parameters flow, speed and density was developed based on the data collected by the moving observer method using the best fit curve technique in SPSS statistical software. The basic relation (5) between the three variables was neglected as described by[11]. The developed relationships are presented in section 4.4 of this document.

2.4.2 Development of Related Traffic Stream Models

To describe the exact relationship between the traffic parameters, Greenshield's macroscopic stream model was applied [11]. He assumed a linear speed-density relationship to derive his model (5). Once the relationship between speed and density was established, the relationship with flow could be derived.

2.4.2.1 Speed –Density Relationship

$$V = Vf - \frac{Vf}{Kj}k \qquad (5)$$

Where: V is the mean speed at density K, Vf is the free flow speed and Kj is the jam density.

2.4.2.2 Flow-Density Relationship

Flow-density relationship is derived as described below:

$$V = Vf - \frac{Vf}{Kj}k$$

$$q = vk$$

Where Q is the traffic flow

By substitution;

$$q = [Vf - \frac{Vf}{Kj}k]k$$

By simplification;

$$q = \left[Vfk - \frac{Vf}{Kj}k\right]k^2 \qquad (6)$$

2.4.2.3 Speed – Flow Relationship

The relationship between speed and flow was derived as described below;

From (5);

$$K = Kj - [\frac{Kj}{Vf}]k$$

By substituting for K in (6);

$$q = VKj - [\frac{Kj}{Vf}]V^2 \qquad (7)$$

III. RESULTS AND DISCUSSION

1.1 Traffic Stream Parameters

The descriptive statistics of the traffic stream parameters is presented in Table 1.The maximum flow rate recorded on the study segment was 329 veh/h while the minimum was 283 veh/h. this infers that on average, 7000 vehicles traverse case study daily.The mean speed is 94.65 km/hthis is in tandem with [17]. The posted speed limit on the study segment is 100 km/h. This may mean that majority of the drivers are travelling within the speed limit. There is a need to conduct a spot speed study in other to examine the accuracy of the moving observer technique. The maximum density observed on the study segment is 3.2 veh/km.

Table.1: Descriptive Statistics of Traffic Stream Parameters

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
speed	20	88.00	104.00	94.6500	4.33195	18.766
density	20	2.80	3.61	3.2395	.22589	.051
flow	20	283.00	329.00	305.9000	11.86725	140.832
Valid N (list-wise)	20					

1.2 Traffic Composition

The composition of traffic stream in both directions along the study segment is presented in(Fig.2). Passenger car makes 69% of the total traffic followed by motorcycle/tricycle. The percentage of motorcycle/tricycle is high because there are quite a number of farm settlements adjoining the study segment in which majority of them use motorcycle as a means of transportation to their non-motorable farms. The impact of land use on the traffic stream could be a subject of future research. The heterogeneity of the traffic stream further justifies the need to develop traffic stream relationships suitable for local conditions and not the "one-size-fits-all" approach. The implication of this phenomenon on the traffic flow is outside the scope of this study.

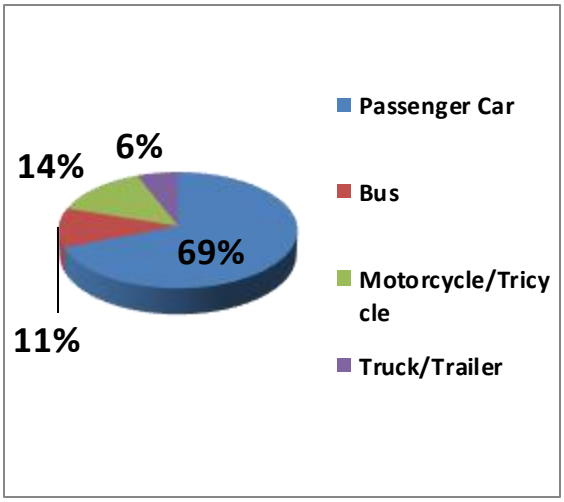

Fig.2: Composition of Vehicles in the Traffic Stream

1.3 Traffic Stream Relationships

https://dx.doi.org/10.22161/ijaems.5.1.13 *ISSN: 2454-1311*

Scatter diagrams were plotted between speed-density, speed-flow, and flow-density using the data collected from the study segment (Fig. 3, 4, and 5). It is observed from these charts that the data collected covers a wide range of traffic stream parameters. The linearity of the speed-density relationship chart supports the claims of Greenshield [11]. The scatter diagram of speed-density relationship indicates that when density becomes zero, speed approaches free flow speed. The ideal relationship between flow and density and flow-speed are parabolic in shape [11] though this is not clearly seen in the scatter plot possibly because the chart forms a part of the whole curve(Fig. 4 and 5).

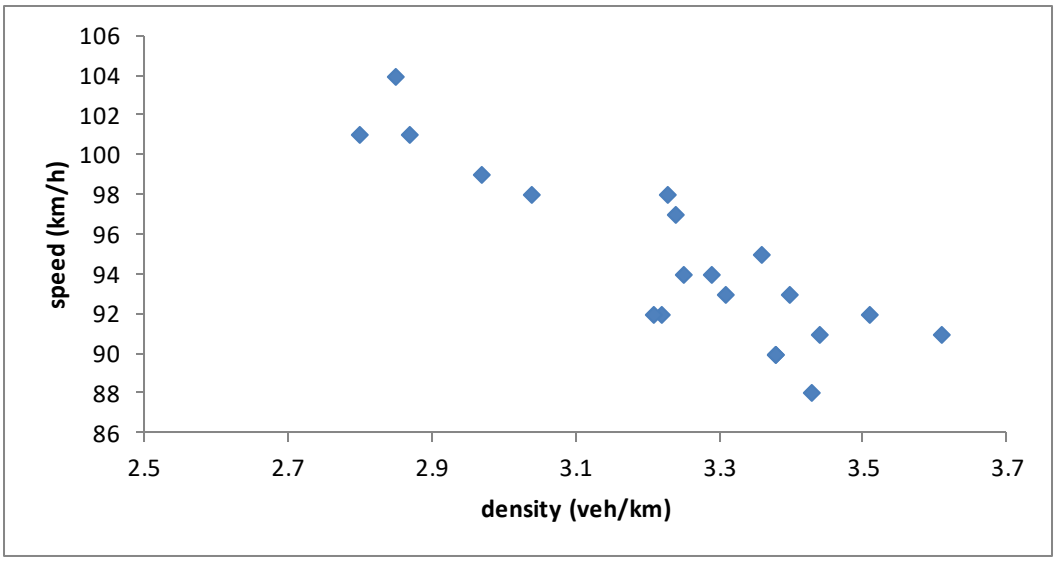

Fig.3: Speed – Density Relationship

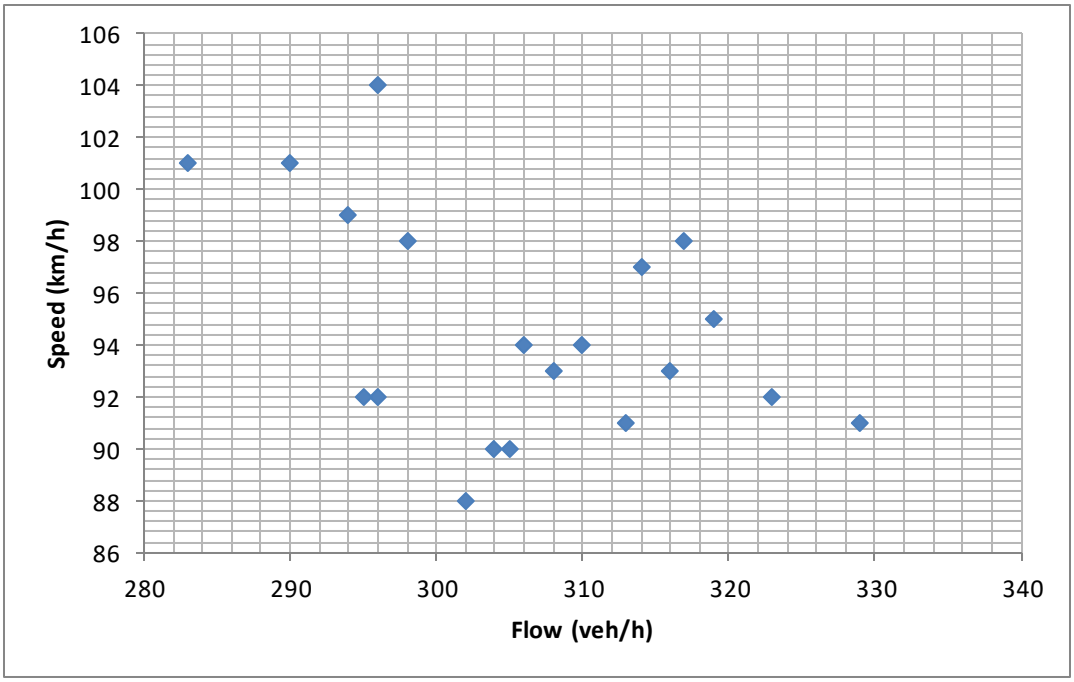

Fig.4: Speed – Flow Relationship

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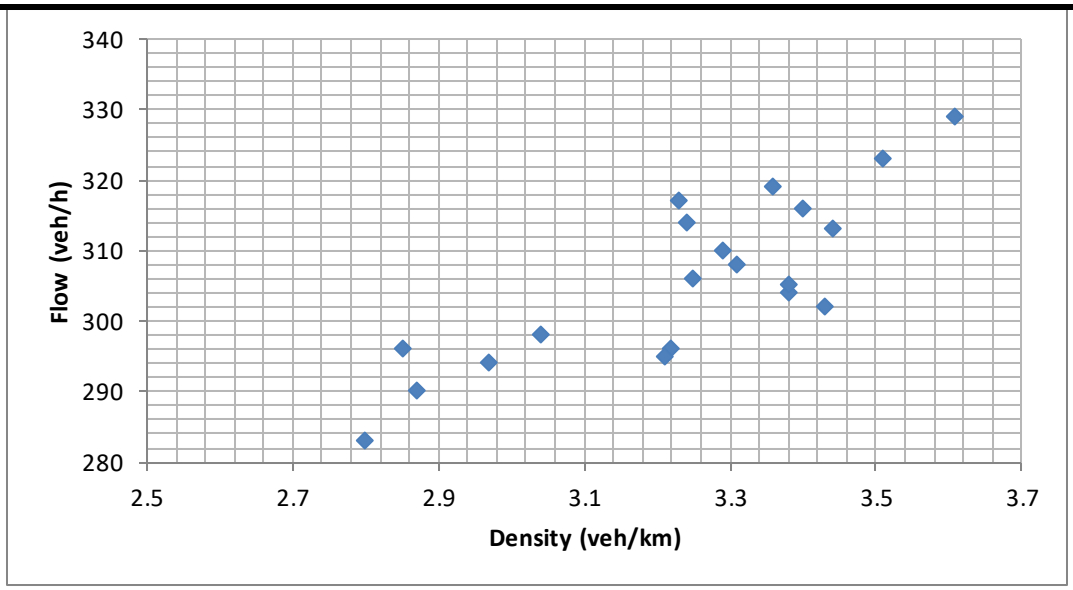

Fig. 5: Flow – Density Relationship

3.4 Model Development

Best fit curve technique was used to develop the relationship between the traffic stream variables; flow, speed and density based on the collected data by neglecting the fundamental relationships between the three variables[11].The developed relationships are presented in (8),(9) and (10).

Speed – Density Relationship

$u = 149.027 - 16.786k$ (8)

Flow – Density Relationship

$q = 376.791 - 90.442k + 21.066k^2$ (9)

Flow – Speed Relationship

$q = -1457.22 + 38.084u - 0.205u^2$(10)

This relationship is inaccurate because at density or speed equal to zero, flow rate is not equal to zero. In addition to this, the estimated values are different for the same inputs in the above equations. These short comings necessitate the development of related traffic stream models.

3.4.2 Related Traffic Stream Models

The first step in developing related traffic stream models was to develop the best fit speed-density relationship (11),then flow-density and flow-speed models were developed from this relationshipas presented in (12 and 13).Equation 11 validates the claim of [11] that speed-density relationship is linear under free flow conditions.Using the relationships developed in (11, 12, and 13), the maximum flow of the two-lane road under study was estimated as 330 veh/h. This result is very close to the maximum flow rate of 329 veh/h recorded during field survey. The density at the maximum flow rate was estimated as 4.44 veh/km. This implies that when the road under study is operating at capacity there are 4.44 vehicles on a kilometer of road section and they are travelling at a speed of 74.51 km/h. The free flow

3.4.1 Nonrelated Traffic Stream Models

speed was estimated as 149.027 km/h. This implies that when the density tends towards zero a vehicle can travel as high as 149.027 km/h on the road segment under study, though the posted speed limit is 100km/h.

Speed – Density model

$u = 149.027 - 16.786k \; at \; k < 4.44 veh/km$(11)

Flow – Density model

$u = 149.027k - 16.786k^2 \; at \; k < 4.44 veh/km$(12)

Flow – Speed model

$q = 8.74u - 0.058u^2 \; at \; u > 74.51 \; km/h$(13)

The developed models are applicable for free flow speed equal to 149.027km/h or less.

3.5 Model Performance

In this study, coefficient of determination (R^2) was employed to evaluate the performance of the related traffic stream models developed. The developed models performed well at describing the relationship between traffic stream parameters. This result is similar to [21].

Table.2: Summary of Related Traffic Stream Model Performance

Relationship	R^2
Speed-Density	0.80
Flow-Density	0.75
Flow-Speed	0.62

IV. CONCLUSION

Development of mathematical relationships among the primary elements of a traffic stream: flow, speed and density; helps traffic engineers in planning, designing, and evaluating the effectiveness of implementing traffic engineering measures on a highway system. The macroscopic relationships between traffic stream parameters: flow, speed and densityof a two-lane highway

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in southwest Nigeria have been investigated. The application of moving observer technique in collection of traffic flow parameters was found satisfactory, but there is a need to compare its accuracy with other methods like manual counts and spot speed. The related traffic stream models developed in this study performed well at describing the relationship between flow-speed, flow-density and speed-density. These models can be found useful by policy makers, researchers and transportation engineers. Future research can consider investigating the impact of heterogeneity and land use on traffic stream characteristics.

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Appraisal of the Choice of College among Management and Business Technology Freshman Students

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Abstract**—** *This paper aimed to investigate who influenced the 211 freshman students from the College of Management and Business Technology (CMBT) to take their course.Their influencers' reasons for choosing the course and selecting the NEUST, San Isidro Campus (SIC) as their mother University.*

A survey questionnaire was the instrument utilized to gather data and descriptive statistics such as frequency, percentage, and weighted mean were the statistical tools used in analyzing and interpreting the gathered data. Findings have shown that the advice of the respondents' parents played a big role in their choice of a college course. As to their to their reasons for taking their course, the course they have chosen is popular to the majority of their acquaintances and they chose NEUST SIC because of its scholarships and grants, excellent teachers and quality education.

Keywords— Choice of College, excellent teachers, parents' advice, quality education.

I. INTRODUCTION

"Education is the most powerful weapon which you can use to change the world"…Nelson Mandela.

Most if not all of the parents want their children to have a good college education to be successful in life. According to the author in [1], "education is important for the personal, social, and economic development of the nation and the standard of living of its citizens is largely dependent on the level of education the citizens are able to acquire."

One of the universities in Nueva Ecija, the Philippines that offers good college education is the Nueva Ecija University of Science and Technology (NEUST). "It offers quality education to its clientele and the researches of this university focused on studies that will contribute to quality instruction, effective instruction services, globally competitive technologies, good governance and curriculum development [2]." "Likewise, to produce responsible and productive citizens who are skilled in research is one of the aims of the university [3]."

Vital for all universities, including the NEUST,is knowing how students choose their college school. "Students are the lifeblood of the universities and student characteristics often define the distinctiveness of individual campuses [4]."

"Students have different preferences in choosing their courses and college although some may not have a solid decision on where to go in college and what degree program they may possibly take. They are planning to enter college without a clear idea of what career to pursue their future [5]."

Investigating several factors that may affect the judgment of students in picking the school and their college course can be a good source of insight for higher educational institutions like NEUST to offer quality services that will suit to the needs, expectations, and demands of the community. This is how this study was conceptualized. It aimed to investigate who influenced the students to take their course, what are their influencers' reasons for choosing the course and selecting the NEUST, San Isidro Campus (SIC),as their mother University.

II. METHODOLOGY

The study used a descriptive method of research in an attempt to appraise, analyze and interpret the student's decision making in choosing their university and college course. The respondents of the study were 211 freshman students of the College of Management and Business Technology (CMBT) in NEUST San Isidro Campus, who are currently taking the course Bachelor of Science in Business Administration (BSBA) major in Marketing Management and Bachelor of Science in Entrepreneurship. The researchers-made questionnaire was the main instrument used by the researchers in conducting this study. However, the questionnaire used for obtaining respondents' reasons for choosing NEUST SIC was adopted from the study of the author in [6]. Frequency, percentage and weighted mean were utilized to compute and evaluate the data gathered in this study.

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III. RESULTS AND DISCUSSIONS

Table.1: Profile of the Respondents

	Frequency	Percentage
Sex		
Male	59	27.96
Female	152	72.04
Total	**211**	**100.00**
Address		
San Isidro	57	27.01
San Antonio	50	23.70
Gapan	25	11.85
Jaen	34	16.11
San Leonardo	2	0.95
Cabiao	43	20.38
Total	**211**	**100.00**
Family Monthly Income		
P 30,000 above	5	2.37
P 25,000–P 29,999	24	11.37
P 20,000–P 24,999	35	16.59
P 15,000–P 19,999	78	36.97
P 10,000–P 14,999	37	17.54
P 10,000 below	32	15.17
Total	**211**	**100.00**
Parents Highest Educational Attainment		
Mother		
Elementary Undergraduate	86	40.76
Elementary Graduate	37	17.54
High School Undergraduate	25	11.85
High School Graduate	12	5.69
College Undergraduate	27	12.80
College Graduate	22	10.43
With MA Units	0	0.00
With MA Degree	0	0.00
With Doctorate Units	0	0.00
With Doctorate Degree	2	0.95
Total	**211**	**100.00**
Father		
Elementary Undergraduate	150	71.09
Elementary Graduate	32	15.17
High School Undergraduate	25	11.85
High School Graduate	3	1.42
College Undergraduate	0	0.00
College Graduate	0	0.00
With MA Units	1	0.47
With MA Degree	0	0.00
With Doctorate Units	0	0.00
With Doctorate Degree	0	0.00
Total	**211**	**100.00**

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Majority of the CMBT freshman students are females and living in San Isidro, Nueva Ecija. This means that the course was dominated by females who are living within the vicinity of the campus. Their parents are both elementary undergraduates who are earning within the range of P15,000.00 to less than P20,000. This implies that college education of their children is very important to the parents of the respondents despite the fact that majority of them did not reach high school and they belong to lower-middle-income class (Class D).

Table.2: Influencers of the Respondents to enroll in the Course

DESCRIPTION	**Frequency**	Percentage
It is my personal choice.	32	15.17
I followed my parents' advice.	100	47.39
My high school teacher inspired me to take the course.	42	19.91
My peers influenced me to enroll in this course.	37	17.54
Total	211	100.00

The respondents answered that their parent'sadvice played a big role in their choice of a college course."There is no argument that child's upbringing has a significant impact on the person he becomes; therefore, it is entirely plausible to make the assumption that parents would have some level of influence over a child's post-secondary education career choices [7]". "Furthermore, high schools are a transition to higher institutions of learning and the world of work so they have a critical role in assisting students to choose careers [8]" that's why their teachers in senior high school can also be an influence in their choice of course. Peer influence is also another factor that influenced students in their choices even in choosing their track in college. "It was proven that peer and friends have considerable impetus towards career decisions and academic choices [9]."

Table.3: Reasons for Taking the Course

	Frequency	**Percentage**
The course will give me a longer term of employment.	55	26.07
There are job opportunities after graduation.	33	15.64
I am good at this field.	2	0.95
The course is popular tothe majority of my acquaintances.	76	36.02
The course is in demand in the country and abroad.	24	11.37
The field of work is elegant.	21	9.95
Total	**211**	**100.00**

Since students spend most of their times in school with their peers and friends, they are considered as a strong factor when they make decisions that's why the respondents disclosed that the course they have chosen is popular to the majority of their acquaintances.

Another top reason why the respondents choose their course is that of its stability. They want to take the course that will give them the long term of employment. The authors in [10] have "identified a range of factors influencing course preference among students and one of them is graduate employment from the course."

Table.4: Reasons for Choosing NEUST San Isidro Campus (SIC)

	WM	**Verbal Description**	Rank
1. NEUST offers quality education.	3.28	Agree	3
2. NEUST has high accreditation status.	3.27	Agree	4
3. NEUST has highly qualified teachers.	3.53	Agree	2
4. NEUST trains the students about the real world of work.	3.04	Moderately Agree	7
5. NEUST trains the students to be good and spiritual.	3.02	Moderately Agree	8
6. NEUST has scholarships, grants and affordable tuition fees.	3.54	Agree	1
7. NEUST trains the students to be catalysts in their field of specialization.	3.01	Moderately Agree	9

https://dx.doi.org/10.22161/ijaems.5.1.14 *ISSN: 2454-1311*

8. NEUST has well-known alumni.	3.26	Agree	5
9. Other people respect and admire NEUST's graduates.	3.25	Agree	6
Overall Weighted Mean	3.24	Agree	

Legend: 1.00 to 1.74 Disagree; 1.75 to 2.49 Slightly Agree; 2.50 to 3.24 Moderately Agree; 3.25 to 4.00 Agree

Top among the reasons why the students picked NEUST SIC is because the university has scholarships, grants and affordable tuition fees. It is followed by the university has highly qualified teachers and it offers quality education. The data suggest that the university was chosen by the students because of its scholarships and grants, excellent teachers and quality education. This finding coincides with the finding of the author in [6]. Foskett et al. (2006) as cited by authors in [10] found that "students consider more carefully economic factors in times of distress and financial difficulty. These factors include job opportunities to supplement their incomes, accommodation costs, and family home proximity." As to the teachers' quality, most of the teachers in the university are making their instructions effective, engaging and enjoyable [11] to cater to the needs of their students.

IV. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the study, the researchers arrived at the following conclusions:

The advice of the respondents' parents played a big role in their choice of a college course. As to their to their reasons for taking their course, the course they have chosen is popular to the majority of their acquaintances and they chose NEUST SIC because of its scholarships and grants, excellent teachers and quality education. Based on the findings and conclusions, the following recommendations are given: a.the students should be well–informed with the jobs and careers that await them after college if they take up BSBA courses; b. the university must conduct a survey to different schools offering senior high school to identify the courses preferred by the students when they enter college; c.when the university use marketing strategies with the courses being offered, it should promote those characteristics of the institution that the students value most; and d.the university must continue to strengthen their programs in the BSBA equipped with the most academically qualified and well–experienced faculty members;

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