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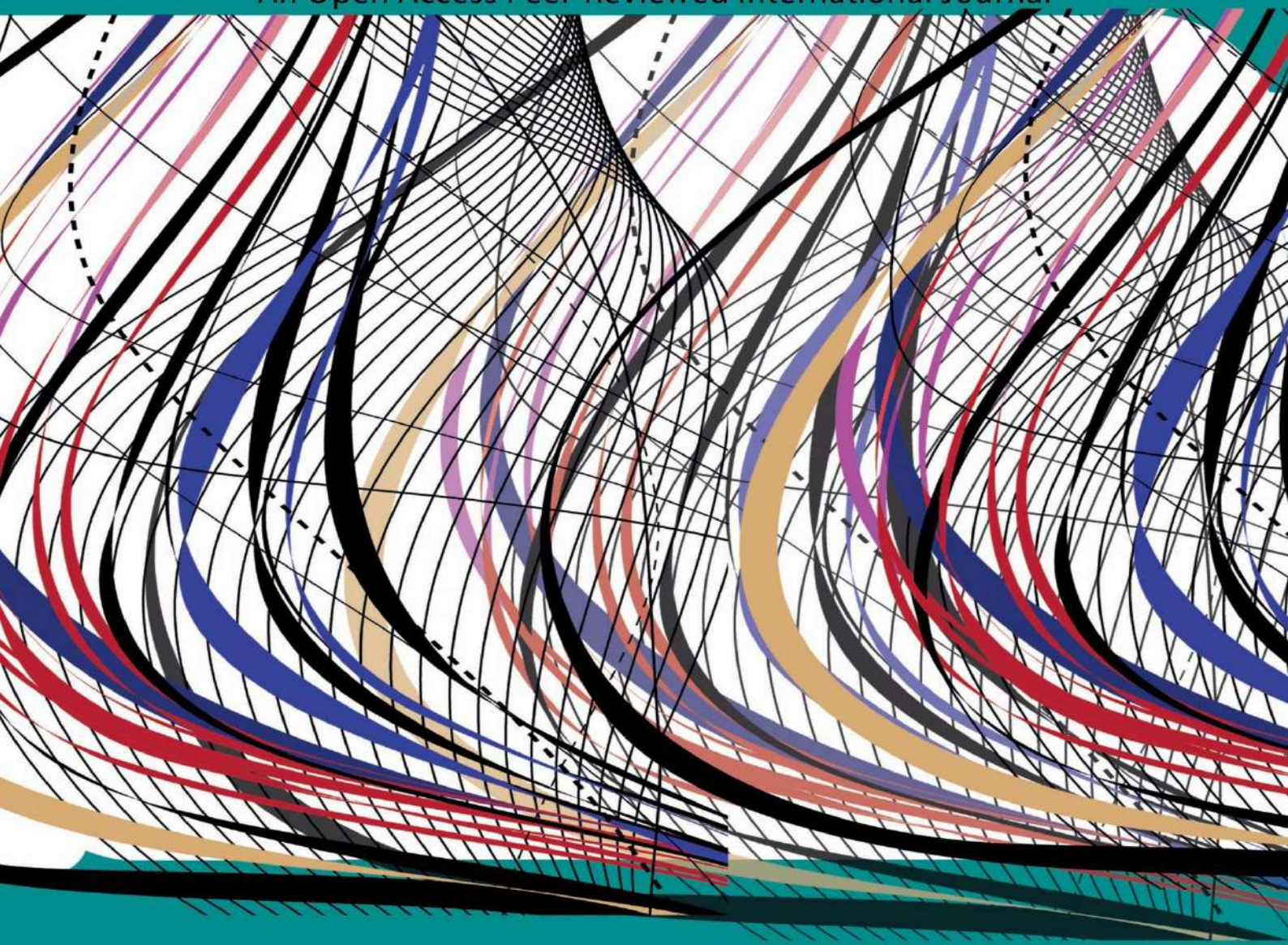

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Ultra-Wide Band (10 GHz Bandwidth) Microstrip Patch Antenna for Millimeter Wave - 5G Applications

Tauseef Ur Rehman[1], Nabeel Muqarrab[2]

[1]University of Engineering and Technology Peshawar, Pakistan
tauseefrehman93@gmail.com
[2]University of Engineering and Technology Peshawar, Pakistan.
muqarrab92@gmail.com

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Abstract**—** *This paper introduces a microstrip patch antenna (MPA) for fifth Generation (5G)/ millimeter-Wave (mm-Wave) applications for frequencies > 50 GHz. The proposed antenna is designed and simulated on a flexible substrate of cotton jean having ε_r =1.76, δ =0.078, and a height of 1 mm. The designed antenna operates over an impedance bandwidth of 10 GHz with a maximum gain of 6.167 dBi. The antenna patch's largest dimension is 2.82mm (0.52687 λ) and the ground is 8 mm (1.499 λ), whereas λ is calculated at the center frequency of impedance bandwidth.*

Keywords**— 5G, mmWave, Microstrip Patch.**

I. INTRODUCTION

A next-generation communication system (5G) has gone under tremendous development in the recent past [1] [2]. 5G technologies are still vigorous and untamed entity for the researchers, as the existing challenges that 5th Generation faces are not yet addressed by 4th Generation i.e., Provision of Consistent Quality Experience, Higher Data Rates, Security, Gigantic Device Connectivity, Reduced Cost, Higher Capacity, High Throughput, Smart network software's, D2D communication, Heterogeneous networks (Small cells) and Massive MIMOs.

To make 5th Generation technologies viable in the market a thorough examination of the existing multiple access techniques within the installed networks is required as they are on the verge and need substantial improvement to suffice for the existing problems. As current multiple-access technologies will work for the next 50 years i.e., OFDMA, and to change the existing system for just 5G networks is not economically feasible. According to the survey wireless users spends 80% of the time indoor and 20% outdoor so to coupe for the urges of the users and to tackle the challenges 5G network architect will offer a solution to differentiate between inside and outside setups as to reduce the penetration loss and increase spatial efficiency. This is where the concept of massive Multiple Input Multiple Output (MIMO) technology emerges [3] [4]. In 5G this MIMO will be geographically dispersed and will be consisted of 100 [5] or more antenna units to utilize more of the huge capacity gains and will be installed for outdoor utilization. Ultra Wide band (UWB), Wi-Fi, Visible Light communication, mm-wave communications, and Small Cell are preferred as they are for small range, indoor communications and have large data rates. And the other technological concept within the 5G is the introduction of device to device (D2D) [6], Machine to Machine (M2M) communication which will bring a remarkable improvement in communication range, channel reliability, spectral efficiency, and system communication because it enables the spatial diversity realization. Along with that, 5G communication systems infer that: all mobile devices must be capable of interacting with other devices that are within the vicinity of it. As the existing conventional antennas that are currently installed in portable devices which are found in smartphones are not suitable for handling 5G higher frequencies applications as set by the Federal Communications Commission (FCC) of the United States in July 2016. Meanwhile, industry-related 5G is still at disagreement on what will become of

it, apart from its advantages and disadvantages: there are a lot of prominent signs of upcoming things [7] and it has been anticipated in [8] that it will max-out its performance in merely 10 years from the time of its launch. Whereas according to the survey [9] the rate at which the data traffic between 2020 and 2030 is foreseen to increase by 55% annually, generating 5,016 Exabyte data in a single month by 2030. To meet these ends techniques like Machine Learning (ML) and Quantum Computing will play significant roles in enhancing the overall performance of the networks, optimization, and improve data-driven decision capabilities of the systems [10] [11] [12].

In this paper single microstrip patch antenna on a flexible substrate for 5G applications at frequencies > 50 GHz, is designed and simulated. As the utilization of electronic devices and gadgets is increasing day by day where as they are scaled-down in size, power utilization, by new assembling and state of the art electronic manufacturing technologies. Owing to the recent miniaturization of wireless communication electronic devices, improvement in the use of textile materials in wearable technologies has been observed [13]. Presently wireless electronic devices are cost-effective and bring ease to human society by providing portability [14]. Among the other various applications of wearable wireless electronic technology, one of the most prominent applications is the utilizations of the wearable hardware in medical care systems and wearable sensor-based wellbeing control monitoring systems to communicate information from patient to specialist remotely as are examined and discussed in [15] [16] [17]. The development of wearable textile technology in recent years is rapidly increasing, since their increasing demands in numerous applications namely navigation, radar, sportswear, health monitoring, public safety, tracking, military, portable communication, and in the civil domain are noticed [18] [19].

The principal aim of the textile based wearable antenna is to improve the existing living standard by creating electronic gadgets on textile material (fabric) which can be effortlessly incorporated onto attire. The textile artifact wherein electronic gadgets and sensors are incorporated on to clothing's to become body-worn is alluded to as e-textiles or wearable technology. These wearable innovations are a blend of both electronic innovation and textile material, which makes simple accessories of ordinary life activities. Functional advancement of the wearable electronic idea was presented in 1950; a large portion of the exploration focused on planning a wearable PC's and numerous successful designs are introduced in [20] [21]. E-textile can be amalgamated on to embellishments and kits like glasses, watches, shirts, caps, and so on.

Whereas, common users are benefitted from both in the case of smart/e-textile where textile and electronic technologies are combined. Very smart and passive/active smart are some of generations of the smart/e-textile as reported and discussed in detail in [22]. It is investigated in [23] that flexible substrate should be used in the design of wearable electronics gadgets to make it flexible, light, and foldable by exploring two flexible layers of metals to design a multichip.

An antenna is one of the essential parts of any wireless communication system, including the partially deployed 5G wireless communication system. Owing to its low cost, lightweight, easily available, and ease of integration with cloths, textile materials are preferable and adoptable in the design of wearable antennas. A wearable antenna used in wireless communication systems usually has a substrate of textile materials that are having a low dielectric constant, mostly below 3, recuperate the impedance bandwidth, and reduces the surface wave losses [24]. Furthermore, designing of compact size wearable antenna with a wider impedance bandwidth is a challenging task [25]. Simple planar wearable antennas are comprised of fabric materials used as substrate-like cotton, jeans, and cordura mostly, that are usually flexible and comfortable to wear and can be easily used in stacking configuration as well.

II. DESIGN PROCEDURE

The proposed MPA is designed for 5G applications for a frequency ranging from 51 GHz – 61 GHz. the patch size is smaller in size which is favorable for compact applications. Here in following the summary of the design procedure.

Substrate Selection and Conducting Material

Proposed MPA is designed on a cotton jean i.e. (flexible substrate) with ε_r of 1.76, δ of 0.078, and height of 1 mm [26]. For patch and ground, adhesive copper tape is used with the thickness of 0.035 mm as used in [27].

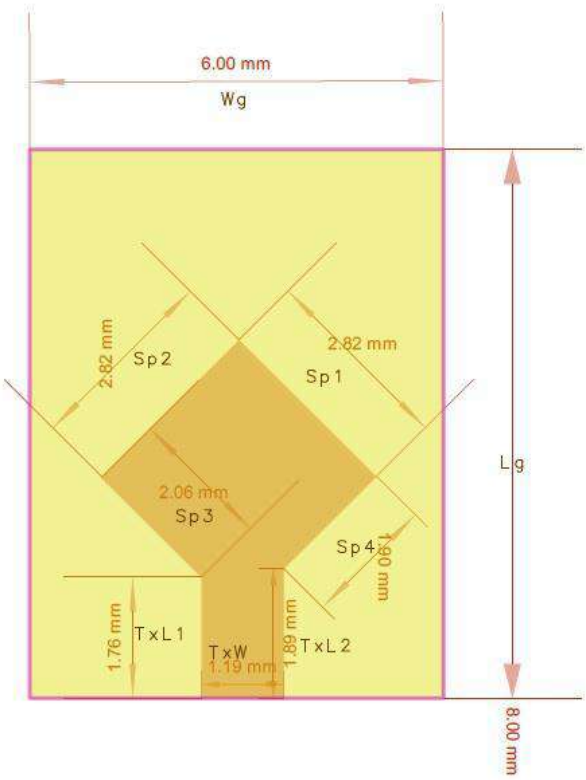

Fig.1: Proposed Antenna Design with Dimension

Dimension Calculation

Initial dimensions for the rectangular patch antenna were calculated from [28] at a center frequency of 56 GHz. The dimensions were further optimized to get the desired results. The largest dimension of the radiating patch resulted in 2.82 mm and ground's 8.00 mm.

Geometrical Shape

The shape of the antenna was modified and the nominal uneven rectangular shape and was rotated at 45 degrees to get the diamond-shaped structure with bottom edge cut for matching purposes.

Transmission Line

The transmission line was matched to the patched using loaded dimensions which can be seen in Fig.1 above.

III. RESULTS AND DISCUSSIONS

The proposed antenna is simulated in Advance Design system ADS-2016.01 and the antenna performance parameters are obtained at the frequency range of 51 GHz – 61 GHz. The analysis of proposed antenna is computed over the following parameters i.e., VSWR, return loss S11, gain, directivity, radiation pattern, and efficiency.

S11

Figure 2 shows the S11 plot of the proposed design. The results illustrate that the simulated antenna provides an impedance bandwidth of 9.85 GHz (17.55 % of Fractional Bandwidth).

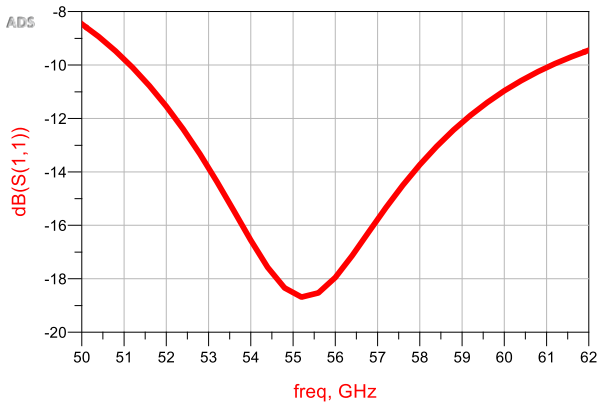

Fig.2: S11 Plot of the Proposed Antenna

VSWR

The simulated VSWR shown in figure 3 shows that the antenna is matched throughout the impedance bandwidth depicting values VSWR < 2 asset standard for the antenna design requirements.

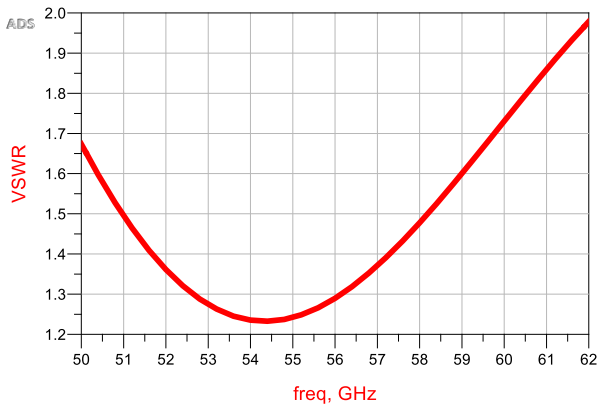

Fig.3: Plot of VSWR

Gain and Directivity

Antenna gain and directivity of the simulated antenna from Fig.4 and Fig.5 can be observed as both increase with the increasing frequency and is maximum at 61 GHz. The simulated gain and directivity range from (4.934 dBi to 6.167dBi) and (8.052 dBi – 9.171 dBi) respectively.

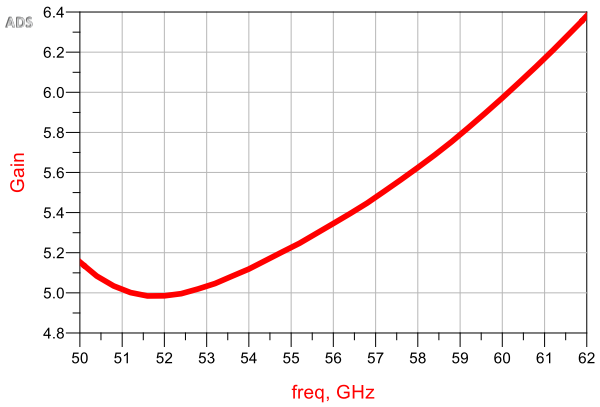

Fig.4: Simulated Gain Plot

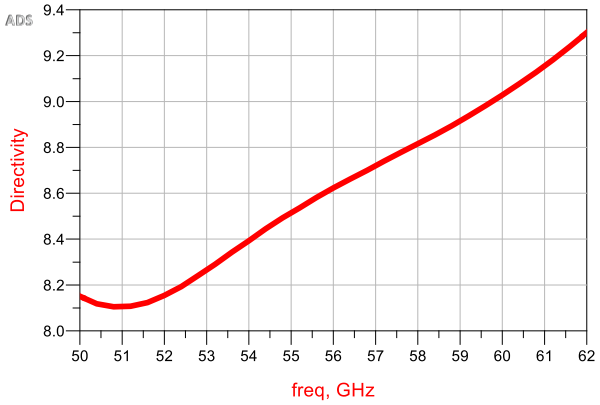

Fig.5: Simulated Directivity Plot

Radiation Pattern

The radiation pattern of the simulated antenna in the E and H Plane is shown in Fig.6 and Fig.7 below at a frequency of 55.78 GHz. The antenna radiates two main lobes and is directive in nature.

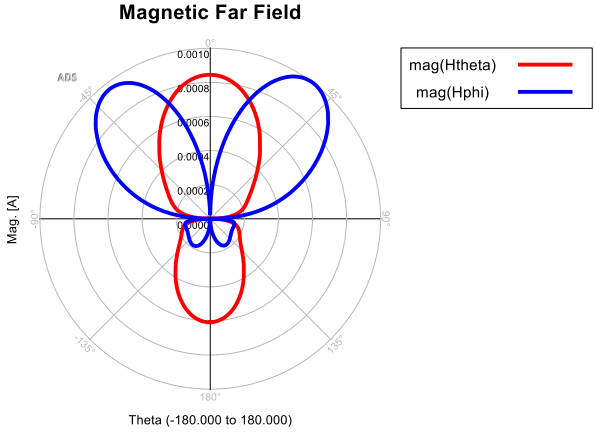

Fig.6: Simulated H-plane (Far Field) Polar Plot

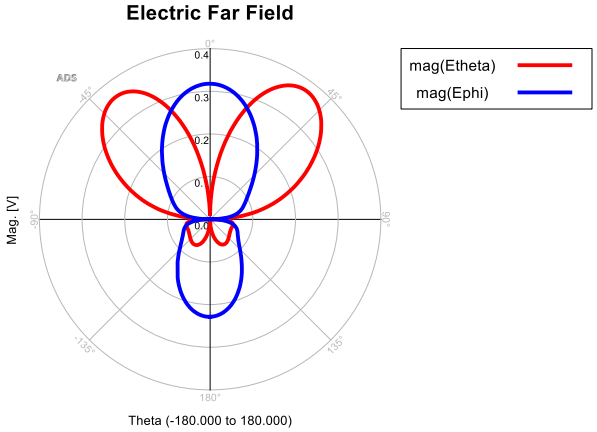

Fig.7: Simulated E-Plane (Far Field) Polar Plot

Efficiency

The efficiency of the proposed simulated antenna as shown in Fig.8

)

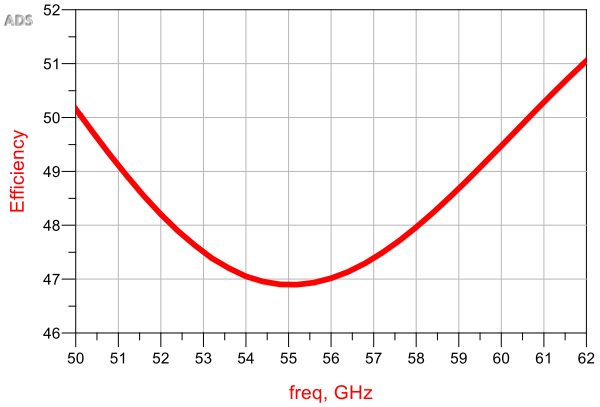

Fig.8: Simulated Efficiency Plot

IV. CONCLUSION

In this manuscript, a novel 5G antenna (Flexible) is designed and simulated at the frequency range of 51 GHz - 61.0 GHz (9.85 GHz of Impedance bandwidth) which provides a maximum gain of approximately 6.167 dBi and maximum directivity of 9.171 dBi. The inspected result shows that the said design can be used in future 5G applications at higher frequencies.

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A Conjoint Analysis and Customers Approval in Food Delivery Services in Cabanatuan City

Alvin Gino M. Bautista, MBA; Elizabeth S. Manuel, MPA; Renato L. Virola, MBA

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Abstract**—** *Food delivery has become an essential part of our lives. Many people nowadays patronize this third-party service because of convenience, especially this time when people limit their movements and preferred to stay at home and be safe. Many food delivery services do their business in the City of Cabanatuan, hence, this study aimed to investigate the satisfaction rating of customers in the services performed by the providers using Conjoint Analysis and in a descriptive method of research. The answers in the questionnaire of the selected respondents were tallied, and the frequency, percentage, and weighted mean, of their answers were calculated in order to obtain their verbal interpretation. The result of the study from the data gathered revealed that young professionals are mostly the customers of food delivery services and cheap delivery charges, high-quality products even it is expensive is much valued by the respondents.*

Keywords**— Food Delivery, Cost-Based, Conjoint Analysis, Cabanatuan City, Customers Approval**

I. INTRODUCTION

Food delivery is a special courier service offered by restaurants and other fast-food chains to transfer their products to the customers, but due to this COVID19 pandemic where the government limits the movement of the people, food delivery services are now a third-party business that booms nowadays. Food Panda, Grab Delivery, Toktok, Bitbit Delivery, Manong, PassFast Cabanatuan, and many more offer their services in the easiest and most accessible way of transferring your order from the stores all the way to your door. For both customers and businesses, food delivery presents several advantages. It's fast, convenient, and offers a variety of options that's simply not evident across other platform types.[1]

The Philippines is famous fora fast-food culture influenced from American culture, so not surprised to see lots of fast-food brands are dominating the top food delivery apps in the Philippines for both iPhone and Android mobiles.[2]Convenience,this is one reasonwhy the Food Delivery business is now acceptable and patronized by many customers in the City of Cabanatuan, Nueva Ecija, especially during this pandemic. As we all know, food delivery is not new, but the emergence of this business is notable, thus, the researchers want to study the predilections or preferences, as well as the approval of the customers in food delivery services specifically with their products and services, and the problem encountered by the customers using conjoint analysis.

Objective of the Study

This study was conducted to investigate the satisfaction of the customers in food delivery service in Cabanatuan City, Nueva Ecija. Specifically, it sought to answer the following questions:

1. How may the profile of the respondents be described in terms of:
   - 1.1 Age;
   - 1.2 Sex;
   - 1.3 Location of the house from store or business center (in kilometers);
   - 1.4 Source of income;
   - 1.5 Estimated monthly income;
   - 1.6 Frequency of delivery order per month.
2. Products and Services;
   - 2.1 Computer/Phone Application;
   - 2.2 The price of the products compared to store price;
   - 2.3 The deliveredfood and

drinks;
2.4 The delivery charges;
2.5 The manners of delivery person; and
2.6 Payment options.

3. Choice-Based Conjoint Analysis
   3.1 The product price is high, in good quality, the delivery cost is expensive;
   3.2 The product price is cheap, in good quality, the delivery cost is expensive;
   3.3 The product price is high, the quality is low, the delivery cost is expensive;
   3.4 The product price is cheap, the quality is low, the delivery cost is cheap;
   3.5 The product price is high, of good quality, the delivery cost is cheap;
   3.6 The product price is cheap, the quality is low, the delivery cost is cheap;
4. Problems encountered by the customers.

II. METHODOLOGY

The Descriptive Survey Method of research was used by the researchers in this study. According to Calderon (2006), defined descriptive research as a purposive process of gathering, analyzing, classifying, and tabulating data about prevailing conditions, practices, processes, trends, and cause-effect relationships and then making an adequate and accurate interpretation about such data with or without or sometimes minimal aid of statistical methods. Also, this method ascertains prevailing conditions of facts in a group under study that gives either qualitative or quantitative, or both, descriptions of the general characteristics of the group as results.[3]

The study wishes to find out and describe the present profile of the respondents, their satisfaction in the products and services rendered, and assess the problem encountered by the customers to the service providers using conjoint analysis. According to Tim Stobierski,Conjoint analysis is a form of statistical analysis that firms use in market research to understand how customers value different components or features of their products or services. It's based on the principle that any product can be broken down into a set of attributes that ultimately impact users' perceived value of an item or service.[4]

This research limits the study in using Choice-Based Conjoint Analysis. Choice-based analysis (AKA discrete choice experimentation) is a type of response used in conjoint studies where respondents are tasked with choosing which option they would buy. It is considered the most reliable method of choosing responses as it is the most realistic in a market research context. [5]

The respondents who are living in the City of Cabanatuan were randomly selected to answer the casual interviews and questionnaire interpreted by the researchers. The data gathered were used only for the study and treated with supreme privacy.

After all the data needed were gathered, the frequencies of answers in each question were tallied and their percentage was obtained. The Frequency, percentage, weighted mean, and mode of their answers were calculated in order to obtain their verbal interpretation.

The hereunder scale with its corresponding description was used as a guide in interpreting the response to the items.

Table 1 Scoring Method

SCALE	WEIGHT	VERBAL INTERPRETATION
4	3.26 – 4.00	VERY SATISFIED
3	2.51 – 3.25	MODERATELY SATISFIED
2	1.76 – 2.50	SLIGHTLY SATISFIED
1	1.00 – 1.75	UNSATISFIED

III. RESULTS AND DISCUSSION

According to the result of the survey conducted by the researchers, the following results were:

Majority of the respondents who patronize food delivery services were female, in the 20-30 age bracket. Salary is the main source of their income, and in the frequency of orders per month, 64% or the majority of the respondents answered they Sometimes avail the service of food delivery, 29% answered Often, and the remaining 7% answered Always.

Table 2. Approval Rating on the Product and Delivery Services

Factors	WM	VI
Cellphone/Computer Application	3.06	MODERATELY SATISFIED
The price of the products compared to store price;	2.54	SLIGHTLY SATISFIED
The delivery of the products;	2.90	MODERATELY SATISFIED
The manners of delivery person	3.33	MODERATELY SATISFIED
The delivery charges	2.47	SLIGHTLY SATISFIED

Payment options	3.30	MODERATELY SATISFIED

Table 2 shows the approval or satisfaction rating with a verbal interpretation of the respondents' experiences on the food delivery service.

Based on the result of Choice-Based Conjoint Analysis, majority or 53% of the respondents chose the factor of "The product price is high, of good quality, the delivery cost is cheap", while few respondents chose "The product price is cheap, the quality is low, the delivery cost is cheap."

Moreover, the top problems encountered by the respondents with the food delivery service according to the survey conducted are as follows:

1. The product is taking too long to be delivered.
2. Unable to locate the exact area of delivery.
3. Wrong product delivery.
4. The product is damaged.
5. Delivery person has a bad attitude.
6. The delivery person has no money for a change.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the aforementioned outcome of the research study the following conclusion and recommendations were drawn by the researchers: Most of the respondents are female in the age bracket of 20-30, the researchers conclude that they are young working professionals who love to eat in a fast-food restaurant rather than cooking their own food.

With respect to the approval rating on the delivery service provider and as shown in Table 2, researchers conclude that there are minor errors with regards to the cellphone or computer application, the price of the products compared to store price, the delivery of the products, the manners of the delivery person, the delivery charges, and payment options. However, the researchers recommend that these minor errors as well as the recorded problems encountered by the customers be used by the delivery service provider to furtherly improve their business.After-sales feedback from the customers must also be gathered and be used to earn business excellence. According to Tekeuchi and Quelch, the quality of customer service after the sale is often as important as the quality of the product itself. Of course, excellent customer service can rarely compensate for a weak product. But poor customer service can quickly negate all the advantages associated with delivering a product of superior quality.[6]

According to Niel Patel, Price is one of the most common objections your visitors will have. Few businesses want to compete on price. And no marketer wants their product to be thought of, first and foremost, as either "cheap" or "expensive." [7]Consumers nowadays are looking for the best quality productseven it is more expensive than other options, thus, it is highly recommended to prioritize the quality of the products at all time, and do not be afraid to sell them because customers value expensive products and they use it more than usual. However, the researchers also recommend to consider the delivery charges because it is also valued by the consumers. In doing marketing research to furtherly improve the product and services, the researcher recommends to do a Conjoint Analysis to determine how people make decisions and on what factors do they place real value in various products and services. Further study on how to improve their business aside from the recommendations of the researchers is highly encouraged.

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Assessment of Yield Enhancement Intervention under National Rice Program and Rice Competitiveness Enhancement Fund to Palay Production and Income of Nueva Ecija Farmers

Ronel Leabres

Garduate School, Nueva Ecija University of Science and Technology, Philippines
Email: leabresronel@gmail.com

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***Abstract*—*Rice is a staple food for Filipinos and the sufficiency of its supply is essential. The Philippines source its supply of rice from local production and importation from neighboring Southeast Asian countries such as Vietnam and Thailand. Nueva Ecija and its farmers are the largest rice producer in the Philippines. Nueva Ecija was popularly known as the Rice Granary of the country as it produces 9.5 – 10% of the total rice production in country for the last 5 years or equivalent to 1.6 million MT to 1.9 million MT. A percentile change in the production volume of rice in the province will have an impact of approximately 18000MT of change in supply availability. The level of supply in the province may affect the farmgate pricing of palay, affect the income of the farmers and helps determine their willingness to plant in the upcoming seasons. Farmgate price of palay in Nueva Ecija from 2010 to 2020 is Php 12.72 to Php26.68.Low farmgate prices discourage farmers to plant or disable them to do so as they are losing capital for the succeeding seasons. Rice seeds and farm inputs are being provided by the government thru RCEF to selected farmers to increase their productivity and subsidize some of the cost of production. The same programs were rolled out in Nueva Ecija, but farmers still ask for support to help them turn the rice farming profitable.*

Keywords*—*RCEF, rice farming, rice production, rice tariffication.

I. INTRODUCTION

Filipino's whole day meal will not be complete without rice. Similar with Philippine's neighboring Asian countries, a meal is not considered a meal without rice for majority of its population. Filipino's have also made several dishes made of rice - from porridge, to fried rice, to rice cakes and or the normally cooked white rice. There is a deep relation of rice to the normal life of Filipino's.

Philippines all throughout its archipelago is gifted with fields capable to grow rice and Nueva Ecija is one of its provinces with the highest volume of rice produced annually. Nueva Ecija's central plane account to 9.5 to 10% of the total rice production in the Philippines making it popularly known as the rice granary of the Philippines. Nueva Ecija has around 207,401.16 ha of rice fields and account to 43% of the Region III rice growing locations.

The Philippine government had long been aiming to be self-sufficient in producing rice and reduce its dependency in importing rice from other countries to maintain a sustainable supply of food for is more than 100 million population. In 2018, the Department of Agriculture launched Philippine Rice Industry Roadmap with a goal of a "Rice-Secure Philippines". Aside from the 2018 road map, laws were also enacted aiming to boost the rice competitiveness in the country which includes the controversial Rice Tariffication Law.

Nueva Ecija has more than 110000 farmers relying on the tilling of rice fields as their main source of

income. Qualified farmers from Nueva Ecija are recipients of the government programs either in National Rice Program or Rice Competitiveness Enhancement Program. This are programs which aims to enhance the yield of the farmers with the implementation of several interventions in the rice farming.

II. DESCRIPTION OF THE SITUATION

Department of Agriculture Region 3 Rice Program covers the provinces of Bataan, Pampanga, Bulacan, Aurora, Nueva Ecija, Tarlac and Zambales. It is anchored on the Philippine Rice Industry Roadmap twin goals of Masaganang Ani at Mataasna Kita. Under this program, DA-Region 3 provided to the farmers includes the following services:

- Production Support Services
- Extension Support, Education and Training Services
- Research and Development Services
- Irrigation Network Services
- Agricultural and Fishery Machinery, Equipment, and Facilities Support Services

Under the Production Support Services, Nueva Ecija farmers receives commercial hybrid rice seed and certified seeds. Seeds are distributed to farmers to increase their seed production output in contrasts to their selected conventional rice seed. Rice seeds produced by certified seed growers and hybrid rice seed manufacturers are chosen to be part of the rice seed distribution program. In 2019, DA-Region 3 has allocated 549.66 million of budget for its rice seed distribution program.

III. REVIEW OF RELATED LITERATURE

Philippine Rice Industry Roadmap (PRIR)

"The industry vision is a rice-secure Philippines. It is anchored on the societal goal, availability and affordability of food for all Filipinos. For rice, it means availability, affordability and accessibility of high-quality and nutritious rice at all times. It encompasses broad areas relating to rice cultivation, commerce, consumption and competitiveness. The most sustainable pathway to realizing rice security is producing sufficient rice at a competitive cost."

The vision aims to deliver competitive, profitable, resilient and responsive rice industry. It acknowledges that for the rice industry to be profitable, it needs to achieve at least 50% net income for farmers at a baseline of P17/kg farmgate price, production cost of P12/kg and yield level of 4MT/ha.

The Department of Agriculture laid down necessary intervention to achieve the roadmap. It identifies 57 priority provinces. The provinces were selected based on covering yields, area harvested, cost of production and percentage of irrigated area harvested.

Nueva Ecija position itself as one of the priority provinces being one of the high yielding locations and at low production cost.

The Philippine Rice Industry Roadmap 2030 (PRIR) laid the roles and responsibility of the implementing agencies which includes the Regional Field Offices. Under the roadmap, DA-Region 3 Field Office which oversees Nueva Ecija shall exercise the following roles:

- Responsible for in the overall planning, coordination and monitoring of program implementation in the regions
- Coordinate, monitor and implement seed production activities
- Coordinate and monitor implementation of program interventions
- Update Registry System for Basic Sectors in Agriculture
- Assist in the evaluation of qualified farmers organization/beneficiaries
- Deploy subject matter specialist
- Provide accurate and timely reports
- Provide resource person in training courses for AEWs

Department of Agriculture – Region 3 Field Office Rice Program

Mandated under the PRIR, DA-RFO3 has a vison of "A food secure and resilient Philippines with empowered and prosperous farmers and fisherfolk". It has a twin goals of "Masagang ANI at Mataasna KITA". In 2021, the intervention programs launched by DA-RF03 are as follows:

Production Support Services

1. Yield Enhancing and Cost-Reducing Interventions
   - Commercial Hybrid Rice Seed
   - Certified Seeds
   - Inorganic Fertilizers
2. Disaster Response: Buffer Stocking (Registered and Certified Seeds)
   - Hybrid Rice Seed
   - Certified Seeds

Extension Support, Education and Training Services

1. Information Dissemination
   - Radio Program
   - Radio Plugs

- TV Plugs
- Advertisement Placement

2. Generation of RCM Recommendations
3. Incentive Allowance for LGU-AEWs, AFCs and LFTs

Research and Development

1. DA-IRRI Collaboration
   - Pest Risk Identification and Management (PRIME)
   - Next Gen
   - RCM Transition Plan
2. Strategic RDE Support
   - Mushroom on Station Modules
   - Rice Productivity and Cost Reduction Studies for Rainfed and Irrigated Lowland Ecosystems
   - Mechanization Assessment and Database Establishment
3. Regional Rice R4D Projects
4. Collaborative R4D with Other Institutions

Irrigation Network Services

Solar-Powered Fertigation System (SPFS). A modern technology that will redefine irrigation application as production efficiency by reducing production cost and to have an accurate irrigation and fertilizer application

Agricultural and Fishery Machinery, Equipment, and Facilities Support Services

- Four-Wheel Drive Tractors. More efficient because it can deliver 10% more power to the ground for the same fuel consumption, and have much better traction and flotation capabilities, thus, improving the quality of land preparation. In addition, this machinery lessens the time devoted for land preparation in areas affected by typhoons and floods. This machinery can perform well for both dry and wet conditions ensuring that weeds and stubbles will be incorporated thoroughly into the soil for proper decomposition that could minimize weed growth and facilitate distribution of irrigation water.
- Hand Tractors. A multi-purpose equipment since the engine can be utilized for irrigation purposes as well as in transportation of farm inputs and produce.
- Combine Harvesters. In using this machinery, threshed grains are directly placed in the sack and is ready to be sold at reasonable farm gate price reducing the stress and health risk of farmers from sun-drying. This machinery is proven to minimize production losses and fast-track harvesting operation as well as minimizing the cost of harvesting and threshing expenses.

Hybrid Rice

Hybrid rice is a type of rice that has been bred from two very different parents. It can significantly outyield other rice varieties. Hybrid rice has the capability to outperform other varieties in terms of yield when grown in a suitable location. It generates an opportunity of high level of harvest volume and generate high income level for farmers.

In the Philippines, several companies and institutions has been developing hybrid rice varieties for Filipino farmers. As of November 2021, 445 hybrid rice varieties were registered in National Seed Industry Council. Since 2011, 229 of the registered hybrid rice seeds were registered and available to Filipino farmers by seed producers such as International Rice Research Institute, Long Ping High Teck, Corteva Agriscience, Advanta, Philippine Rice Research Institute, University of Philippines-Los Baños, Syngenta Philippines Incorporated, Bayer Crop Science, SL-Agritech Corporation, Prasad Seeds, Bioseeds Research Philippines Incorporated and many other organizations in the country.

The Department of Agriculture recorded in 2021 that the hybrid rice production supported its goal of improving Philippine's food security level. Data from the Philippine Statistics Authority showed that the total production contributed by hybrid rice in 2021dry cropping season reached 3.67 million MT (MMT), which is 37 percent of the total palay production last dry season.

Philippines Rice Tariffication Law (RA11203)

RA11203 or commonly known as Rice Tariffication Law – Act liberalizing the importation, exportation and trading of rice, lifting for the purpose the quantitative import restriction on rice and for other Purposes was signed into law on February 14, 2019. It was a controversial legislation and were feared to impart the farmers. Notable parts of the law are as follows:

"SEC. 13. Rice Competitiveness Enhancement Fund. There is hereby created a Rice Competitiveness Enhancement Fund, herein referred to as the 'Rice Fund'. The Rice Fund shall consist of an annual appropriation of Ten Billion pesos (P l0,000,000,000. 00) for the next six (6) years following the approval of this Act and shall be automatically credited to a Special Account in the General Fund of the National Treasury which shall be in place within nine ty (90)' days up on the effectivity of this Act."

(b) Rice Seed Development. Propagation and Promotion - Thirty percent (30%) of the Rice Fund shall be released to and implemented by the Philippine Rice Research Institute

(PhilRice) and shall be used for the development, propagation and promotion of inbred rice seeds to rice farmers and the organization of rice farmers into seed grower's associations and/or cooperatives engaged in seed production and trade.

SEC. 15. Rice Industry Roadmap. - Upon the effectivity of this Act, the DA, together with the NEDA. Department of Finance (DOF), DBM, DAR, National Irrigation Administration (N1A), TESDA. PCIC. National Anti-Poverty Commission (NAPC) Farmer Sectoral Council Representative and other government agencies concerned, including rice farmer representatives, shall be given a maximum of one hundred eighty (180) days to formulate and adopt the rice roadmap to restructure the government's delivery of support services for the agricultural rice sector. "The following principles shall govern the development and implementation of the roadmap for the rice industry:

(a) Raise sustainable investments in the rice industry particularly on rice support infrastructure and post-harvest facilities;

(b) Improve the productivity, efficiency and profitability of small rice farmers and landless farmworkers

(c) Strengthen research and development programs that will enhance the resiliency of the rice industry

(d) Preserve and enhance the rice production capabilities of future generations

(e) Provide accessible, targeted and technology-oriented support services that cover the entire value chain;

(f) Set up responsible, participatory and effective governance mechanisms: and

(g) Address impact of income loss caused by rice tariffication. "The rice industry roadmap shall be implemented through a complementation of the DA's 13 rice sector programs as funded by the GAA and the Rice Fund created under this Act. A colon is inserted before an equation is presented, but there is no punctuation following the equation. All equations are numbered and referred to in the text solely by a number enclosed in a round bracket (i.e., (3) reads as "equation 3"). Ensure that any miscellaneous numbering system you use in your paper cannot be confused with a reference [4] or an equation (3) designation.

IV. SCOPE AND DELIMITATION

This study covers the impact of the National Rice Program and Rice Competitiveness Enhancement Fund seed distribution program in Nueva Ecija rice production and its farmers.

Other components of NRP and RCEF such as farming mechanization, education and research development shall be out of the scope of the study.

V. DATA GATHERING PROCEDURES

Data used in this study were collected using the available data in the Philippine Statistics Authority. Data downloaded from PSA includes the harvested area and volume of rice harvested in the province of Nueva Ecija. The yield was evaluated in per season and annual basis.

To derive the income of the farmers, available Statistics on Agriculture published by PSA were used to determine the production cost of palay in the Philippines.

Data collected from PSA includes a 10-year data and a 5-year data to analyze the trend of the parameters that this study is looking on to.

VI. SIGNIFICANCE OF THE STUDY

The result of this study will benefit the following:

Department of Agriculture – Region 3 Field Office – Recommendations can help the DA to customize or update its rice seed intervention program in Nueva Ecija. It can assist the agency in crafting programs which will benefit the country in achieving its rice-resilient target and provide more income to more than 100000 Novo Ecijano farmers.

Municipal and Provincial Agriculture Office – The municipal and provincial agriculture office employees will have a visibility of the on-ground intervention needed and the actions needed from their respective office to support and assist the regional field office in crafting the program for the province of Nueva Ecija.

Novo Ecijano Farmers – farmers will receive services from DA and the local government units suitable for their needs and welfare. It will also help the farmers to have an informed decision in selecting seeds for planting.

VII. RESULTS AND DISCUSSION

Nueva Ecija palay production covers 207,401.16 ha from 27 municipalities and 5 cities. 183,201.17 ha of the rice area are irrigated and 24,199.99 ha are rainfed. The vast field of rice fields is tilled by 117,713 farmers.

To determine the yield level of the rice production in Nueva Ecija, harvested area and volume of production in the province was collected both for dry season (H1) and wet season (H2).

Table 1 – Harvested Area ('000 Ha

	2017		2018		2019		2020		2021	
	H 1	H 2	H 1	H 2	H 1	H 2	H 1	H 2	H 1	H 2
Irrigated	137	154	141	157	150	163	149	149	151	153
Rainfed	-	33	-	33	-	24	-	21	-	14

Rice area planted in Nueva Ecija from 2016 to H1 of 2021 ranges from 65% to 92% of the total available area in the province. Planted and harvested area in the province is at lowest rate during the H1 or dry season harvesting where only the irrigated areas were able to plant rice crops. This is equivalent to 65% to 73% of harvestable area from the last six years. Harvested area from the irrigated areas increased by 6.02% in 2019, the same time when NRP and RCEF, compared to previous cropping season. Between 2021 and 2019, an additional 9,564.82 hectare was added in the harvested area from irrigated areas.

Wet season or H2 harvested area increased by 7.6% from 2016 to 2018 but sharply declined by 12.53% from 2018 to 2021. The 2021 H2 harvested area is even lower than 2016 harvested area by 10,552 ha. Decreased in area harvested in mainly driven by the reduction of the areas harvested dependent to rain which steadily decline from 2016 to 2021.

Table 2 – Volume of Rice Produced (Million MT)

	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Nueva Ecija	1.68	1.88	1.87	1.95	1.90	1.88
Region 3	3.34	3.63	3.62	3.73	3.63	3.74
PHILIPPINES	17.6	19.3	19.1	18.8	19.3	19.9

Nueva Ecija consistently produced more than 50% of the total rice volume for Region 3 and remains to be the highest producer of rice in the Philippines from 2016 to 2020. The province posted a steady increased from 2016 to 2019 or equivalent of 271609.14MT of rice production volume.

The volume of production declined in 2020 and 2021 with aggregated reduction of 71,637.17MT. The reduction in volume is expected and can be attributed to the reduction of area harvested on the same periods.

Table 3 – Yield of Rice per ha (MT/Ha)

Table 3.1 Annual Yield Per Ha

	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Nueva Ecija	5.37	5.81	5.66	5.82	5.97	5.91
PHILIPPINES	3.87	4.01	3.97	4.04	4.09	4.15

Table 3.2 Yield per Ha (Semestral)

	2017		**2018**		**2019**		**2020**		**2021**	
	H 1	H 2	H 1	H 2	H 1	H 2	H 1	H 2	H 1	H 2
Nueva Ecija	6.91	5.02	6.68	4.91	6.71	5.10	6.43	5.56	5.93	5.89

Table 3.3 Regional Annual Yield

	2016	**2017**	**2018**	**2019**	**2020**	**2021**
PHILIPPINE	3.87	4.01	3.97	4.04	4.09	4.15
CAR	3.46	3.85	3.51	3.78	3.67	3.71
REGION I	4.37	4.55	4.24	4.55	4.67	4.65
REGION II	4.19	4.53	4.23	4.54	4.49	4.75
REGION III	4.75	5.04	4.97	5.10	5.11	5.14
REGION	3.49	3.53	3.87	3.69	3.64	3.71
REGION	3.75	3.83	4.01	3.99	4.03	3.95
REGION V	3.60	3.67	3.78	3.49	3.74	3.89
REGION VI	3.31	3.41	3.34	3.32	3.49	3.48
REGION	2.89	3.23	3.17	2.72	2.88	3.03
REGION	3.56	3.47	3.51	3.51	3.53	3.50
REGION IX	3.74	4.06	4.10	4.11	4.09	4.12
REGION X	4.44	4.54	4.62	4.65	4.68	4.78
REGION XI	4.27	4.29	4.58	4.37	4.54	4.49
REGION	3.80	3.76	3.85	3.66	3.78	3.69
REGION	3.08	3.11	3.18	3.09	3.22	3.16
ARMM	2.56	2.61	2.82	3.24	3.11	3.57

Annual yield or rice production in Region III, Nueva Ecija in particular, is above the national average rate from 2016 to 2021. Region III recorded a 3.4% yield improvement after the launching of NRP and RCEF. Meanwhile, Nueva Ecija posted an increase in yield by 4.41% from 2018 to

2021. Nueva Ecija farmers yield on the first two years of rice seed intervention had an increase 0.3MT/ha. On the other hand, 2021 yield is 1% lower than 2020 or 60kg lower yield than previous year.

H1 yield level of rice production in Nueva Ecija slightly improved in 2020 but declined to level lower than the pre-NRP/RCEF seed intervention. Yield level in irrigated fields (H1) has declined by 11.2% from 2018 to 2021. The yield level in Nueva Ecija in H1 of 2021 is the lowest yield level the province has in six years.

H2 yield level increased by 20% for the same period in which the dry season declined. The increase is equivalent to 980kg of additional harvested volume per hectare. The double digit increase in the yield during wet season harvest enable Nueva Ecija to retain growth in yield per hectare in 2021 despite the decline in yield in dry season.

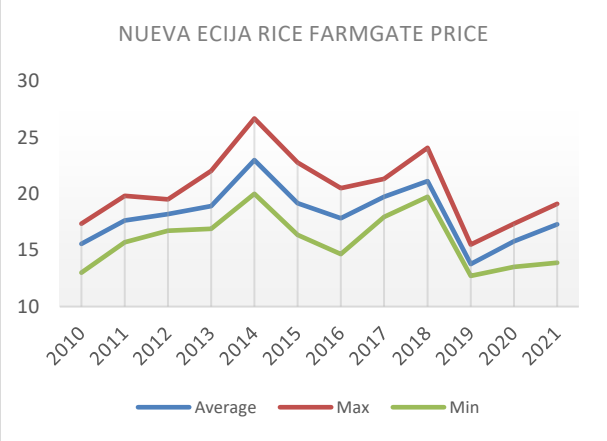

Fig.1 – Rice Farmgate Price in Nueva Ecija per kg

Rice farmgate price in Nueva Ecija from 2010 to 2020 recorded its highest price level in 2014 all throughout the year. Prices has a range of P17 to P20 until 2018. Farmgate price from 2015 to 2018 is within the target farmgate price to deliver 50% profit ration to farmers.

Nueva Ecija rice farmgate price steeply declined in 2019 to P13 level per kg and slightly improved to P17 until 2021. The reduction of farmgate price occurs during the year of implementation of rice seed intervention and increase in the farmer's yield. The farmgate price of the said period may not be attractive for farmers to till their rice fields and thus can be attributed as one of the causes in the reduction of harvested areas for 2019 - 2021.

Table 5 – Rice Production Net Return and Profit Ratio

Table 5.1 Nueva Ecija Farmers Net Return (PHP)

	2016	2017	2018	2019	2020
Philippines	19,811	23,206	33,349	21,324	21,430
Nueva Ecija	44,010	51,806	68,463	25,007	34,936

Table 5.2 Nueva Ecija Farmers Profit Ratio

	2016	2017	2018	2019	2020
Philippines	0.42	0.47	0.7	0.47	0.46
Nueva Ecija	0.67	0.72	1.01	0.38	0.51

Nueva Ecija farmers net return and profit ratio in rice production is above the Philippine average from 2016 to 2020. Year on year income of Nueva Ecija farmers declined in 2019 and 2020 as compared to the prior years. 2019 is the lowest profit ratio and Nueva Ecija farmers net return is close to the average in the Philippines. The profit ratio in 2020 recover to 0.51 and is still below the prior year performance but within the target profit ratio of the NRP.

Philippines rice production in wet season profit ratio for 2019 and 2020 is 0.36 and 0.40 respectively. Nueva Ecija on the other hand has a profit ratio of 0.14 and 0.29 on the same period. Nueva Ecija farmers experience the lowest profit ratio in 2019. A farmer has an average net profit of Php 8210 and Php 18336 in 2019 and 2020 wet season respectively. The increase in yield per hectare for the same period did not result in the increase of farmers income. Lower farmgate price and at-par production cost per kg prior to the NRP/RCEF seed intervention resulted to lower income of farmers.

VIII. CONCLUSION AND RECOMMENDATION

Based on the results of the study, the researchers concluded that : (a) The seed intervention program of National Rice Program and Rice Competitiveness Enhancement Fund increased the rice production volume of Nueva Ecija. It was able to add additional volume to Philippine rice supply. (b) Nueva Ecija was able to increase its rice production volume despite the reduction in area of rice fields planted and harvested. The intervention of providing hybrid and certified seeds to Nueva Ecija framers helps to increase their yield per hectare during wet season harvest. (c) The increase in yield brought by NRP/RCEP seed intervention did not result to higher net profit and profit ratio for Nueva Ecija farmers. The lowest net income and profit ratio was also observed in the same period that seed intervention of NRP/RCEP was implemented. Production cost remains at par prior to the implementation of NRP and RCEF. (d) The seed

intervention during this period is not sufficient to drive better yield for Novo Ecijano farmers. Yield is declining during dry season and is not align with the goal of Masaganang ANI. Based on the findings and conclusions, the following recommendations are given: (a)The Department of Agriculture – Region III Field Office, Municipal and Provincial Agriculture Office should continue the rice seed intervention program in Nueva Ecija to increase the production volume in the province and increase the yield of farmers. (b)Conduct an evaluation of the rice seeds distributed and used for dry season harvest. Evaluation should include the suitability and compatibility of the varieties used for the said season. High performing varieties for dry season must be prioritized and position for distribution and use. (c) Collaborate with seed growers and hybrid rice producers in determining the varieties for distribution to farmers. The said organizations and companies can be required to submit localized adoptability reports as pre-bidding requirements for NRP and RCEF seed intervention programs. DA-Region III and Nueva Ecija Field Offices can leverage the "rice derby" of products offered by different seed producers. (d) Provincial and municipal agriculture office to profile the land in their area of jurisdiction. The profile shall be used by the Regional Field Office in the determination of the rice varieties to be allocated for each municipalities/city. (e) Provincial and municipal agriculture office to plan with the municipal/city/provincial executives to craft intervention programs to manage the farmgate price of palay to at least P17 per kg. With the implementation Mandanas ruling, Nueva Ecija LGU executives may buy palay directly from farmers. RA11321 or known as Sagip Saka Act should be implemented as well in parallel to this LGU interventions. (f) Continuous efforts must be implemented to reduce the production cost of rice in the province.

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The Influence of Problem Solving, Self-Management and Technology Development on Entrepreneurship with Intervening Variables of Teamwork

Agustian Zen[1], Aulia Januar Malik[2]

[1]Department of Economy and business, Bhayangkara Jakarta Raya University, Indonesia
Email: agustianzen02@gmail.com
[2]Department of Management, Institut Bisnis Muhamnadiyah Bekasi, Indonesia
Email : aul.januar@gmail.com

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Abstract— *The purpose of this study was to determine the influence of problem solving, self-management, and technology development on entrepreneurship with the intervening variable of teamwork. This study uses a quantitative analysis method (quantitative), namely research using the output of the statistical analysis process on primary data, which is the answer or feedback from respondents who collected through a questionnaire (questionair). This research was conducted at Bhayangkara University, Greater Jakarta, Bekasi. The number of samples set as many as 99 respondents using purposive sampling method. The data processing technique uses PLS 3.0 tools. Based on the results of the tests that have been carried out, it shows that the indicators are valid and reliable. Problem solving to teamwork has a positive effect of 9.354, self-management to entrepreneurship has a negative effect of 0.606, technology development to entrepreneurship has a positive effect of 4,005 and teamwork to entrepreneurship has a positive effect of 9.354.*

Keywords— ***Problem Solving, Self-Management, Technology Development, Teamwork and Entrepreneurship.***

I. INTRODUCTION

It is unavoidable that the progress of the industrial revolution 4.0 is changing the joint order of human life, where at this time a lot of changes in the workforce are being replaced by technological [1]advances which cause limited job creation, so it is imperative that entrepreneurial knowledge and entrepreneurial spirit become an obligation.

Entrepreneurship becomes a necessity because entrepreneurship can be learned and can be taught by designing an entrepreneurship curriculum from school to college so that the younger generation or millennial generation creates competence in terms of entrepreneurship[2], the younger generation or millennial generation if you want someone to be able to compete in the entrepreneurial world then he. must have leadership skills, independence, teamwork, innovation, information technology, problem solving, marketing.[3]

This condition is exacerbated by the COVID-19 pandemic creating a tremendous impact in the business world, so entrepreneurship through digital technology is a solution. Digital businesses built through internet networks such as Google, Microsoft and social media have been able to create communication patterns without geographic barriers. Digitization also has an impact on the development of new entrepreneurs.

[1]Agustian Zen, Kesih Sukaesih, Aulia Januar Malik, analisis pengaruh sistem pendidikan dan motivasi mahasiswa dalam penciptaan daya saing tenaga kerja (suatu studi kasus menghadapi revolusi industri 4.0), jurnal

[2] Ahmad Gunawan, D Hazwardy, 2020, pelatihan digital entrepreneurship untuk mewujudkangenerasi milenial berjiwa wirausaha, E- jurnal

[3]Suratna, pengembangan jiwa kewirausahaan mahasiswa melalui inkubator bisnis, E-jurnal

The potential for new business development is increasing due to the opportunity to digitize business branches and change businesses from offline to online. Digital entrepreneurship is a sub-category of entrepreneurship where traditional organizations that are physically active are catalyzed, so that traditional entrepreneurs change into new forms of business in the digital era.

Digital entrepreneurship is also an effort to achieve new business opportunities through new media and internet technology. The concept of digital entrepreneurship is an aspect that must be understood by the community to increase opportunities to compete in the business world. Given the enormous potential, it is appropriate that the concept of digitalization of entrepreneurship needs to be developed. Therefore, it is important to get a team of business founders who are stable in starting a business with a typical experiment. trial-error) in the early stages.[4]

Life Changer Allianz(2018): Another advantage of entrepreneurship at a young age is that it is so close to the latest technology[5]. The digital entrepreneurship phenomenon creates wide opportunities in the future and that must be a concern. It is not impossible to be born a successful millennial generation entrepreneur. But there are also many millennial generations who don't produce these facilities or maybe they don't know how to produce them so they don't generate income[6]

The millennial generation is very attached to information technology. They are familiar with the internet and gadgets. However, many millennial generations do not produce these technological tools for positive things, especially businesses or businesses that produce. The potential of information technology is very wide open[7]. Nowadays people are easier to sell than in the past. Without the need to create a shop or business area, someone can already market goods on market places or social media, Information technology creates connections between businesses and organizations designing the potential to reach more consumers[8].

The role of the young or millennial generation today is very important in building entrepreneurship in a region or a nation because with the millennial thinking style that combines technological abilities with management science, human resources, communication, finance, leadership, problem solving, geography and others make being able to compete in entrepreneurship[9], being able to create new trends, being able to become a pioneer of entrepreneurship and creating new things in entrepreneurship, it is not an easy thing to be able to give birth to young or millennial entrepreneurs, because it is not only the availability of capital, the use of technology, having a strong team, the ability to management, problem solving skills and many others that must be completed in entrepreneurship.

II. HEADINGS

2.1 Problem solving

Problem solving is thinking about goals and ideals. If goals or ideals can be determined, problems can be defined. On the other hand, if you set goals incorrectly, it will be difficult to define the problem, let alone solve the problem (Haris, 1998).[10]

Ideal problem solving is a strategy used to improve thinking skills and solve a problem introduced by Bransford and Stein (1993).

In summary, the problem solving process includes the following steps:

1) Gather information and resources for evaluation and obtain a clear picture of the situation and ensure proper understanding of it;

2) Brainstorm and plan the solution process. Brainstorming is looking at the situation and its changes, and predicting the consequences of these changes;

3) Implement the solution. Once a series of steps has been identified, it is necessary to look at the results of each step to ensure that the steps taken so far are producing the desired results;

[4]Falahuddin, Fuadi, Munandar[3]Devi Andriyani, Arliansyah, 2021, pelatihan digital business bagi calon entrepreneur muda kota lhokseumawe di masa covid-19,E- Jurnal Pengabdian Masyarakat Nusantara

[5]Ambarwati, Indra Sumarna Sobari, membangun Jiwa kewirausahaan di era milenial bagi mahasiswa
Institut Stiami Kampus Tangerang Selatan, E- Jurnal

[6] Ahmad Gunawan, D Hazwardy, 2020, pelatihan digital entrepreneurship untuk mewujudkangenerasi milenial berjiwa wirausaha, E- jurnal

[7]Ahmad Gunawan, 2020, Pelatihan Digital Entrepreneurship Mewujudkan Generasi Milenial Berjiwa Wirausaha Di Sekolah SMA Desa Karangasih Cikarang, E-Jurnal Abdimas Kartika Wijayakusuma

[8] Livia dan Kartika Nuringsih, 2020, Pengaruh Technology Usage, E- Networking Dan Government Support Terhadap Keberhasilan Entrepreneur Di Jakarta, E- Jurnal Manajerial dan Kewirausahaan

[9]Ambarwati, Indra Sumarna Sobari , membangun jiwa kewirausahaan di era milenial bagi mahasiswa, institut stiami kampus tangerang selatan, e-jurnal

[10]Ikhwanuddin, Amat Jaedun, dan Didik Purwantoro, problem solving dalam pembelajaran fisika
untuk meningkatkan kemampuan mahasiswa berpikir analitis, e-jurnal

4) Check the results. After the solution is reached, it needs to be re-examined to ensure that the results achieved are in accordance with the stated goals (Haris, 1998).[11]

Learning with problem solving is divided into several cycles as presented by Bransford Strain, Hayes, Strenberg cited by (Janet.E Davinson and Robert J.S, 2003). The cycle consists of several stages in which solving the problem must follow the following steps:
(1) Problem identification
(2) Describe and describe the problem;
(3) Develop a solution strategy;
(4) Organizing their knowledge of the problem;
(4) Prepare physically and mentally to solve problems;
(6) Monitor their progress towards goals;
(7) Evaluate their solution whether it is in accordance with the solution of the problem. According to (Conny R. Semiawan, 2009)[12]
Ideal problem solving is a strategy used to improve thinking skills and solve a problem introduced by Bransford and Stein (1993).[13]

a. Self-management

According to Cormier (1985), self-management is a process in which a person directs changes in his own behavior by using one or a combination of several strategies.[14]
Mappiare (2006:297) self-management refers to a technique in cognitive-behavioral therapy based on learning theory designed to help clients control and change their own behavior toward more effective behavior, often combined with (self-reward). rewards.[15]
According to Edelson (1998) self-management is a term used to describe the process of achieving independence
Trost (2015) defines self-management as a technique for managing individual behavior that aims to direct and manage oneself in order to achieve independence and live a productive life.[16]
Suwardani (2014) defines self-management as a form of individual behavior that aims to direct and manage oneself in order to achieve independence and live a productive life.[17]
Self-management strategy is a strategy that provides an opportunity for a person to regulate or monitor his own behavior with a strategy or a combination of strategies to change behavior. Various self-management strategies include:
1) Self monitoring,
2) Stimulus control
3) Self-rewards.
The self-management technique, the researcher uses the stages proposed by Waston and Tharp (in Yusuf 2016:205), namely:
1) Selecting a Destination,
2) Translating goals into target behavior,
3) Personal Monitoring,
4) Designing a change plan,
5) Evaluate the action plan[18]

b. Technologi Development

Stacey and Ashton (1990) state that technological advances will play an important role in achieving long-term advantage.[19]
Higgins (1995) suggests that technology has been identified as a contributing factor to the success of a company's operations, while Frohman (1985) stated that technology affects a company's profitability, and the higher the technological capability, the company has a tendency to achieve higher profits.[20]
The definition of information technology according to Sutabri (2014: 3) is as follows: "Information technology is a technology used to process data, including processing, obtaining, compiling, storing, manipulating data in various ways to produce quality information, namely relevant information. , accurate and timely, which is used for

[11]Ikhwanuddin, Amat Jaedun, dan Didik Purwantoro, problem solving dalam pembelajaran fisika
untuk meningkatkan kemampuan mahasiswa berpikir analitis, e-jurnal
[12] KetutSutarmi1,ImdSuarjana2,peningkatan hasil belajar siswa menggunakan metode problem solving dalam pem belajaran ipa,e-jurnal
[13] Himmatul Ulya, profil kemampuan pemecahan masalah siswa bermotivasi belajar tinggi
berdasarkan ideal problem solving, e-jurnal
[14] Aji Bagus Priyambodo, penggunaan strategi self management untuk meningkatkan self-regulated learning pada mahasiswa baru fakultas psikologi universitas airlangga, e-jurnal
[15] Nikmatus Sholihah, enerapan strategi self-management untuk meningkatkan disiplin belajar pada siswa tunadaksa cerebral palcy kelas iv sdlb-d ypac surabaya,e-jurnal
[16]Risqi Dwi Amaliasari[1], Uun Zulfiana[2] , hubungan antara self management dengan perilaku agresi pada
siswa sma, e-
[17]Risqi Dwi Amaliasari1, Uun Zulfiana2 , hubungan antara self management dengan perilaku agresi pada
siswa sma, e-jurnal
[18]Hadei Yoga Swara[1], Supardi[2], Padmi Dhyah Yulianti[3], layanan bimbingan kelompok dengan teknik self-
management terhadap prokrastinasi akademik, e-jurnal
[19]Adnan Hakim, model struktural hubungan teknologi informasi, kualitas informasi dan kinerja manajerial industri kreatif percetakan digital, e-jurnal
[20]Adnan Hakim, model struktural hubungan teknologi informasi, kualitas informasi dan kinerja manajerial industri kreatif percetakan digital, e-jurnal

personal, business, and government purposes and is strategic information for decision making"

c. Teamwork

Jones et al., (2007) in Manzoor et al. Cooperation is working together to achieve a common goal (Johnson & Johnson, 1991).[21]

West (2002) "There has been a lot of research proving that teamwork in groups leads to better efficiency and effectiveness.[22]

Davis (in Dewi, 2006) that, "Cooperation is the mental and emotional involvement of people in group situations that encourage them to contribute to group goals or various responsibilities to achieve goals".[23]

Robbins and Judge (2008) teamwork is a group whose individual efforts[24]

d. Entrepreneur

Interest in entrepreneurship is the desire, interest and willingness to work hard or have a strong will to try to fulfill their needs without being afraid of the risks that will occur, and always learn from their failures (Putra, 2013).[25]

Kuratko and Hodgets (1996) for example define entrepreneur as "a person who performs the task of organizing, managing and accepting business risks"

Kirzner (1979) describes entrepreneur as an individual who is always alert about business opportunities that have not been glimpsed by others.

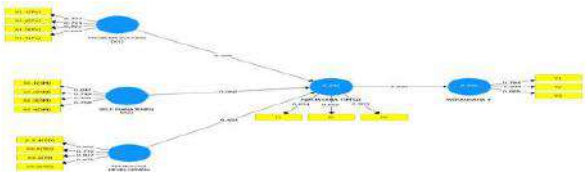
Kirzner (1979) says that 'an entrepreneur is more than a risk-taker and innovator. He is someone who sees a future that no one else sees and, if this perception is correct, will result in realignment of resources to produce greater customer satisfaction and technological efficiency.

III. INDENTATIONS AND EQUATIONS

This research was conducted at Bhayangkara University, Greater Jakarta, which is located at Jalan Raya Perjuangan Marga Mulya, North Bekasi. And the sampling was carried out at Bhayangkara University, Greater Jakarta & Muhammadiyah Business Institute Bekasi. The time of the study was carried out from October 2021 to February 2022. The sample population was 99, purposive sampling. The statistical method used to test the hypothesis was to use Partial Least Square (PLS) and Structural Equation Modeling (SEM) with the SmartPLS 3.0 program.

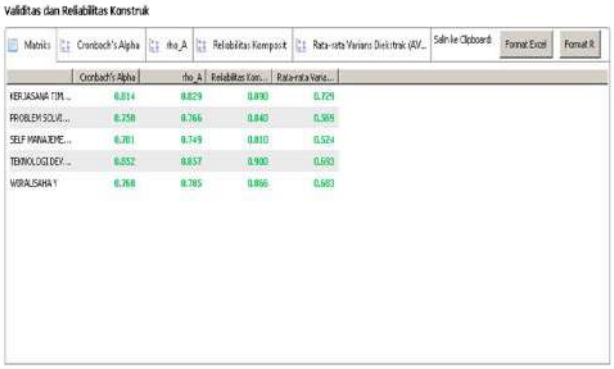
IV. FIGURES AND TABLES

The variables used in this variable are problem solving variables (X1), self-management variables (X2), technology development (X3), teamwork (i) and entrepreneurship (Y).



4.4 Test Validity and reliability

The validity test with the SMART PLS 3.0 application is described by the outer loading value, then it is said to be valid if the outer loading value > 0.7 (Heir et al, 2014) the results of the model analysis in Figure 1 have several invalid and reliable questions, so some questions will be deleted to obtain valid data, then the results of the validity and reliability are met can be seen in Figure 1[26]



4.2 Outer Model

The outer model test describes the relationship between each indicator and the latent variable, the structural model for the outer loading model to predict indicators, the outer loading test consists of

1. Discriminant validity

Discriminant validity aims to describe an indicator that is represented by other indicators. This is measured by the cross loading value, the variable is said to be valid if the cross loading > 0.7 and the cross loading value must be

[21]Bekti Wulandari[1], Fatchul Arifin[2], Dessy Irmawati[3], peningkatan kemampuan kerjasama dalam tim melalui pembelajaran berbasis lesson study, e-jurnal

[22]Muhammad Hatta1, Said Musnadi2, Mahdani3, pengaruh gaya kepemimpinan, kerjasama tim dan kompensasi terhadap kepuasan kerja serta dampaknya pada kinerja karyawan pt.pln (persero) wilayah aceh, e-jurnal

[23]Muhammad Hatta1, Said Musnadi2, Mahdani3, pengaruh gaya kepemimpinan, kerjasama tim dan kompensasi terhadap kepuasan kerja serta dampaknya pada kinerja karyawan pt.pln (persero) wilayah aceh, e-jurnal

[24]Wahyu Kusuma Pratiwi, Dwiarko Nugrohoseno, pengaruh kepribadian terhadap kerjasama tim dan dampaknya terhadap kinerja karyawan, e-

[25]Siti Mubassaroh dan Triana Noor Edwina DS, hubungan antara pengetahuan tentang kewiraswastaan dan dukungan orangtua dengan minat berwiraswasta pada siswa smk negeri 2 wonosari, E-jurnal

[26] Ardy Kristianto[1], Ni Nyoman Sawitri[2], Raden Achmad Harianto [3], influence analysis of price, service quality and marketing relationship on repurchasing interest with customer satisfaction as intervening variable in cv. bekasi unggas, E-jurnal

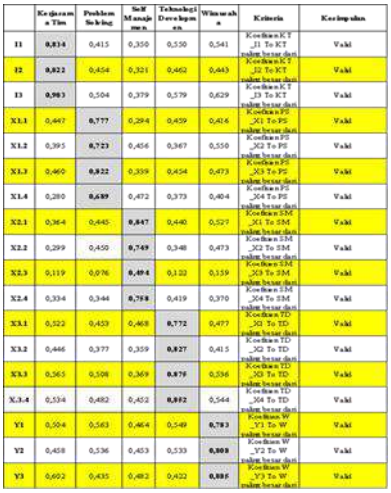
greater than the others (Hair at al 2016). The results of the discriminant test can be seen in Figure 2 which can show that the average valid variable mean

2. Average Variance Extracted

Average Variance Extracted aims to evaluate the discriminant validity for each construct and latent variable, the variable is said to be eligible if the AVE value > 0.5 (Wednesday et al, 2016) the results of the discriminant validity test can be seen in Figure 2 shows that the average is valid

3. Cronbach's Alpha

Cronbach's Aplha test aims to strengthen the composite results of the reliability of a variable. The variable is eligible if the value of Cronbach's aplha > 0.7 (Hair et al, 2016). The results of Cronbach's alpha can be seen in Figure showing that the average variable can be relied on[27]



4.3 Inner Model

Inner model aims to predict the relationship between variables used in this study. The inner model test consists of discriminant coefficient, predictive relevance and effect size criteria.

1. Discrimination Coefficient (R2)

Coefficient discrimination aims to assess the level of prediction accuracy for endogenous constructs, the value of R2 can be declared strong if the value is more than 0.7, moderate if the value is > 05, weak if the value is > 0.25

	R Square	Adjusted R Square	Tingkat kriteria	Kealkurata n Prediksi
Kerasama tim	0,446	0,428	> 0,25 Lemah, > 50 Merega h, > 0,70 Tinggi	Lemah
Wirausaha	0,406	0,399	> 0,25 Lemah, > 50 Merega h, > 0,70 Tinggi	Lemah

2. Predictive Relevance (Q2)

Predictive Relevance (Q2) aims to measure how well the observation value is said to be relevant if the observation value is said to be relevant if Q2 > 0 (Hair et al, 2016) the results of predictive relevance (Q2) as below[28]

	Kerjasam a Tim	Problem solving	Self Manaje men	Teknologi develepme nt	wirausaha	Kriteria	Kesimpulan
Kerjasama tim					0,682	> 0,02 Lemah, > 0.15 sedang, > 0,35 kuat	Kerjasama tim memprediksi Wirausaha = kuat
Problem Solving	0,075					> 0,02 Lemah, > 0.15 sedang, > 0,35 kuat	Problem solving memprediksi Kerjasama tim = lemah
Self Manajemen	0,004					> 0,02 Lemah, > 0.15 sedang, > 0,35 kuat	Self manajemen memprediksi kerjasama tim = lemah
Teknologi Devlopment	0,235					> 0,02 Lemah, > 0.15 sedang, > 0,35 kuat	Teknologi development memprediksi kerjasama tim = sedang

4.4 Hypothesis Testing Results

Hypothesis testing is done by analyzing the booststrap in the PLS 3.0 program to assess between variables that can be defined by Tstatistics or the p-value of a variable can be said to have a significant effect on other variables if it has a Tstatistic greater than T table or a p-value lower than 0.5 (Manurung and Budastuti, 2019) The T-table for this study is 1,299 (99 samples and 5 variables)[29]

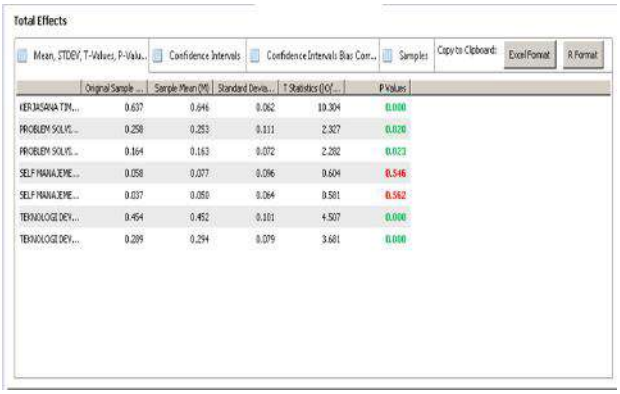
1. Direct Effects

The results of the research that have a direct effect can be seen in Figure 3, it can be concluded that: 1. problem solving has a significant effect on teamwork, 2, self-management has no significant effect on teamwork, technology development has a significant effect on teamwork, teamwork has a significant effect on entrepreneurship

[27] Ardy Kristianto[1], Ni Nyoman Sawitri[2], Raden Achmad Harianto [3], influence analysis of price, service quality and marketing relationship on repurchasing interest with customer satisfaction as intervening variable in cv. bekasi unggas, E-jurnal

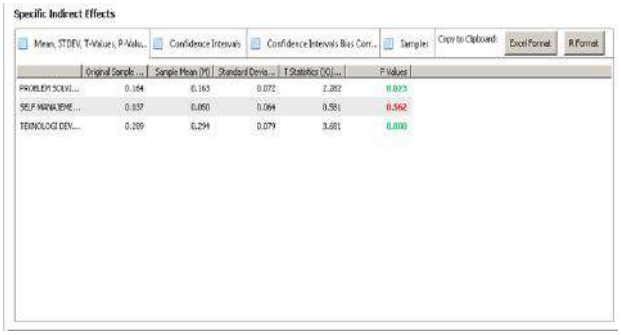
[28] Ardy Kristianto[1], Ni Nyoman Sawitri[2], Raden Achmad Harianto [3], influence analysis of price, service quality and marketing relationship on repurchasing interest with customer satisfaction as intervening variable in cv. bekasi unggas, E-jurnal

[29] Ardy Kristianto[1], Ni Nyoman Sawitri[2], Raden Achmad Harianto [3], influence analysis of price, service quality and marketing relationship on repurchasing interest with customer satisfaction as intervening variable in cv. bekasi unggas, E-jurnal



2. Indirect Effect

The indirect effect can be seen in Figure 4, it can be concluded that, 1. Problem solving has a significant effect on teamwork, 2. Self-management has no significant effect on teamwork, 3. Technology development has a significant effect on teamwork.



V. CONCLUSION

5.1 CONCLUSION

Based on the results of the research analysis and discussion on the effect of problem solving, self-management and technology development on entrepreneurship with the intervening variable of teamwork. Then the following conclusions can be drawn:

1. Based on the results of the study that the first hypothesis (H1), namely the problem solving variable, has a positive and significant effect on teamwork
2. Based on the results of the study that the second hypothesis (H2), namely the self-management variable has no effect and is not significant on teamwork
3. Based on the results of the study that the third hypothesis (H3), namely the technology development variable, has a positive and significant effect on teamwork
4. Based on the results of the study that the fourth hypothesis (H4), namely the teamwork variable has a positive and significant effect on entrepreneurship

5.2 SUGGESTION

Based on the results of the study, the results of the discussion and the conclusions obtained, the suggestions that can be put forward are as follows:

1. Based on the results of research, entrepreneurship should be able to improve and continue to improve entrepreneurial abilities and be able to encourage the young or millennial generation to be able to compete in the entrepreneurial world
2. Based on the research results, teamwork is very important in the world of entrepreneurship and there must be a clear division of labor, different abilities in a team and good communication within the team.
3. Based on the results of self-management research, although the results do not have a positive effect on teamwork, self-management skills must be improved so that self-management abilities become balanced in a team
4. Based on the results of research on technology development, entrepreneurship must be able to follow technological developments and must be able to use renewable technology.

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