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Drivers and Barriers to Implement Industry 4.0 in Manufacturing Sectors, Systematic Literature Review

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***Abstract*: The Fourth Industrial Revolution (IR 4.0) nowadays has attracted more and more attention around the world to different kinds of sectors especially the manufacturing sector. In the published literature, there is still a lack of systematic information about the drivers and barriers to implement industry 4.0 in the manufacturing sector. This study addresses the gap in this area to support the managers and practitioners to well-understand the key aspects to implement IR 4.0. A systematic literature review has been carried out, twenty-two articles and one electronic book are selected from leading database (Scopus, WoS and Google Scholar) from 2015 to 2020. The result identified sets of eighteen drivers and twenty-three barriers and obstacles. The identified drivers and obstacles were further classified into seven categories: economic, strategy, legislation, operation and process, organization and cultural, people and competencies and environment and safety. The outcome of this study will contribute theoretically to the development of literature on the implementation of Industry 4.0 from a managerial perspective and it could support decision makers and practitioners to address the drivers and the barriers that will eventually pave the way for successful implementation of Industry 4.0 across the manufacturing sectors.**

***Keywords*: Industrial Revolution, Manufacturing, IR 4.0**

1. INTRODUCTION

Nowadays, the manufacturing companies all over the world utilize the advance science and technology to support the whole value chain in their organization. The initiative of implementing this high tech comes from Germany government when they announce in 2011, the 'High-Tech Strategy 2020' action plan. This strategy known after that IR 4.0, which is represents the German ambitions in the manufacturing sector, and was intended to support national growth by promoting manufacturing development [1,21]. Following this, different countries come with their own initiatives with different names to promote this progression, such as "Smart Manufacturing" in the USA, "Future of Manufacturing" in the UK, and "Made in China 2025" in China, additional to that there are more than 30 national and regional initiatives at Europe [2, 3].

Implementation of this new era (IR 4.0) in the manufacturing sector, imperative for the decision-makers to have sufficient knowledge and clear understanding of two aspects. The first one to know the implementation results in terms of economic, technical and quality wise and the second aspect, what are the limitations and barriers that limit that. However, there is successful adoption in different countries and also there is still lack of studies in the data base providing empirical evidence about the way these technologies are adopted in manufacturing companies. Thus, there is a need for more investigation to identify the drivers and barriers to implement I4.0 in the manufacturing sector, which could help the decision maker and practitioners to make mitigation strategy, which may lead to smoother adoption of Industry 4.0 [12].

There are multiple reasons that drive the use of digital production technologies (IR 4.0) forward. In contrast, there are many barriers that affect its adoption. A well understanding of the mechanism to implement IR 4.0 processes definitely will assist the enterprises to prepare the application duly in order to make it a successful project. The objective of this paper is to conduct systematic literature review to identify the drivers and barriers to implement IR 4.0. The research gap enables to contribute to the following research question: *Which drivers foster the adoption of IR 4.0?" and Which barriers hindering the adoption of IR 4.0?"* [13]. This paper started with section 1 introduction section 2 about the era IR 4.0. The remaining of the research is organized as follows. Section 3 describes the materials and methodology. Section 4 presents the results and discussion. Section 5 concludes this paper.

2. INDUSTRY 4.0

2.1 INDUSTRY 4.0 HISTORICAL BACKGROUND

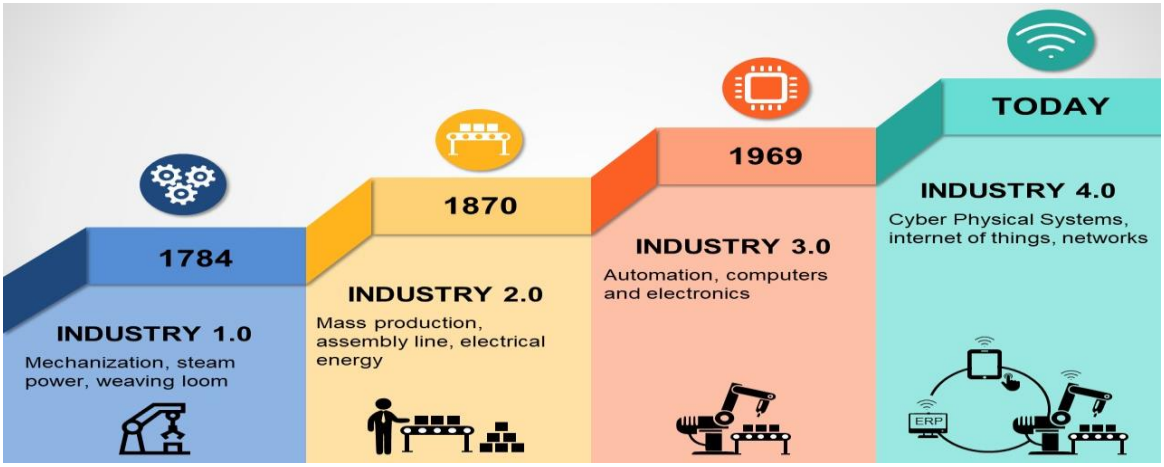
Stages in the development of industrial manufacturing systems from manual work towards Industry 4.0 concept presented by different researchers as a path through the four industrial revolutions. The stages of the development are illustrated in Figure (2.1). The first industrial revolution (IR 1.0) or industry 1.0 began from 1760 and 1820, with the mechanization and mechanical power generation. It brought the transition from manual work to the first manufacturing processes and it was adopted first mostly in textile industry as well as iron industry, agriculture, and mining.

The second industrial revolution (IR 2.0) or industry 2.0 also known as the technological revolution began in the period between 1870 and 1914 and was triggered by electrification that enabled industrialization and mass production [2]. The best-known examples for the second industrial revolution are the increasing use of electric energy. This revolution enabled low costs mass production and increase productivity and the great benefits of it was the present of electricity which allowed for factory electrification and the modern production line [2, 20]. The third industrial revolution (IR 3.0) or industry 3.0 or digital revolution, started in the late 20th century,

after the end of the two big wars, as a result of a slowdown with the industrialization and technological advancement compared to the previous periods. There were many technologies in different sectors introduced in this revolution, generally like industrial robots, computer aided management processes, computer aided manufacturing, and automated assembly lines. This revolution was characterized by the digitalization and has significant impact to different sectors like aerospace, IT, energy and other sectors. The first three industrial revolutions can be summarised, in respective order, as the results of mechanisation, electricity and lastly information technology (IT) [20, 3].

Today we are in the fourth industrial revolution (IR 4.0) or industry 4.0 that was triggered by the development of Information and Communications Technologies (ICT). Industry 4.0, its technological basis, combines and captures contemporary automation, data exchange and manufacturing technologies.

Fig. 2.1. Industrial Revolution Stages (Source: slide model.com)



2.2 INDUSTRY 4.0 DEFINITION

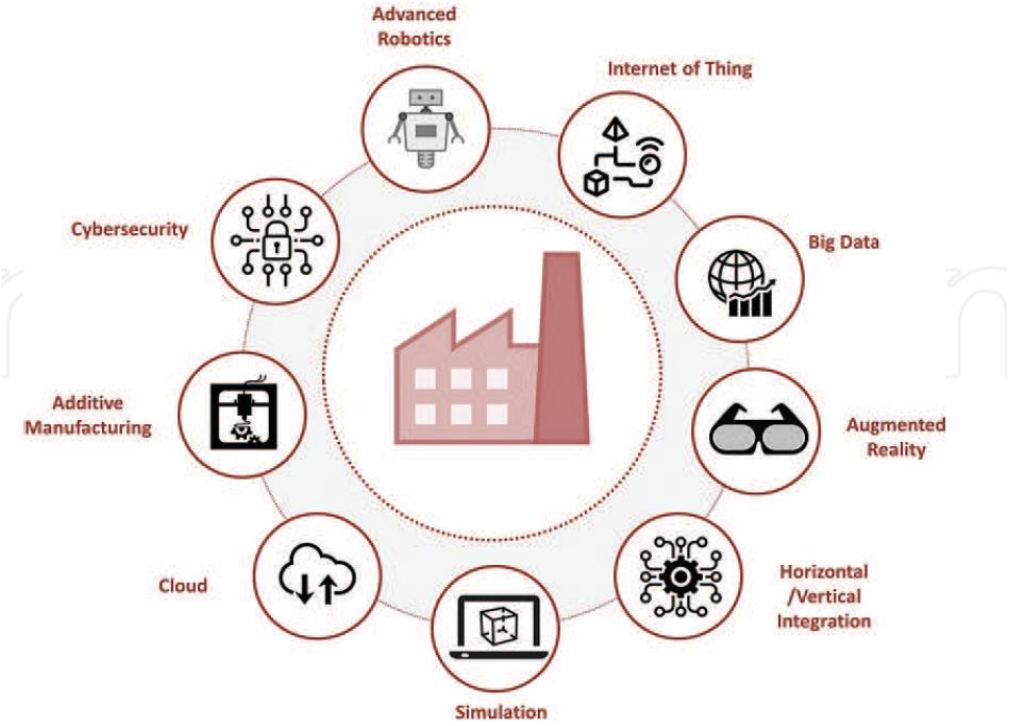
The term Industry 4.0 originates and invented from the Germany in 2011. The German Federal Government initiative to strengthen the competitiveness of the German manufacturing industry [20, 24]. In some sources the expression digital transformation also stands for IR 4.0. Many definitions of Industry 4.0 are proposed from different researchers [13]. In this paper, we rely on the following understanding and definitions of Industry 4.0. One of the definitions is integration of cyber-physical systems in production and logistics as well as the application of the Internet of Things in industrial processes [7]. According to [2, 15, 23] I4.0 is a new concept of the market characterized by the wide integration of information, communication and Cyber-Physical Systems (CPS) in the industrial environment. So, it involves the technical integration of Cyber-Physical Systems into manufacturing and logistics and the use of the Internet of Things and Services in industrial processes. Some authors refer IR 4.0 to a new global wave that aims to seamlessly combine manufacturing, automation and Information & Communication Technology (ICT) into a vertical network within an organization by connecting two or more of these organizations in a horizontal chain. Furthermore, Industry 4.0 technologies are under rapid development and consequently the theoretical and conceptual understanding. As a result of this, from this context it is defined by causes of rapid technological advancements in recent times. Digital transformation is defined in manufacturing as "the use of new digital technologies (social media, mobile, analytics or embedded devices) to enable major business improvements (such as enhancing customer experience, streamlining operations or creating new business models" [13].

From the above definitions and different contexts, the main technology used in Industry 4.0 is cyber-physical systems (CPS). CPS are considered a Key Enabling Technology (KET) in the fourth industrial revolution [18].

2.3 KEY TECHNOLOGY OF INDUSTRY 4.0

The change of processes in the organization by adopting IR 4.0 needs strong supporting tools, several authors described nine pillars or key technologies or sometimes known as building blocks. These nine key technologies are big data and analytics, autonomous robots, simulation, horizontal and vertical system integration, internet of things (IoT) (including sensors), cyber-security, the cloud, additive manufacturing and augmented reality [2, 4]. The nine key technologies are illustrated below in Figure 2.2. While some of these digital technologies are already in use in industrial applications, some others are still not ready for application at scale. Manufacturers need to carefully pick the right mix of technologies that would maximize returns on investment [9]. The integration of all of these key technologies will transform industry and lead to implementation of Industry 4.0.

Figure 2.2 Key enabling technology for industry 4.0 (source 18)



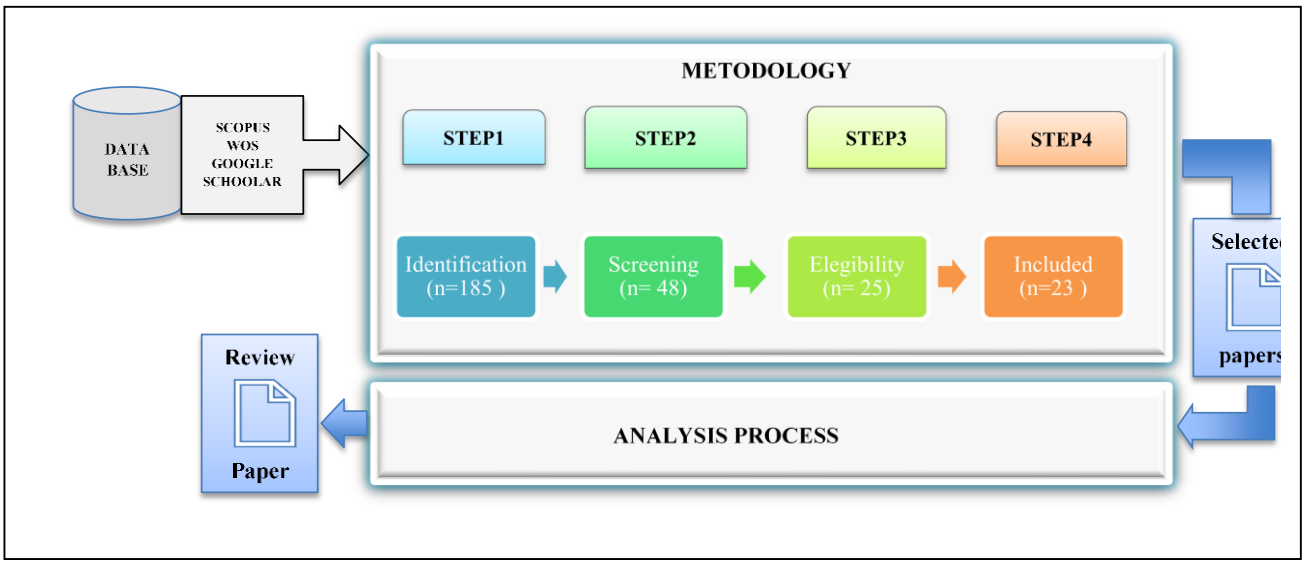
3. MATERIALS AND METHOD

3.1 SYSTEMATIC LITERATURE REVIEW

Considering the novelty of the topic, systematic literature review was used to insure a good result. The systematic literature review methodology was developed in the field of medicine in order to improve research performance and the quality of review processes; it could also inform government bodies more precisely in order to improve health system interventions [17]. For all these mentioned reasons, the same method was selected and applied to different managerial studies, and was chosen by the author as the research methodology for this paper [17]. The systematic literature review was conducted between July and November 2020.

The research began by identifying three scientific databases, Scopus-Elsevier, the Web of Science—WoS and one search engine (Google Scholar) from which the papers were extracted. The following keywords were used in the search: 'Industry 4.0', 'drivers' and 'barriers'. Figure 3.1 illustrates the research process.

Figure 3.1 Research process (source adopted from (17) and modified by author)



3.2 RESEARCH FINDING

The three scientific databases (Scopus-Elsevier, the Web of Science—WoS and one search engine, Google Scholar) were used to search for the industry 4.0 drivers. Twenty industry 4.0 implementation drivers were identified. There are many similar literatures about the industry 4.0, the main drivers to implement it in manufacturing sector and also the different published papers illustrated the barriers hindering the implementation [17]. The summary of the search is listed below:

3.2.1 INDUSTRY 4.0 IMPLEMENTATION DRIVERS

From the 22 articles and one electronic book the below drivers were identified:

1. Applying information and communications technology to digitize information and integrate systems into conception, development, manufacturing and use of products.
2. Increase innovation capacity.
3. Increase productivity.
4. Develop new standards and regulations.
5. New software technologies for modeling, simulation, virtualization and digital manufacturing.
6. Development of cyber-physical systems to monitor and control physical processes.
7. The evolution of 3D printers and additive manufacturing to simplify manufacturing.
8. Savings of raw materials and energy.
9. Decision support for human operators, the emergence of intelligent tools and assistance using augmented reality.
10. Integration of customer through network (cyber-physical systems).
11. Human-Robot Collaboration.
12. Raise up the employee technical and non-technical skills to adapt with new technology.
13. Digital Computing Assistance Systems and Virtual Training.
14. Decentralization: faster and data-driven decision-making.
15. Efficiency increases and cost reductions.
16. Role of government as enabler facilitator and policy makers.
17. Improving the work environment.
18. Decrease documentation and administration.
19. Increase traceability.
20. Increase people safety in the dangerous work places.

3.2.2 INDUSTRY 4.0 IMPLEMENTATION BARRIERS

Barriers to the successful implementation of Industry 4.0 in the manufacturing sector were identified based on the literature review and experts' input (5), From the 22 articles and one electronic book the barriers to implement industry 4.0 were listed below:

1. High Investment in Industry 4.0 Implementation.
2. Lack of Clarity Regarding Economic Benefit and excessive investments.
3. Challenges in Value-chain Integration.
4. Low Maturity Level of Preferred Technology.
5. Disruption to Existing Jobs.
6. Lack of Standards, Regulations, Forms of Certification and operation procedures.
7. Lack of Digital Skills.
8. Lack of Internal Digital Culture and Training.
9. Ineffective Change Management.
10. Resistance to Change.
11. Lack of Infrastructure.
12. Data security risks.
13. High Cost of Digital Technologies.
14. Insufficient qualifications of employees.
15. Lack of a clear digital vision.
16. Lack of data analytical capabilities.
17. Leadership Skill Gap.
18. Workforce Skill Gap.
19. Lack of a Digital Strategy Alongside Resource Scarcity.
20. Top management has no awareness in Industry 4.0.
21. Integration of new technology with old equipment.
22. Lack of formalized information on Industry 4.0 implementation.
23. Lack of methodical approach for implementation.

4. RESULT AND DISCUSSION

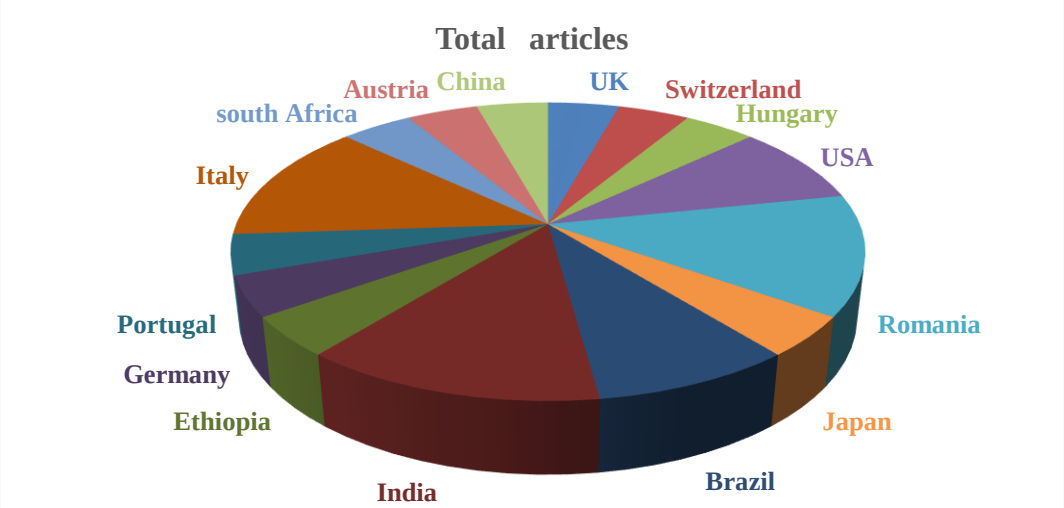
The main objective of this paper is to identify and investigate the main drivers and barriers to implement IR 4.0 in manufacturing sector through systematic literature review. To ensure a comprehensive result the articles were selected according to keywords from

different countries to cover the research gap from different perspectives. Table 4.1 shows the articles according to their origin countries. Fig. 4.1 shows distribution of articles per country.

Table No 4.1 Distribution of articles per country

No	Country	Total No of Articles	% from 23
1	UK	1	4.3
2	Switzerland	1	4.3
3	Hungary	1	4.3
4	USA	2	8.7
5	Romania	3	13
6	Japan	1	4.3
7	Brazil	2	8.7
8	India	3	13
9	Ethiopia	1	4.3
10	Germany	1	4.3
11	Portugal	1	4.3
12	Italy	3	13
13	south Africa	1	4.3
14	Austria	1	4.3
15	China	1	4.3
Total		**23**	**100%**

Figure No 4.1 Distribution of articles per country

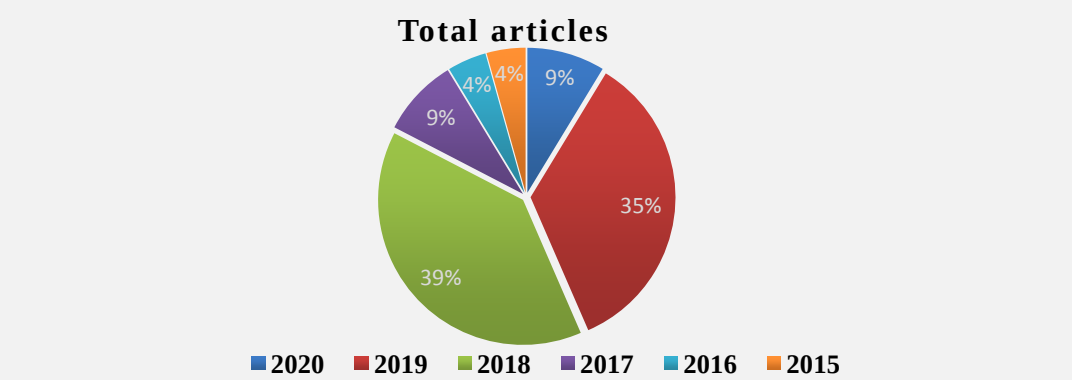


To insure also the data are up to date the search was on the articles that has been published in the last five years (2015-2020). Table 4.2 shows the selected articles in chronological order.

Table 4.2 Distribution of articles according to the year of publication

NO	Year	Total articles	% from 23
1	2020	2	8.7
2	2019	8	34.8
3	2018	9	39.1
4	2017	2	8.7
5	2016	1	4.3
6	2015	1	4.3
Total		**23**	**100%**

Figure 4.2 Distribution of articles according to year of publication

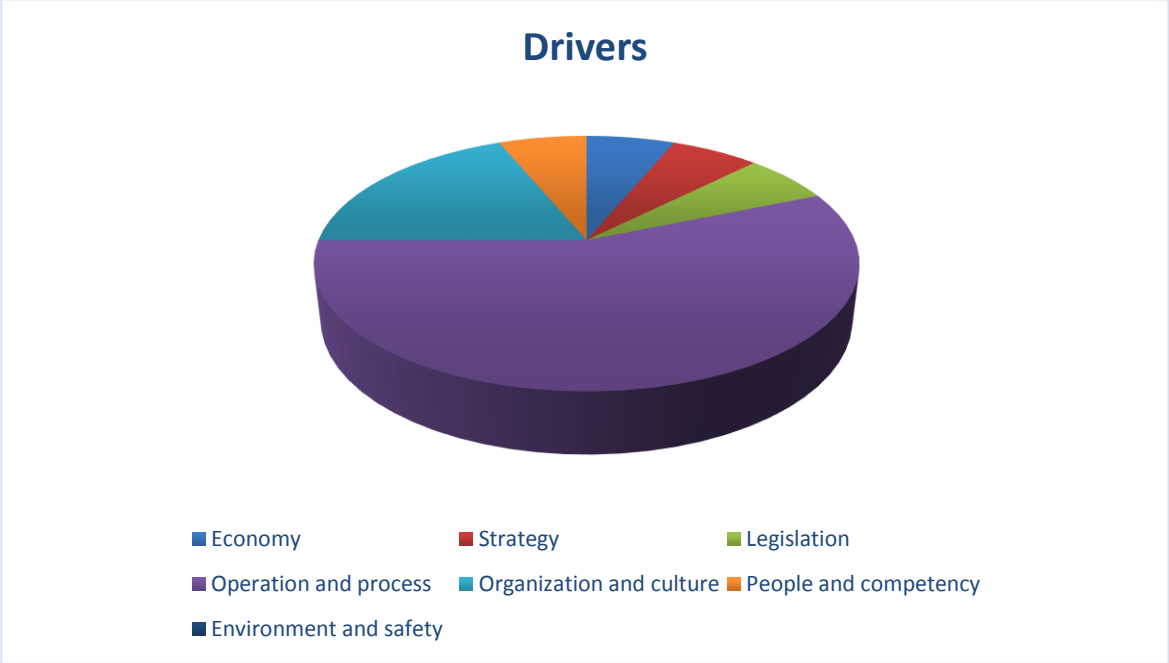


The eighteen drivers, to implement industry 4.0 in manufacturing sector, later were categorized into seven groups: economy, strategy, legislation, operation and process, organization and culture, people and competency and environment and safety. Table 4.3 illustrates these drivers with their respective categories.

Table 4.3 The drivers to implement industry 4.0 in manufacturing sectors (develop by author)

No	Category	Drivers
1	Economy	Efficiency increases and cost reductions
2	Strategy	Role of government as enabler, facilitator and policy makers
3	Legislation	Develop new standards and regulations
4	Operation and process	Applying information and communications technology to digitize information and integrate systems into conception, development, manufacturing and use of products.
		Increase innovation capacity
		Increase productivity.
		New software technologies for modeling, simulation, virtualization and digital manufacturing.
		Development of cyber-physical systems to monitor and control physical processes.
		Savings of raw materials and energy.
		Decision support for human operators, the emergence of intelligent tools and assistance using augmented reality
		Integration of customer through network (cyber-physical systems).
		Human-Robot Collaboration
5	Organization and culture	Decentralization: faster and data-driven decision-making
		Decrease documentation and administration
		Increase traceability
6	People & competency	Raise up the employee technical and non-technical skills to adapt with new technology.
7	Environment & safety	Improving the work environment.
		Increase people safety in the dangerous work places

Figure 4.3 The drivers to implement industry 4.0 in manufacturing sectors

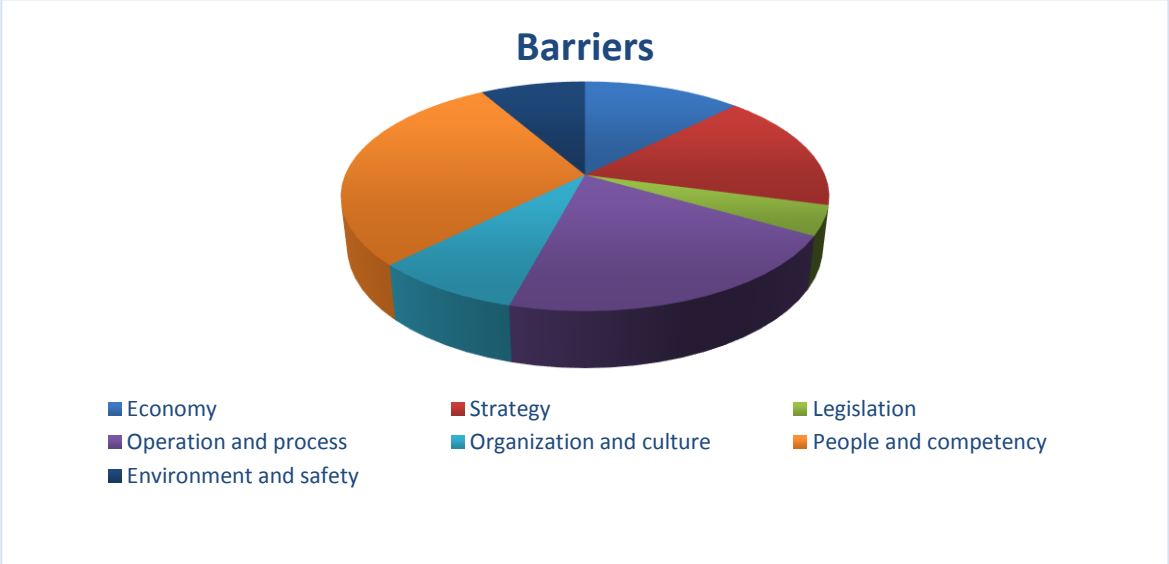


The following part represents the second objective of this paper. The 23 barriers, to implement industry 4.0 in manufacturing sectors, were further critically analyzed. The outcome of the further analysis is the categorization of the barriers. The barriers, to implement industry 4.0 in manufacturing sectors, are categorized in seven groups. Table 4.4 illustrates these barriers with their respective categories.

Table 4.4 The barriers hindering to implement industry 4.0 in manufacturing sectors (develop by author)

No	Category	Barriers
1	Economy	High Investment in Industry 4.0 Implementation
		Lack of Clarity Regarding Economic Benefit and excessive investments
		High Cost of Digital Technologies
2	Strategy	Lack of a clear digital vision
		Lack of a Digital Strategy Alongside Resource Scarcity
		Lack of formalized information on Industry 4.0 implementation
		Lack of methodical approach for implementation
3	Legislation	Lack of Standards, Regulations, Forms of Certification and operation procedures
4	Operation and process	Challenges in Value-chain Integration
		Low Maturity Level of Preferred Technology
		Lack of Infrastructure
		Lack of data analytical capabilities
		Integration of new technology with old equipment
5	Organization and culture	Ineffective Change Management
		Resistance to Change
6	People & competency	Disruption to Existing Jobs
		Insufficient qualifications of employees
		Leadership Skill Gap
		Top management has no awareness in Industry 4.0
		Workforce Skill Gap
		Lack of Digital Skills
		Lack of Internal Digital Culture and Training
7	Environment & safety	Data security risks

Figure 4.4 The barriers hindering to implement industry 4.0 in manufacturing sectors



The number of companies in the manufacturing sector implementing IR 4.0 is increasing all over the world due to their understanding of the necessity of that era to keep them compete with other companies in the same field. Currently, there is a lack in the literature review that addressing the implementation of industry 4.0 in the manufacturing sectors and more specifically the drivers and barriers. Most of the manufacturing companies still seeking to well understand the drivers that encouraging them to implement the IR 4.0 and what benefits they can gain from it. On the other hand, the barriers to implement the IR 4.0 are still another challenges to the companies who want to implement the IR 4.0. Therefore, many companies selecting not to take the risk in implementing the IR 4.0.

5. CONCLUSION

In this paper the researcher has identified and shed the light on the drivers and barriers. Knowing the drivers will motivate companies to implement IR 4.0. Moreover, knowing the barriers will help companies to mitigate the risk before they implement IR 4.0. The relevant literature were reviewed and to consider the novelty of the topic, not only referring to the leading data base like (WoS, Google scholar and Scopus-Elsevier) to extract the driver and barriers, diversifying literature from different countries were reviewed. Through a systematic literature review, 22 articles and one electronics book were considered. The outcome of the critical analysis are 20 drivers and 23 barriers which were further categorized into relevant groups.

The expecting contribution of this paper, is to fill in the gap of the knowledge in implementing IR 4.0, particularly, in the manufacturing sectors. In addition, the identified barriers could be used to develop a mitigation plan that could help managers to implement IR 4.0 into their firms. The findings also have strong implication for policymakers, managers and practitioners.

In future, further efforts from researchers will be needed to provide a framework that help to mitigate the barriers and facilitate the implementation of IR 4.0 in manufacturing sectors.

6. ACKNOWLEDGMENT

My great thanks to Dr Abdelgadir Mohamed for his kind support, great efforts and for providing me valuable assistance and helping me to write this paper. I gratefully acknowledge his important contribution and wisdom to write this paper.

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Engineering Students' Entrepreneurial Intentions: Comparison Analysis between University and Polytechnic

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***Abstract*: Comparing Entrepreneurial Intentions (EI) between Engineering students from University and Polytechnic was the focus of this research. The problem to be discussed was looking for the influence between Attitude, subjective norms, and Perceived Behavioural Control (PBC) factors based on Theory Planned Behaviour (TPB) on Entrepreneurship Education (EE) and Entrepreneurial Intention (EI). The aim of this study to enrich Entrepreneurship Education (EE) methods and modules. The population in this study were engineering students at public Polytechnics and Universities in Medan, North Sumatera. The study used a convenience sampling technique with respondents as many as 255 engineering students of University and Polytechnics in Medan city. Data analysis techniques used SmartPLS 3.2.1 software. The analysis results divided into two parts; a model for University Engineering students and a model for Polytechnic students. The results obtained to state that for direct influence, only the Perceived Behaviour Control (PBC) variable has the most positive and significant impact on Entrepreneurship Education (EE) and Entrepreneurial intentions (EI) for Engineering student at the University and Polytechnic. Meanwhile, only Attitude and PBC has a significant effect on Entrepreneurial Intention (EI) with Entrepreneurship Education (EE) as a moderating variable of students of the University.**

***Index Terms*: entrepreneurial intentions, entrepreneurship education, Theory Planned Behaviour (TPB), engineering students**

Introduction

According to the Indonesian Central Statistical Agency [1], the number of unemployed in Indonesia decreased in August 2019. The number of open unemployed recorded at 7.05 million people or 5.28% of the total workforce was 5.34%. This situation does not include the underemployed, amounts to 8.14 million and 28,41 million people part-time workers [2]. However, this number will suddenly change rapidly and significantly with the coronavirus outbreak globally. The unavoidable layoffs of employees and workers due to this epidemic had made the number of unemployed massively increase. The Center of Reform on Economics (CORE) estimates that the number of open unemployment could rise to 9.35 million in the second quarter of 2020, with an additional 5.2 million unemployed [3]. Of course, this situation is a threat to today's job seekers who hardly compete with current workers. Condition of companies in Indonesia, which is still deteriorating due to the epidemic, has made the competition for job-seekers tighter.

Students cannot underestimate this situation. The fewer jobs, increasing competition for positions in companies are things that students must pay attention to before entering the world of work. Because of the above conditions, one way to avoid competition for job searches is inevitable, so it is better to become an entrepreneur who can create jobs for other people. Becoming an entrepreneur usually thought of by many business students, even before choosing the major in college. Nevertheless, very few students from the Department of Engineering likely intend to become entrepreneurs after finishing college. This information is essential for this study to escalate the entrepreneurial intentions for engineering students since studying in college. The intention to become an entrepreneur plays a significant role in starting a business [4].

Entrepreneurial education is needed to generate entrepreneurial intentions for students who can hone students' abilities and competencies through education and meta-analysis [5]. Authors wanted to observe the factors to prompt the students' entrepreneurial intentions and the entrepreneurship education methods in fostering entrepreneurial intentions.

This study compared the opinions between the University and Polytechnic's students based on the differences in the educational objectives given. In University, education mostly develops for academic skill and scientific purposes. On the other hand, Polytechnic students must master particular skills and gain competency with 60% practical and 40% theory. The topic appeals to the objective's differences between the universities and polytechnics mentioned above. It is necessary to know what factors can influence entrepreneurial education patterns on target for Engineering students at Universities and Polytechnics to enhance their entrepreneurial intention.

The entrepreneurial theories for Engineering students presented by using the TPB (Theory of Planned Behaviour from Fishbein and Ajzen [6] to examine respondents' behaviour towards things that widely used by researchers [7]. TPB used widely in the various researches and used in this study. To explain entrepreneurial activities, including individual entrepreneurship efforts based on three dimensions: Attitude, Subjective Norms, and Self-Efficacy [8]. These TPB dimensions also affect the effectiveness of entrepreneurship education [9]. Below were sub-objectives given:

1. To examine the effect of each variable of Theory of Planned Behaviour (TPB) which are subjective norms and perceived behavioural control (PBC), on Entrepreneurship Education and Entrepreneurial Intentions.

2. To examine Entrepreneurial Education as a mediating role of Entrepreneurial Intention.

I. LITERATURE REVIEW

Entrepreneurial Intentions (EI) defined as a strong self-acknowledgement by someone who intends to build a new business in the future [10] and as a social phenomenon that documented through the theory of Planned Behaviour [11]. Entrepreneurial Intentions describes the expression of someone's willingness to build a new business by identifying business opportunities [12]. A person's expertise and competence are the relevant triggers for entrepreneurial intentions, including technological skills, procedural and managerial skills, and participating in various training/education [13].

Entrepreneurship Education (EE) contains many educational programs or processes for entrepreneurial attitudes and abilities [14]. It is challenging to create an entrepreneurial spirit at the beginning of learning because not everyone has the intention to become an entrepreneur. Each individual has a different psychological approach to show an entrepreneurial spirit and contribute to economic growth [15]. Therefore, it is necessary to have Entrepreneurial Education as insight and competence to do tasks in general and also an alternative for career choices in work [16], [12].

It cannot be denied that graduates from engineering low in number to establish new businesses than graduates from other fields [17]. So, the particular entrepreneurship education required according to their needs [18]. EI believed in providing engineering students with the ability to recognise business opportunities, identify problems, and generate new ideas [19] based on planning, creativity [20], and programs [21].

As the first factor of the Theory of Planned Behaviour (TPB), Attitude is the individual's way of thinking or feelings or opinions about entrepreneurial activities positively addressed to overall function. It considered a challenge [22] dan [23] also described as individual preferences related to circumstances that lead to advantages and disadvantages [15]. Personal Attitude applies to perceived feasibility as a primary factor for individual self-efficacy, significantly influences entrepreneurial behaviour [24] and [25]. Attitude has several components: empathy, openness, authority, responsibility and the ability to evaluate others, making other individuals as role models and examples [26], obtaining financial benefits, self-satisfaction, and able to control stress in the job [11].

Although several studies stated that Attitude did not significantly predict entrepreneurial intentions [27], it mentioned that the relationship between individual perceptions could be learned [28]. [29] noted that engineering students' attitudes significantly and powerfully influence entrepreneurial Intentions (EI). The better and more positive a person's Attitude towards proper behaviour, the stronger the intention to start a business [20]. This study proposes the following hypotheses based on Attitude measuring Entrepreneurship Education (EE) and Entrepreneurial Intention (EI):

H1. Attitude has a positive effect on Entrepreneurship Education (EE)
H2. Attitude has a positive effect on Entrepreneurial Intentions (EI)

The second factor of TPB is subjective norms as a function of perceived normative beliefs related to society's influence on individual intentions and behaviour or both [15]. It has a significant impact on family, friends, colleagues based on personal motives to obey normative beliefs [30]. It is related to a person's perceptions or opinions from reference groups such as family and friends that influence someone's behaviour [20]. In entrepreneurship, the individual's view comes from the trust and support of family, friends, or people considered essential [31]. Subjective Norms trusted to make someone follow directions or suggestions from people around them to participate in entrepreneurial activities [32]. Subjective norms showed a significant impact on Entrepreneurship education/program (EE) and played an essential role in forming students as entrepreneurs [33]. The reverse results showed that subjective norms significantly influence business students positively and negatively for engineering students with EE as a mediating factor [20]. In another research, the effect of subjective norms on entrepreneurial Intentions (EI) mostly focuses on parents as entrepreneurs [34]. Although studies that found subjective norms do not directly impact students' entrepreneurial intentions, it positively influences the process [35]. Specifically, the following hypotheses proposed:

H3. Subjective norms have a positive effect on Entrepreneurship Education (EE)
H4. Subjective norms have a positive impact on Entrepreneurial Intentions (EI).

This study's last TPB factor is Perceived Behavioural Control (PBC) / Self-Efficacy [36]. A person's belief about the possibility of carrying out planned behaviour, thoughts, mental and physical, hobbies, finances and resources. It also controls a person to take action [37]. Moreover, the ability to make something popular or expected [38] has positive effects: effort, persistence, setting goals, achievements, and consistent actions [39], [40]. If someone has the highest level of the above conditions, it will be easy to find a solution to the problem at hand [41]. Behavioural control preferred entrepreneurs who work for others because they believe in managing business, leadership and human resources [31].

Students who receive EE confidently create and evaluate entrepreneurial opportunities and manage the resources needed [20]. The effect of PBC on EI more strongly predicted to a certain extent [42], [43]. Considering the literature of PBC, the following hypotheses proposed:

H5. Perceived Behavioural Control (PBC) has a positive effect on Entrepreneurship Education (EE)
H6. Perceived Behavioural Control (PBC) has a positive effect on Entrepreneurial Intentions (EI).

Consequently, this study will investigate the mediation effect of Entrepreneurship Education (EE) between Theory of Planned Behaviour (TPB) factors and Entrepreneurial Intentions (EI), resulting in these following hypotheses:

H7. Entrepreneurship Education (EE) mediates the relationship between Attitude and Entrepreneurial Intentions (EI)
H8. Entrepreneurship Education (EE) mediates the relationship between Subjective Norms and Entrepreneurial Intentions (EI)

H9. Entrepreneurship Education (EE) mediates the relationship between Perceived Behavioural Control (PBC) and Entrepreneurial Intentions (EI).

The relationship between EE and EI on students using TPB had received much attention among researchers and professionals [14] and more robust than the connection between Business Education and Entrepreneurial Intention [5], [44]. Moreover, EE can positively and negatively affect EI [20], [44], [45]. After receiving Entrepreneurial Education (EE), the students' capacity and intention to start a business increase [21]. Thus, the following hypothesis proposed:

H10. Entrepreneurship Education (EE) has a positive effect on Entrepreneurial Intentions (EI)

Study Framework

The study framework based on the literature mentioned above on TPB for Entrepreneurial Intentions (EI), is proposed in Figure 1. In this framework, TPB dimensions urge direct influence on Entrepreneurship Education (EE) and Entrepreneurial Intentions (EI). Direct paths mentioned in hypotheses H1 to H6. Further, Attitude, Subjective Norms, and Perceived Behaviour Control (PBC) and Entrepreneurship Education (EE) assessed in terms of medication effect between TPB factors and Entrepreneurial Intentions (EI). Indirect paths specified for hypotheses H7 to H9. Hypothesis 10 described the direct impact between Entrepreneurship Education (EE) and Entrepreneurial Intentions (EI).

The model used in this study refers to the Theory of Planned Behaviour (TPB) from Fishbein and Ajzen [6] used by many previous researchers [20], [46], [47], and others. The difference between the previous model and this research was Entrepreneur Education (EE) becomes the moderating variable.

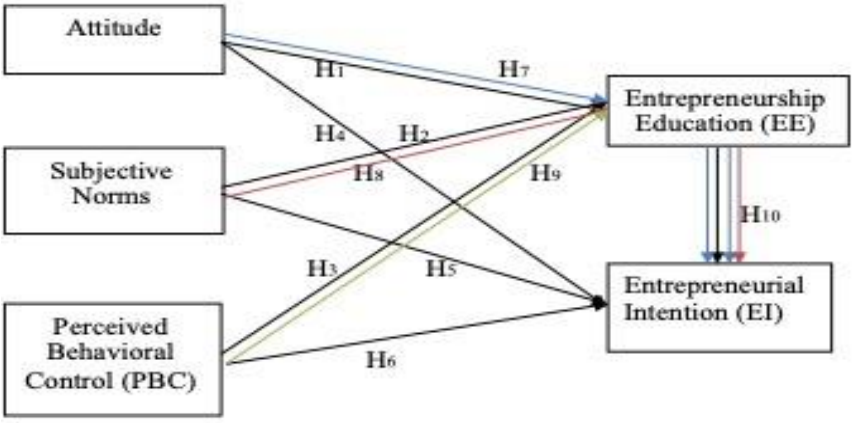

Figure 1. Model for Entrepreneurial Intentions (EI)

II. RESEARCH METHODOLOGY

This quantitative research with the descriptive method using path analysis with three independent variables: Attitude, Subjective Norms, and Perceived Behavioural Control (PBC) and two dependent variables, Entrepreneurial Education (EE) as moderating variable and Entrepreneurial Intentions (EI). About 27 statement items on the questionnaire, including 19 items for TPB variables and four items for Entrepreneurship Education (EE) and four items for Entrepreneurial Intentions (EI). The questions were in the form of five-scale Likert statements from 'strongly disagree' to 'strongly agree'. The structured questionnaire provides principal information to develop the survey instrument—the survey questionnaire for this study based on previous literature.

Data Collection

The students of educational institutions in Medan were the population in this study. This study took the sample from Electrical Engineering, Industrial Engineering, Chemical Engineering, Mechanical Engineering, Environmental Engineering, and Civil Engineering departments.

TABLE 1. Respondent Profile

Socio-Demographic		*f*	%
Gender	**Male**	168	65,90%
	Female	87	34,10%
Age	**16-20 years old**	137	53,70%
	21-25 years old	100	39,20%
	26-30 years old	18	7,10%
Education	**University**	149	58,43%
	Polytechnic	106	41,57%

We collected the data by distributing the questionnaire to engineering students to answer their Entrepreneurial Intentions (EI). The survey delivered and collected online through Google form and offline were circulated to gather the data and conducted from July to November 2020. This study used a convenience sampling technique with respondents as many as 255 engineering students of the Universities and Polytechnics in Medan city. As shown in the table, the distribution according to gender among Engineering students who became respondents showed that 65.9% were male and 34.1% female. Respondents of 16-20 years old were 137 people, 39.2% were 21-25 years old, and 7.1% of respondents 26-30 years old. Respondents of the Universities were 149 students (58,43%). Meanwhile, a total of 106 students or 41,57%, came from Polytechnics.

Data Analysis

Structural equation modelling (SEM) used to test the model using Smart PLS 3.2.1package for the partial least squares approach to SEM-based analysis and multigroup analysis. This study model comprises mediating variables; therefore, PLS-SEM will ensure correct and valid terms for theory validation and predict the relationship among the variables [48]. The PLS technique estimated the study model with two steps: a structural model (outer) that establish the link among latent variables and measurement model (inner) [15].

TABLE 2. Measurement Model Results

Construct		UNIVERSITY			POLYTECHNIC		
		Loading	CR	AVE	Loading	CR	AVE
ATTITUDE			0,801**	0,574***		0,825**	0,703***
ATT1	I can understand other people character	0,791*			0,592		
ATT2	I always available providing opinions and ideas	0,745*			0,736*		
ATT3	Pleased to be given authority and responsibility	0,59			0,720*		
ATT4	Ability to judge the other's character	0,735*			0,544		
ATT5	The desire for financial freedom	0,664			0,538		
ATT6	Feeling satisfied with the successful effort	0,381			0,362		
ATT7	Able to withstand the stress under any circumstances	0,51			0,315		
SUBJECTIVE NORMS			0,869**	0,68***		0,785**	0,554***
SN1	Greatly concern about public opinions and the closest person's opinion	0,856*			0,858*		
SN2	I have the spirit of entrepreneurship because the trust from others	0,840*			0,771*		
SN3	I encouraged doing business because of the support from family, friends and my closest person.	0,794*			0,575		
PERCEIVED BEHAVIOUR CONTROL (PBC)			0,768**	0,531***		0,883**	0,716***
PBC 1	Have the confidence to manage business correctly	0,830*			0,846*		
PBC2	Determined and consistent in business	0,766*			0,844*		
PBC3	Determine planning the short, medium, and long-term goals	0,564			0,848*		
ENTREPRENEURSHIP EDUCATION (EE)			0,89**	0,67***		0,832**	0,559***
EE1	Can recognise the problem earlier	0,726*			0,552		
EE2	Able to make a good business plan and proposals	0,836*			0,800*		
EE3	I have many creative ideas to develop business	0,803*			0,772*		
EE4	I can create a comprehensive business proposal	0,9*			0,833*		
ENTREPRENEURIAL INTENTIONS (EI)			0,867**	0,62***		0,826**	0,545***
EI1	I want to be an entrepreneur	0,767*			0,776*		
EI2	I can describe the type of my future business	0,811*			0,830*		
EI3	Able to notice the successful business opportunity	0,731*			0,743*		
EI4	I will expand my business based on new ideas	0,836*			0,570		

Note: * Loading > 0,7; ** CR > 0,7; *** AVE > 0,5 ; N=27), CR: Composite Reliability; AVE: Average Variance Extracted

III. RESEARCH RESULTS

In this study, data analysis techniques used to answer problem formulations or test the hypotheses formulated using SmartPLS 3.2.1 software. In the PLS (Partial Least Square) method, the analysis techniques carried out are as follows:

Outer Model Analysis

Outer model analysis ensures that the measurement used is valid and reliable. Validity is a standard measure that shows an instrument's accuracy [49] with an outer loading value > 0.7, which is considered sufficient. Table 2 showed the convergent validity

measurement; the average variance extracted (AVE) was used, which higher than 0.5 [50]. Convergent validity indicated by AVE values ranges from 0.531 to 0.680 for University and ranges from 0.526 to 0.716 for Polytechnic. After carrying out the reduction process, several university model indicators were removed, which were ATT3, ATT5, ATT6, ATT7 and PBC3. Meanwhile, in the Polytechnic mod-el, the indicators eliminated were ATT1, ATT4, ATT5, ATT6, ATT7, SN3, EE1, dan EI4.

So that all valid indicators used in further calculations. Reliability measures respondents' stability and consistency in answering matters relating to the construct of questions that are the dimensions of a variable and arranged in a questionnaire form [51]. The reliability of the constructs is proper if the variable has a Composite Reliability (CR) value> 0.70 (table 2). Reliability ensured by CR value for all the constructs ranges from 0.768 to 0.890 for universities and 0.765 to 0.883 for Polytechnic.

Inner Model Analysis

The inner model analysis evaluated by using the R-square for the dependent construct, the t-test and the significance of the structural path parameter coefficients. Furthermore, testing the inner model (structural model) can be evaluated by looking at the r-square (indicator reliability) for the dependent construct and the t-statistic value from the path coefficient test.

TABLE 3. R-Square (R2) values

	University		Polytechnic	
	R^2	%	R^2	%
Entrepreneurship Education	0,464	46,4	0,428	42,8
Entrepreneurial Intention	0,597	59,7	0,47	47

Based on the R-square (R2) value in the table below (table 3), it showed that all TPB variables could explain the Entrepreneurship Education (EE) variable by 46.4%. Those three TPB variables explained the Entrepreneurial Intentions (EI) variable through Entrepreneurship Education as a moderating variable of 59.7% for universities' students. Meanwhile, for Polytechnic's students, TPB variables clarify the Entrepreneurship Education variable by 44.9% even explained the Entrepreneurial Intentions (EI) for 47.9% with Entrepreneurship Education as a moderating variable.

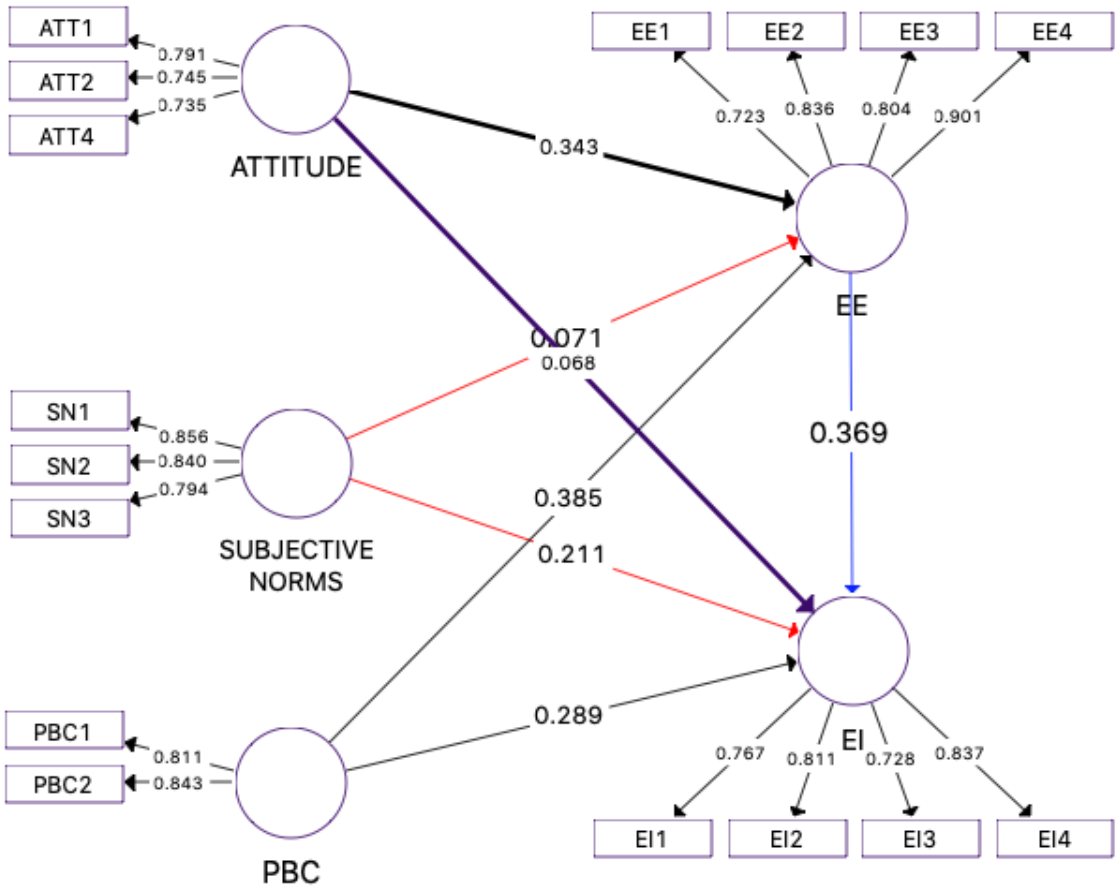

Figure 2. Model Entrepreneurial Intention of University Students

The higher the R-square (R2), the better the research model. This test aims to determine the influence of the independent variable on the dependent variable. This study explained different path coefficients and coefficients of determination (R2) of University and Polytechnic students' structural model.

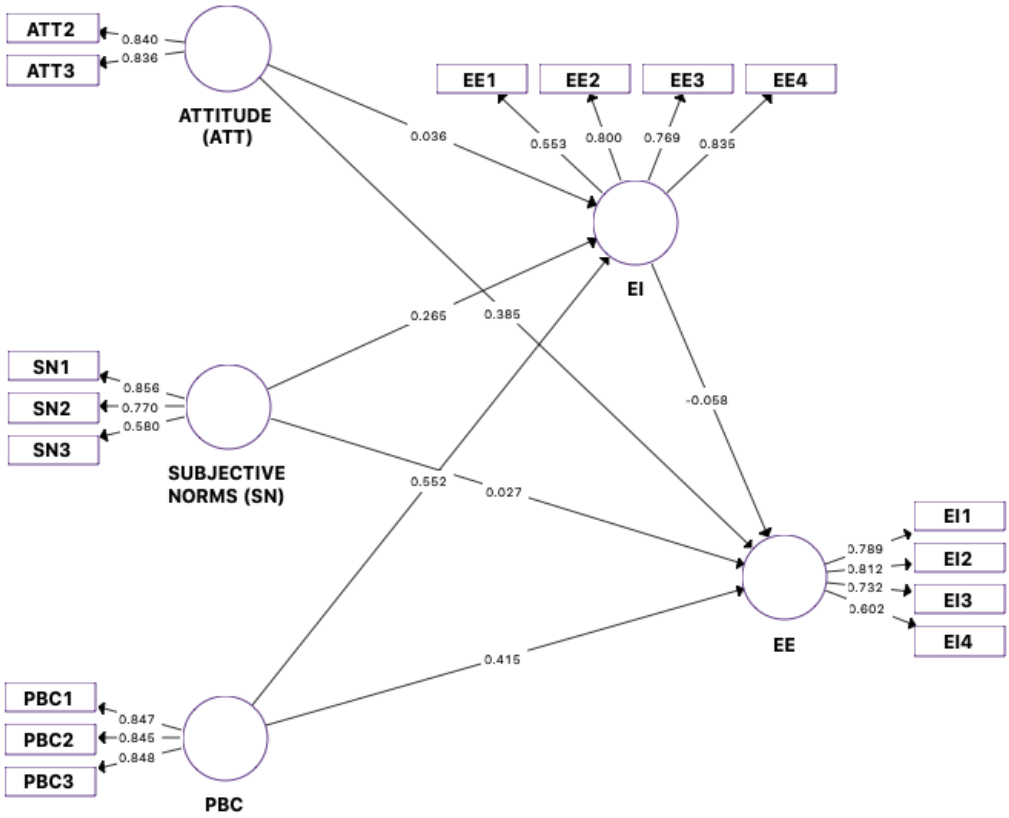

Figure 3. Model for Entrepreneurial Intentions of Polytechnic Students

Hypothesis Testing of University Students

Hypothesis testing performs based on the Inner Model (structural model) test results to see whether a hypothesis accepted or rejected, including the significance value between constructs, t-statistics, and p-values. This research hypothesis testing carried out by SmartPLS (Partial Least Square) 3.2.1 software.

1. Direct Effects

The significance value between the construct, t-statistic, and p-value can be seen from the bootstrapping results, as in table 4. Mediation analysis performed to determine the direct and indirect effects. The hypothesis was accepted if the t-statistic> 1.96 had a significance level of p-value 0.05 (5%) and the positive coefficient beta.

TABLE 4. Direct Effects of University Students

	Original Sample (O)	Sample Mean (M)	T Statistics (|O/STDEV|)	P Values	Hypothesis
ATT --> EE	0,343	0,349	3,909	0,000	H1
ATT --> EI	0,068	0,067	0,802	0,423	H2
SN --> EE	0,071	0,078	1,096	0,273	H3
SN --> EI	0,211	0,218	2,995	0,000	H4
PBC --> EE	0,385	0,376	3,759	0,000	H5
PBC --> EI	0,289	0,285	3,559	0,000	H6
EE --> EI	0,369	0,367	4,466	0,000	H10

Note: *p-values < 0,05*

Based on the results, Attitude showed a nonsignificant level in explaining engineering students Entrepreneurial Intention (EI) in University with a p-value of 0.495 Intention (EI). However, it can affect Entrepreneurship Education (EE). Likewise, the same result obtained between subjective norms (SN) to Entrepreneurship Education (p-value = 0,066). So, exclusively Perceived Behaviour

Control (PBC) can affect directly and significantly both the Entrepreneurship Education (EE) and Entrepreneurial Intention (EI) of University students in this model. Therefore, H2 and H3 hypotheses rejected. Thus, H1, H4, H5, H6, and H10 supported.

TABLE 5. Indirect Effects of University Students

	Original Sample (O)	Sample Mean (M)	T Statistics (|O/STDEV|)	P Values	Hypothesis
ATT --> EE -->EI	0,127	0,130	2,561	0,011	H7
PBC --> EE --> EI	0,142	0,135	3,408	0,001	H8
SN --> EE --> EI	0,026	0,029	1,018	0,309	H9

Note: *p-values < 0,05*

2. Indirect Effects

The analysis using SmartPLS resulted in several findings that had a direct or indirect effect on this study. Based on table 5, the Attitude variable affects positively and significantly on Entrepreneurial Intention through Entrepreneurial Education (EE) as moderating variable (= 0.117; p-value = 0.017). Reciprocally, PBC had a positive and significant effect (= 0.132; p-value = 0.001) on Entrepreneurial Intention through the moderator variable. So, for indirect effect in model for University students, H7 and H9 accepted. Meanwhile, H8 rejected (= 0.081; p-value > 0.005).

Hypothesis Testing of Polytechnic Students

As much as 106 engineering students of Polytechnic participated as respondents for this study as seven hypotheses for direct effects and three indirect effects examined in the Entrepreneurial Intentions (EI) model of Polytechnic students.

1. Direct Effects

Based on the direct relationship calculation, the interpretation of the hypotheses results summarised in table 6. The results indicated that attitude had no significant influence towards Entrepreneurship Education (= 0.045; p-value = 0.726). So, in the model, direct influence between entrepreneurial attitude and intention (EI), Subjective Norm (SN) on Entrepreneurship Education (EE), PBC and entrepreneurship education (EE), PBC and Entrepreneurial Intention had positive and significant effects. Hence, the accepted hypotheses were H2, H3, H5, and H6. While H1, H4, and H10 rejected.

TABLE 6. Direct Effects of Polytechnic Students

	Original Sample (O)	Sample Mean (M)	T Statistics (|O/STDEV|)	P Values	Hypothesis
ATT --> EE	0,095	0,099	1,036	0,301	H1
ATT --> EI	0,356	0,351	3,837	0,000	H2
SN --> EE	0,258	0,253	2,436	0,005	H3
SN --> EI	0,022	0,043	0,231	0,817	H4
PBC --> EE	0,486	0,488	5,403	0,000	H5
PBC --> EI	0,459	0,468	4,551	0,001	H6
EE --> EI	-0,097	-0,114	0,965	0,335	H10

Note: *p-values < 0,05*

2. Indirect Effects

In table 7, all indirect effects (indirect relationships) between TPB variables (Attitude, Subjective Norms, and Perceived Behaviour Control) indicated a nonsignificant relation for Entrepreneurial Intentions (EI) with Entrepreneurship Education (EE) as moderating variable. So, all the hypotheses for the indirect effect of polytechnic students were H7, H8, and H9 rejected (p value> 0.05).

TABLE 7. Indirect Effects of Polytechnic Students

	Original Sample (O)	Sample Mean (M)	T Statistics (|O/STDEV|)	P Values	Hypothesis
ATT --> EE -->EI	-0,009	-0,012	0,524	0,601	H7
PBC --> EE --> EI	-0,047	-0,054	0,948	0,344	H8
SN --> EE --> EI	-0,025	-0,032	0,775	0,439	H9

Note: *p-values < 0,05*

IV. DISCUSSION

This study's purpose was to measure Entrepreneurial Intention (EI) and examine the relationship between TPB variables to Entrepreneurship Education (EE) and Entrepreneurial Intention (EI). This study also discussed the mediation effect of Entrepreneurship Education (EE) between TPB variables and Entrepreneurial Intentions (EI). The respondents' perception indicates several differences in Entrepreneurial Intentions (EI) among students in different academic institutions. Analysis factors on university engineering students generated the results of this study that almost all hypotheses accepted. There were three unaccepted hypotheses: the influence between attitudes towards entrepreneurial intention, subjective norms on Entrepreneurship Education and indirect effect between subjective norms on entrepreneurial Intention with Entrepreneurship Education as mediation variable complied for

engineering students at the University. Only attitudes and Perceived Behavioural Control (PBC) that affect Entrepreneurship Education. The results were consistent with previous research in [20] and [47].

Engineering students of University assume that openness in providing ideas on attitude variables and empathy in understanding others' character and assessing their nature can affect entrepreneurship education (EE). They also pay attention to public and closest person' opinions. Moreover, they can build Entrepreneurial Intentions (EI) if they gain trust from family, friends, and the nearest person. The students believe study Entrepreneurship Education on campus can soon enhance their entrepreneurial intention, especially if they have empathy, open mind, and ability to value others.

TABLE 8. Summary of Result

Hypothesis	Path	University Sample	Polytechnic Sample
H1	ATTITUDE -> EE	Accepted	Not Accepted
H2	ATTITUDE -> EI	Not accepted	Accepted
H3	SN -> EE	Not Accepted	Accepted
H4	SN -> EI	Accepted	Not Accepted
H5	PBC -> EE	Accepted	Accepted
H6	PBC -> EI	Accepted	Accepted
H7	ATTI-> EE -> EI	Accepted	Not accepted
H8	SN -> EE -> EI	Not accepted	Not Accepted
H9	PBC -> EE -> EI	Accepted	Not Accepted
H10	EE - > EI	Accepted	Not Accepted

Six hypotheses rejected for engineering students in Polytechnic; non significantly influence between attitudes towards entrepreneurial education, subjective norms on entrepreneurial intention, the nonsignificant effect of each TPB variable; Attitude, Subjective Norms and Perceived Behaviour Control (PBC) on Entrepreneurial Intentions (EI) with Entrepreneurial Education as a moderator variable. A slightly negative influence between Entrepreneurship Education on Entrepreneurial Intentions in engineering students at Polytechnic. Means that the Entrepreneurial Intentions (EI) had negatively influenced by outside parties such as opinions and family support. Their intentions solely based upon the self-abilities. These results above similar to previous studies [35]. Students tend to be open in expressing opinions and ideas regarding the importance of having authority and responsibility if they intend to be entrepreneurs.

Two separate studies among engineering students of University and Polytechnic agree that Perceived Behavioural Control (PBC) variable has a powerful influence directly on Entrepreneurship Education (EE) and also their Entrepreneurial Intentions (EI). Engineering students at Universities and Polytechnics believe in their perseverance and goals to manage the business while studying entrepreneurship and working their business later [20].

Implications

The specific implications for policymakers and researchers need to concern about the differences in delivering the entrepreneurship subjects in disparate academic institutions. Implication's concern referring to [52] that the intention will be formed in the presence of desirability and feasibility to jump into business operations. On a temporal basis, a student must plan what to do in the near and distant future [15]. This study indicated that besides TPB variables, particularly Attitude and PBC, Entrepreneurship Education (EE) is a notable factor to help University's engineering students. They need theories and motivation through education at University to build their Entrepreneurial Intentions (EI).

Entrepreneurship Education (EE) should be further developed in the curriculum by problems identification related to every students' aspects and need. This Entrepreneurship education can help students find the most appropriate business and compatible with their personalities [18]. Although the engineering students of Polytechnic mentioned that Entrepreneurship Education (EE) has nonsignificant level to their Entrepreneurial Intentions, more training and assignment for both students (University and Polytechnic) in preparation of various kinds of planning and business proposals should increase.

Students must be familiar with business formulation if they have further business opportunities. It is even better if students guided to participate in many business start-up competitions and directly mentored by entrepreneurship lecturers in both University and Polytechnic. While students are learning, lecturers should explore as many ideas as possible to match their personalities and attitudes. These ideas can come from digging up stories and meet-up with successful entrepreneurs who started with small capital, young entrepreneurs; and other sources such as the internet and business magazines. At the end of the semester, students' interests and desires have been identified regarding the kind of business they want to develop. Then the ideas made into a high-quality proposal and submitted to the ongoing entrepreneurial competition. This study's findings should be elaborated into teaching methods and modules in Entrepreneurship Education (EE).

Limitation

This research, limited to certain aspects, present several opportunities for future research. While analysing and determining students' Entrepreneurial Intentions, finding also revealed the need for a specific semester to deliver the institution's entrepreneur subject. Besides, the short number of respondents in this study may affect the overall result. Thus, it is necessary to survey multiple

characteristics such as age and prior entrepreneurial experience in the model. Future research requires the aspects to generate the effect of Entrepreneur Education to intensify the students' intentions.

V. CONCLUSION

This study accommodates a new perspective to measure Entrepreneurial Intentions in two different academic institutions: University and Polytechnic. Overall, forming a curriculum for entrepreneurship courses should emphasise the openness in providing business ideas based on each student's personalities, create the intensive proposals, and actively participate in many entrepreneurial competitions. For the University, the curriculum should emphasise understanding and assessing students' character and provide business ideas by accommodating several meetings with successful SMEs owners. Curriculum for Engineering students at Polytechnic consists of learning materials to strengthen and sharpen their ability to manage a business with the simulations. During the lectures, they help students choose the right venture for them.

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Edification, Characteristics, Public Contributions of Livestock Rearer's and Awareness of Tsetse Fly in Bajoga, Gombe State

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Abstract*: This work is aim to assess the edification, characteristics, public contributions and awareness of tsetse fly and animal trypanosomiasis in Bajoga, Gombe state. Method: A physical questionnaire was used in Bajoga, Funakaye LGA, Gombe State to assess the contribution and level of awareness, view and skill of livestock rearers about Tsetse fly. Results: 86.7% of the respondents were male, merely 14.3% were female. 90.4% had sufficient awareness about Tsetse fly, however, 80.0% gave a native name to it and 100%n understand the consequences of Tsetse fly to their livestock. Livestock rearers, 84.3) reported Tsetse flies communicate disease to livestock, (TD) (90.0%) know where their livestock make acquaintance with the tsetse flies and, 90.4% of the respondents believed that, tsetse fly bite caurse irritation to the massive crowd and 25.3% knows tsetse fly in the area, 27% believed that bite cause interruption at time of grazing activities (GA). 30.1% knows the tsetse fly transmit disease (TM) tremendously. In this fig. only 9.6% don't know the transmitting disease (DKTMD) and interruption in the time of grazing activities (GA) and most of the respondents are named tsetse by its local names, 48.2%, 13.3%, 1.2% and 6.0% respectively. Only 9.6% know trapanosomiasis and 15.7% do not kno (DNK). 60.2% believed that livestock get contact with tsetse fly, 22.9% respondents knows livestock get contact with tsetse fly in riverine area (RA) and 30.1% do not know (DNK). The believe of respondents could be associated to the fact, cattle rearers take their livestock for grazing (A) and watering(W) in tsetse fly ecology in dry season in that is only the point where their livestock can get grasses and water. Results obtained from this stdied will be used in medical, edification and awareness preparation of increase material in trypanosomosis anticipation.

***Keywords*: Edification, Tsetse Fly, Trypanosomiasis Tolerant, Gombe, Funakaye, Bajoga**

1. INTRODUCTION

The livestock manufacturing in North-eastern region part of Nigeria is in the control of a precise community. Nigeria it is conquered by the Fulani who justified for over $2^{1/2}$ of crowds in the country (Inuwa, 2013).The old livestock manufacture structure also mostly is nomadic, and is further obvious in the free region. The more moisture arises, agro-green system merging crop and livestock farming invention is skillful. The major limitations to bests land use for agricultural invention is the occurrence of tsetse flies and animal trypanosomosis in huge arable land-living of sub-Sahara Africa, and this is including Nigeria (Mamoudou et al., 2009a) . This has vulnerable the combination of livestock and harvest farming systems (variegated farming). It was touched that a main share of national crowd from the overstocked dry region will be transferred to the sub-tropical region. The livestock population in the sub-tropical region was assessed to have been summarize by 37%, while the tropical region was by 60% (Swallow, 2000). Earlier regulation projects did not include the stakeholders, mainly the rustic peasant and nomadic livestock growers in designing and employment. Diagonally sub-Saharan Africa, the straight influence on livestock output comprises compact meat and milk off take, reduced calving amount, and enlarged both calf humanity proportion and the price of livestock control (Shaw, 2004); ((Mamoudou, 2009b) ; (Chanie, 2013). The demand for combined tsetse flies and African Trypanosomiasi mechanism started achieving powdered and three stages of addition were proposed. Rural development were included, extra virus mechanism methods, else with numerous tsetse and trypanosomiasis mechanism (Holmes, 1997 and Pattec, 2001). African animal trypanosomosis and its vectors happen in massive areas of sub-Saharan Africa with upsetting effect on livestock efficiency. In epidemiology and influence on livestock (e.g cattle) production are firm chiefly by the occurrence and supply of the disease and its vectors in the disturb zones. The restrictions enforce by the tsetse and trypanosomes difficulty remain to irritate the energies and growth in harvest and livestock making, thus giving to hunger, grief of entire societies in Africa (Onyiah, 1985).

2. MATERIALS AND METHODS

2.1 Study Area

Bajoga is a town and headquarters of Funakaye, a Local Government Areas in the Northern part of Gombe State, Nigeria. It is 9 kilometres (5.6mi) south of the Ashaka Cement factory, located on longitude 10°51'9.59" N and Latitude 11°25'32.99" E.

2.2. Analysis of Data

All data collected through the structural questionnaire were examined using bar graphs to describe continuous data (Zangiacom, 2015).

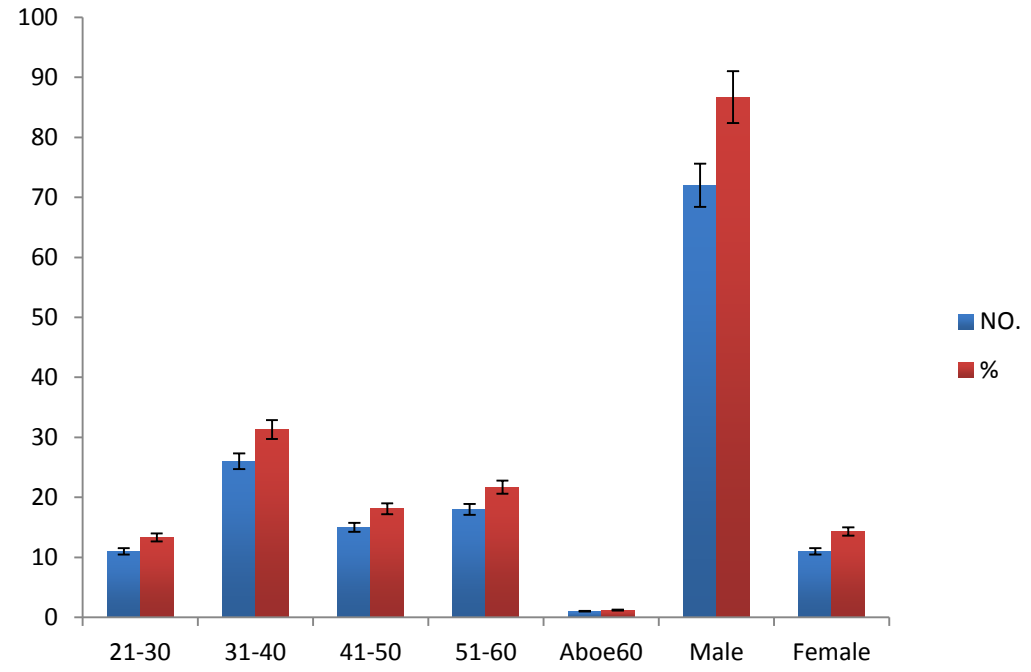

Fig. 1: Respondents Record of Age and Percentages

Fig. 1 shows that 13.3, 31.3%, 18.1% and 21.7% respectively and only 1.2% is above 60 years. 86.7% of the respondents were male and only 14.3% were female. From this figure, age ranges in 31-40 with 26 (31.3%) has a higher percentage while above 60 (1.2%) with low percentage and ages range from 51-60 with 18 (21.7%) high percentage than the ages range from 41-50 with 15 (18.1%) while ages range from 21-30 with 11(13.3) has a least percentage. In this findings it shows that the respondents are well in active, fruitful ages and do well to latest creation of livestock competences of animal disease and parasites avoidance.

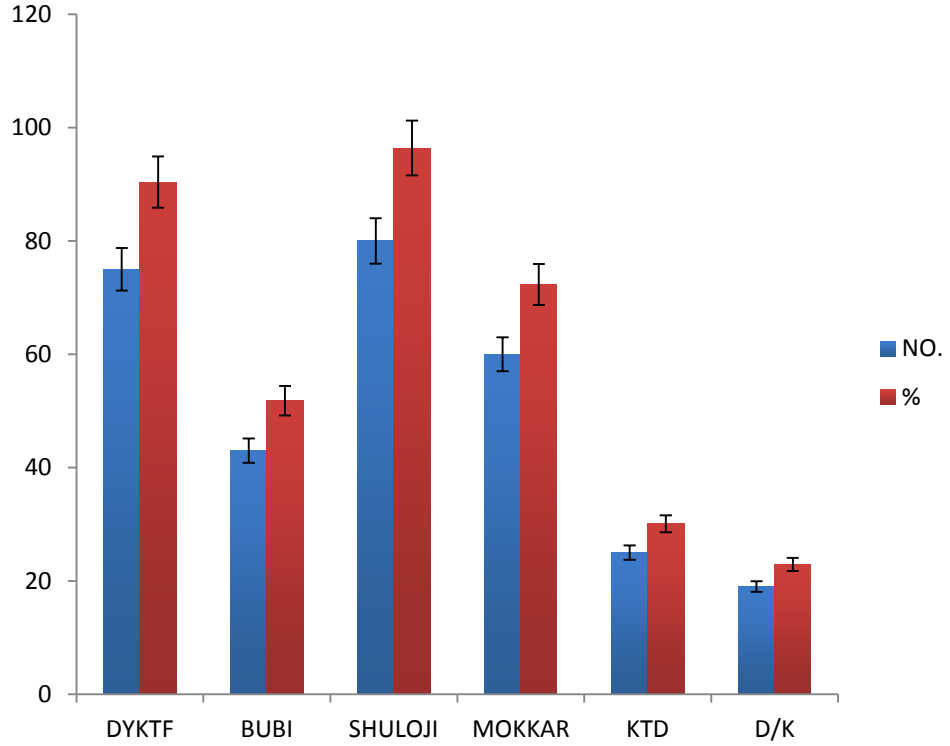

Fig. 2: Respondent Understanding of Tsetse Fly in Bajoga
(DYKNTF=Do you know tsetse fly, KTD=Know transmitting disease, D/k=Do not know)
In fig. 2 above, shows that 90.4% of the respondents have high of knowledge of tsetse fly and their local names (Hausa and Fulfude language). This observed in findings of (Mamoudou, et al., 2009b).

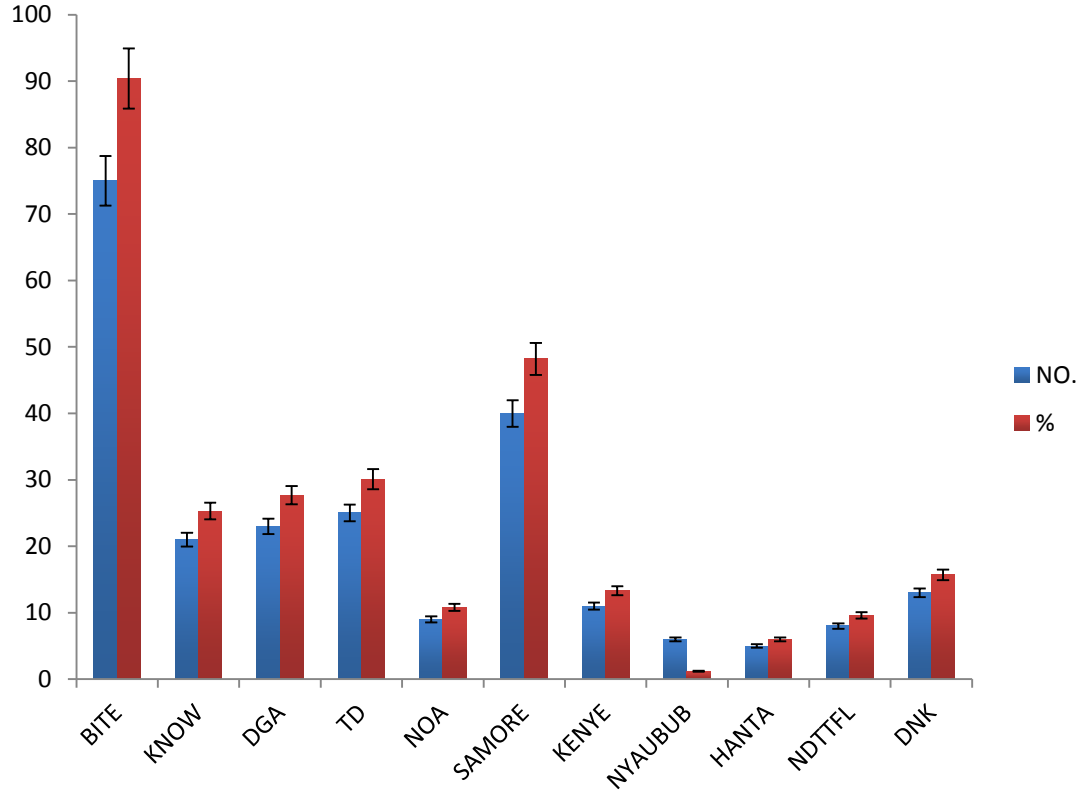

Fig. 3: Respondents on Appearances of Tsetse Fly on Livestock

(DGA=Distract grazing activities, TD=Transmit disease, NOA=none of the above, NDTTFL=Name disease transmit by tsetse fly to livestock)

From Fig**.** 3, 90.4% of the respondents believed that, tsetse fly bite and cause irritation to the massive crowd and 25.3% knows tsetse fly in the area, 27% believed the bite cause interruption at time of grazing activities. 30.1% knows the tsetse fly transmit disease tremendously. In this fig. only 9.6% don't know the transmitting disease and interruption in the time of grazing and most of the respondents are named tsetse by its local names.

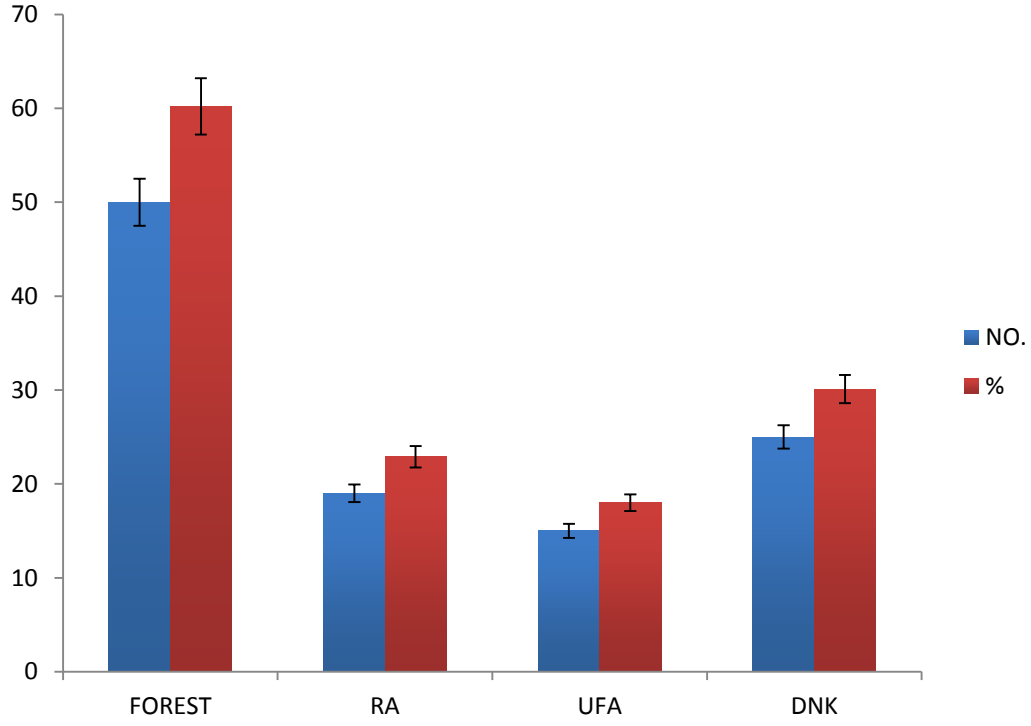

Fig. 4: Respondent on Livestock Site and Contact with Tsetse Fly

(RA=Riverine Area, UFA= un riverine area, DNK=Do not know)

Fig. 4 indicate that 60.2% believed that livestock get contact with tsetse fly , 22.9% respondents knows livestock get contact with tsetse fly in riverine area (RA) and 30.1% do not know (DNK)

3. RESULTS AND DISCUSSIONS

The results in this studied, Fig.1 shows that 13.3%, 31.3%, 18.1% and 21.7% respectively and only 1.2% is above 60 years. 86.7% of the respondents were male and only 14.3% were female. From this figure, age ranges in 31-40 with 31.3% has a higher percentage while above 60 1.2% with low percentage and ages range from 51-60 with 21.7% high percentage than the ages range from 41-50 with 18.1% while ages range from 21-30 with 13.3% has a least percentage. In this findings it shows that the respondents are well in active, fruitful ages and do well to latest creation of livestock competences of animal disease and parasites avoidance, and 86.7% of the respondents were male. And is found in the studied of (Gumel, 2013). Fig. 2 signified the total respondents 90.4% have higher knowledge of tsetse fly (DYKTF) and though 51.8%, 98.4%, 72.3%, 30.1% and 22.6% were able to state Bububi ladde, Shuloji, Mokkare and Kudan tsando/Tsando, however 22.9% don't know the traditional name to the infection tsetse fly spread to cattle. This is found in research of (Mamoudou et al., 2009b). This signifies also extreme level of alertness of the tsetse fly, the infection initiate to the livestock by the respondents. The same observation in study by (Ohaga et al., 2007). From fig. 3, all respondents 90.4% knows tsetse fly bite has upshot on the crowd. This work record with Information of tsetse fly then it shows high level of mindfulness of tsetse fly and the infections it generates (it appearance). In this fig.3, shows the respondent with the following results 25.3%, 27.7%, 30.1% and 13.3% respectively, assumed that tsetse fly cause irritation, distract grazing activities (DGA), transmit disease (TD) and only 10.8% do not know (DGA) and (TM) by tsetse Fly. And this observed in findings of (Gumel, 2013).. However 48.2%, 13.3%, 1.2%, 6.0% and 9.6% and name the disease spread by tsetse fly, only 15.7% don't know. Studied was determined by (Homes, 1997). Fig. 4 shown that, 60.2%, 22.9% and 18.0% understood that host-vector contact arise at Forest, riverine area (RA), and unforest area (UFA) respectively. Only 30.1% do not know (DNK) where cattle contact tsetse fly. This outcome indicate most of the respondents have expertise of where a cattle get contact with tsetse flies. This should be the aims why some of the respondents elude tsetse fly habitat as a stoppage of cattle trypanosomosis. This is observed in the study (Gumel, 2013).

4. CONCLUSION AND RECOMMENDATIONS

In this study, respondents have high edification and characteristic (features) of Tsetse fly in the community and the profitable importance associated to bovine (cattle) invention. The willingness of the livestock growers to make pledge towards tsetse and trypanosomosis control would be careful. Government and contributors supports can twitch a trial scheme which will include a rare of the cattle owners. An appropriate and simple elementary mechanism technology is new to be putative and skillful by planters than a compound and complete scheme. Research should be inspire to investigate the indigenous herbs used by livestock farmers to try to or influence Tsetse fly to save cost and hazard associated with the use of employing conventional insecticides.

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Abstract*: The paper focuses on the impact of Tax Incentives (TI) and Foreign Direct Investment (FDI) on manufacturing companies in Nigeria, the paper used structured questionnaires in collection of data; 325 copies questionnaire. Both descriptive and inferential analyses were used in data analysis, the descriptive statistics revealed that the FDI, Tax Holidays (TH), Custom Duties Exempted (CDE) have mean values of 0.2140, 0.6667 and 0.9290 respectively and transparency, political stability have the mean scores of 2.5 and 4.5454 respectively which indicates that the political stability of Nigeria is good. The Pearson's correlation result implies that none of the explanatory variables is significantly correlated with the dependent variable. Breusch-Pagan/Cook-Weisberg test is used which gives the chi-square value and its probability at 5% significance level which specifies that the model for FDI is significant at the 0.05 level with a p-value of 0.0002 and Cross-section Dependence Test shows that cross-sectional dependence is not an issue since the probability of the FDI model is greater than the threshold p>0. 05. Wooldridge test is utilized in determining autocorrelation in the idiosyncratic error term in the panel-data model. The result of pooled Ordinary Least Square Regression is presented alongside the result of Driscoll-Kraay. Conclusion was made that TIs have a significant positive effect on FDI inflow into the Nigerian economy. The recommendations are made that: Nigerian government should maintain the elegant of TH alongside CDE and Government should intensify means of ensuring that the impact of TIs on FDI extends to agricultural sectors so as to gain more value and continuously re-invest the profit with a view to enhancing the capital base of FDI inflow.

***Keywords*: Tax Incentive, Foreign Direct Investment, Manufacturing Companies, Tax Custom Duties**

1. INTRODUCTION

Taxation is fundamental to sustainable development and the growth of emerging economies especially where natural resources are relatively scarce. Tax incentives (TIs) are basically designed to attract new investment and to expend existing ones in priori industries which is based on the country development plan capable of stimulating economy growth. The globalization process has led to the emergence of new issues such as technological changes and innovation necessitating the need to attract Foreign Direct Investment (FDI) to complement local efforts. Not only have companies tended to become more mobile, but also governments have to deal with this new dimension in the design of their national tax policy on TI in order to attract FDI. An increasing number of governments compete hard to attract multinational companies as FDI using TIs; this trend seems to have grown considerably as evidenced by the number of high profile FDI in Nigeria oil and gas sector (Morisset and Pirnia 1999).

Morisset (2003) notes that TIs approach has had mixed results and have been contested by OECD countries and multilateral organisations because they have often been associated with suspicious capital flows. FDI is a potential source of funding for developing and developed nations. Strategies of attracting FDI turned out to be a heavily used approach of many governments across the world to boost their economies. The rationale behind the granting of TIs is to exploit investment opportunities, where the tax system is seen as obstacle (Michael, 2016) TIs are used to improve social welfare of the community; they can also be used to discourage certain activities which aim is to grant incentives to promote stock market performance (Ondabu, Willy and Kisaka, 2016). The use of TI has generated considerable debate about whether governments have offered unreasonably large incentives to entice those firms to invest in their countries. Taxes affect the Net Return on Capital (NRC) and should influence the capital movements between countries. Morisset and Pirnia (1999) observed that the elimination of barriers to capital movements have stimulated governments to compete for FDI in global markets as well as reinforced the role of tax policy in this process. Oloyede (2002) state that the dual-gap analysis provides the framework, which shows that the development of nation is a function of investment and that such investment that requires domestic savings is not sufficient to ensure that development take place. Soludo (2003) opined that countries borrow for reasons such as macroeconomic reason to both finance higher investment and circumvent hard budget constraints, which have effect on the development of a nation. Several international and regional development institutions have been advocating the importance of FDI in the development of developing countries for decades despite few countries can remain competitive without FDI with the potential benefits including technology transfer, employment gains, skills upgrading, and growth. Arogundade (2005) Posit that TIs policy in Nigeria decorated the statute books for so long without anybody undertaking a survey to determine their effectiveness or continued relevance. The inadequacy and non –availability of the companies' access to the spare parts and raw materials constituted the major factors towards the decline in the growth rate of the

manufacturing sector after 1981 **(**Dipak and Ata, 2003**)**. Aganga (2014) aver that Nigerian manufacturing sector appeared to be gradually bouncing back to reckoning based on the achievements recorded in the sector in the on-going year and the federal government kicked off an industrial revolution in the year 2012 to strategically empower and position the nation's manufacturing sector as the key driver of the economic growth through increased contribution to Gross Domestic Product (GDP) and Nigeria recorded 8.9billion dollars investment inflow in 2013, making Nigeria the number one investment destination in Africa. Therefore, TIs can have positive effect if implemented and planned properly; attract investment to a country, increased employment, higher number of investment transfers, research and technology development, and improvement to less developed areas and negative impacts on an economy if they are not properly designed and implemented. Typically a cost to TIs comprises: resource allocation, compliance, revenue and corruption costs. The imperative of balance of payment (BOP), GDP, and external debt service ratio are combined to make injection of FDI a sine qua non for economic recovery and development. Aganga (2014), if Nigeria is going to migrate from a poor nation to rich country, the key is industrialization. Studies carried out in Nigeria on TIs and FDI of listed manufacturing companies virtually received less attention a result of this attempt to fill the gap in literature by examining TIs and FDI in manufacturing companies of Nigeria shall be made whose challenges has lead Nigeria as a nation to elsewhere, The proxies are TH, CDE, TI administration for the period of ten years to 2018.

2. LITERATURE REVIEW

Conceptual Framework

2.1 Foreign Direct Investment (FDI)

Omankhanlen (2011), FDI is an investment made by an investor or enterprises in another enterprise or equivalent in voting power or other means of control in another country with the aim to manage the investment and maximize profit. FDI serves as an important engine for growth in developing countries through two modes of action: expanding capital stocks in host countries and bringing employment, managerial skills, and technology. Macaulay (2011) states that FDI is an investment made to acquire a lasting management interest in a business enterprise operating in a country other than that of the investor. FDI is an integral part of an open and effective international economic system and a major catalyst to development. Adeleke, Olowe and Fasesin (2014) opined FDI is an investment into production or business in a country by an individual or company of another country, either by buying a company in the target country or by expanding operations of an existing business in that country, which is in contrast to portfolio investment and passive investment in the securities of another country such as stocks and bonds. World Bank (1996) posit that FDI as investment is made to acquire a lasting management interest in an enterprise and operating in a country other than that of the investors. FDI includes mergers and acquisitions, building new facilities, reinvesting profits earned from overseas operations and intra company loans. Aseidu (2004) noted that natural resources and market size are the chief determinants of FDI in Africa and FDI inflow to Africa can be promoted by political and macroeconomic stability, by educated labor force, less corruption and efficient legal system. Lall (2002) revealed that privatization was adopted to encourage foreign investment (FI) in Nigeria, which involves transfer of state-owned enterprises, companies that are completely or partly owned by or managed by private individuals or companies. Shiro (2009) submits that the Federal Government of Nigeria (FGN) has taken a number of measures necessary to woo foreign investors into Nigeria. These measures include the repeal of laws that are inimical to FI growth, promulgation of investment laws, various oversea trips for image laundry by the President. It can be analysed in terms of inflow of new equity capital, re- invested earning, trade and supplier's credit, net inflow of borrowing and other obligations from the parent company or its affiliates (Nwankwo *et al*, 2013). Olopoenia (1985) FI is seen as an additional factor of production and supplement to the national savings effort of the capital importing country. According to Agada and Okpe (2012) FDI is an attempt by individuals, groups, companies and government of a nation to move resources of productive purpose across its country to another country with the anticipation of earning some surplus. FDI emerged as the most important source of external resource flows to developing countries over the years and has become a significant part of capital formation in these countries, though their share in the global distribution of FDI continue to remain small or even declining (Otepola 2012).

2.2 Tax Incentives (TIs)

Tax incentives (TI) are fiscal measures that are used to attract local or foreign investment capital to certain economic activities or particular areas in a country. Zee, Stotsky and Ley (2002) posited that any tax provision that is applicable to all investment projects does not constitute a tax incentive; excludes general tax incentives such as accelerated depreciation that applies to all investments. General tax provisions deserve to be called incentives for three reasons: they are designed as such and function as such; it makes sense for a government to broadcast that it is offering attractive TI for investment even if they take the form of general rather than selective provisions of the tax code and a number of countries, such as Indonesia and Uganda, have shifted from selective to general incentives, all with the intention of stimulating investments. Tax incentive has over the years taken different directional approaches, which are considered as a tool that is used to accelerate economic growth and even development (Olaleye, 2016). Fletcher (2002) observes that TI as those special exclusions, exemptions or deductions, from income tax liability, offered to taxpayers by the government as an enticement or encouragement to engage in specified activities. Ifueko (2009) noted that TI as special arrangements in the tax laws to; attract, retain or increase investment in a particular sector, stimulate growth in specific areas and assist companies or individuals carrying on identified activities. Governments have constantly used the TI laws as a policy instrument for increasing investment in certain economic sector and overcoming challenges posed by unfavorable investment conditions. Among the TI usually utilized in Nigeria are company income taxes (CIT), capital allowances, value added tax (VAT), capital gains tax reliefs, double taxation treaty and TH. Taxation performs an important function in economy policy by generating income for governments to finance public services, increase productivity, improve the overall quality of life of the people, enhance investment climates and facilitate growth. Section (8) of CITA (2004), taxes are payable as specified upon profit of any company accruing in, derived from, brought into, or received in Nigeria in respect of, among others, any trade or business for whatever period of time the trade or

business may have been carried out. Taxation comes in form of Personal Income Tax (PIT), CIT, Capital Gain Tax (CGT), Education Tax (ET), Petroleum Profit Tax (PPT), VAT etc. According to CITA (2004), CIT is a tax payable for each year of assessment on the profit of any company, a rate of 30%, these include profit accruing in, derived from or brought into or received from a trade, business or investment. Companies with turnover of less than 1 million naira are taxed at a low rate of 20% for the first five years of operation if they are into manufacturing. Some of the efforts of the government to create a conducive environment for FDI in Nigeria are such that loans granted to Nigerian companies may be exempted from tax where the required conditions are met, Nigerian companies with a minimum of 25% foreign equity and within their first four years of operation are exempted from payment of minimum tax, TH granted to a firm as a tax –free status for a certain period of time.

3. Customs Duty Exemptions (CDEs)

Customs duty is a tariff on goods when transported across international borders which is to protect country's economy, residents, jobs, environment, etc., by controlling the flow of goods, especially restrictive and prohibited goods, into and out of the country which has a rate in percentage. The percentage is determined by the total purchased value of article paid at a foreign country and not based on factors such as quality, size, or weight. The Harmonized Tariff System (HTS) provides duty rates for virtually every existing item. Custom and Border Protection (CBP) uses HTS Schedule which is a reference manual that provides the applicable tariff rates and statistical categories for all merchandise import.

3.1 Tax Holiday (TH)

Tax holidays are implemented for businesses to encourage financial activity and foster growth, it is used in the hope of increasing the GDP in developing countries, Governments attract foreign investors or foreign companies that set up base in the host country, it is often put in place in particular industries to help promote growth, develop, or diversify domestic industries. The government loses out on revenues that would have been generated from sales during the temporary tax-break periods, it increase tax revenue over the long term because they help businesses stay in business or grow, creating more taxable revenue for the tax authority, the lost revenue offset by the increased purchases of trade looking to take advantage of the tax break. The increased sales during a TH are preceded by reduced sales before the holiday; thus, the TH shifted sales that would have happened before or after the holiday to the holiday dates. Since retailers do not pay sales tax out-of-pocket some retailers may unethically take advantage of TH by increasing the prices of the goods and reducing consumer savings.

3.2 Manufacturing companies in Nigeria

The impact of manufacturing industry in any economic development cannot be overemphasized. Few countries have been able to grow their wealth without investing in the manufacturing industry. A strong and thriving manufacturing sector usually precipitates in industrialization. The history of industrial development and manufacturing in Nigeria has been marred with a series of policy inconsistencies and distractions attributable to the discovery of oil. Despite the challenges that beset the Nigerian manufacturing industry, it has witnessed good growth in recent years. Manufacturing industries in Nigeria have done well in the production of goods for the nation's population as well as for export. Government has highlighted initiatives to boost manufacturing in Nigeria via the provision of incentives to support industrial hubs, Review local fiscal and regulatory incentives to support the development of industrial cities, parks and clusters, Rationalize tariffs and waivers on the equipment and machinery imports required for agro-industry. Lack of funds and an enabling environment for industrialists have denied the nation the capacity to achieve significant industrial growth and development or industrialization which Nigeria has always hoped and craved for. Considering the enormous importance attached to industrialization and how it impacts on our economy, any problem militating against its achievement should be of interest to us. The Construction sector is very crucial in any nation's social and economic development with respect to employment generation; the various activities undertaken in the sector are very germane to fostering effective sectorial linkages. The agricultural sector has contributed the most (about 27%) to this expansion relative to Oil & Gas (1.4%), Financials (3.3%), Manufacturing (9.0%) and Trade (18.8%).

3.3 Empirical Review

Olaleye, Riro, and Memba, (2016) examined CIT incentives on FDI in Listed Nigerian Manufacturing Companies, The findings showed strong positive linear relationships between reduced company income TI and FDI. Adeleke, Olewe and Fasesin (2014) investigated FDI on Nigeria's economic growth for the period of 1999 to 2013, the result revealed that economic growth is directly related to inflow of FDI and statistical significant at 5% level, it implies that a good performance of the economy is a positive signal for inflow of FDI. Abubakar, Haruna and Ahmed (2012), examined Nigerian Investment Promotion council (NIPC) in attracting FDI in Nigeria. Findings reveal a significant correlation between the establishment of NIPC and an increase in FDI inflow and the average value of FDI inflows prior to the establishment differed from the one after the establishment and lastly revealed that NIPC had succeeded in influencing the growth of FDI in Nigeria. Simret (2013) analyzed the effectiveness of tax incentive in attracting FDI in Ethiopia. Dummy variables were used to indicate the presence and absence of TI, TH and CDE in the ten sectors under consideration for the period from 1992 to 2012. Econometric models that include TH, CDE and control variables were used in the analysis. The empirical result shows that only TH was found significant while CDE is insignificant and indicates that tax incentive sensitivity of FDI depends on the sector to which the investment is flowing. Barlow and Wenders (1995) surveyed TI on FDI of 247 US companies on their strategies to invest abroad. The result of the survey showed that together TI (10%) and host country's government encouragement to investors (11%) made up 21% of the responses ranked fourth place behind determinants such as currency convertibility, host country political stability and guarantee against expropriation. Econometric studies carried out on the bivariate relationship between FDI and TI seem to confirm the above survey that though tax considerations are important in the

decision of foreign investors to invest in any host economy; it however, do not carry as much weight as market and political factors and in some cases TI were found to have little or no effect on the locations of FDI.

Agodo (1978) examined tax concession of FDI using 33 US firms having 46 manufacturing investment in 20 African countries. The result showed that TI were found to be insignificant determinant of FDI both in simple and multiple regressions. Wells and Allen (2001) presented case against incentives, consistent result with the above findings which is based on Indonesian experience where TH were offered for foreign investors and then dropped. It was found that FI continued to grow even after the TH were dropped proving the negligible role of TI in attracting FDI. This could be a strong case against incentive schemes as it has showed an actual natural experiment outcome. Hassett and Hubbard (2002) discovered that investment incentives create significant distortions by encouraging inefficient investment and that low inflation is the best investment incentives than TI. The study shows specifically that FDI is affected by tax rates with a 10% point increase in corporate income tax rate lowering FDI by 0.45% point of GDP.

Walid (2010) examined the economic and financial risks on FDI on macro level from 1997-2007 using multiple linear regression models. The result revealed that there exists significant and positive relationship between FDI and economic and financial variables utilized for the study. The study recommended promotion of FDI via TI to attract new investments. Significant to the present study is the empirical analysis conducted by Babatunde and Adepeju (2012) to determine the impact of TI on FDI in the oil and gas sector in Nigeria using data for 21 years. Using Karl Pearson coefficient correlation statistical method of analysis, it was found that there is a significant impact of TI on FDI in the oil and gas sector. Also, found that the major determinants of FDI in Nigeria are openness to trade and availability of natural resources on FDI. Sulaiman and Azeez (2012) studied external debt on the economic growth of Nigeria using GDP as the endogenous variable measuring economic growth as a function of ratio of external debt to export, inflate on and exchange rate (EXRAT) proxy as the exogenous variable for the period from 1970 to 2010, the result shows that external debt has contributed positively to Nigeria economy and a similar research was done by Iya, Gabdo, and Aminu (2013) with the same result.

Dickson and Presley (2013), study on TI and revenue productivity of the Nigerian tax system from 1981 to 2009 periods in order to identify the short-run performance of various taxes. The study concludes that the report on total tax revenue buoyancy calls for serious attention and policy challenge, considering the enormous importance of generating resources and less dependence on external borrowing to facilitating economic growth and development. This can however be tackled by adopting sound policies that will reduce or eliminate the corruption prevalent in the tax system coupled with the inefficiency rocking the system. Similarly, Bora (2013) studies the responsiveness of FDI to tax in Ethiopia which covers ten sectors; the study found out that tax incentive is sensitive but depends on the sector applied. Kimberley (2009) conducted studies which focus on the relationship between TI and FDI composition and analysed how TI can affect the composition of FDI in different countries; the result indicates that TI is only effective in affecting FDI composition in high-tech industries as well as capital-intensive sectors such as finance sector.

Millio, Azimeb and Gollagori (2016) examined the relationship between FDI flows and tax revenues in Ethiopia both at aggregate and disaggregate tax revenue levels such as income tax, corporate tax, trade tax and business profit tax. The results suggest that both FDI and GDP had negative impact on the aggregate tax revenue both in the short-run and long-run. At disaggregated tax revenue components level mixed results have been observed.

George and Bariyima (2015) studied TI and FDI in Nigeria. The result shows that FDI response to TI is negatively significant, that is, increase in TI does not bring about a corresponding increase in FDI. The study recommends that dependence on TI should be reduced and more attention be put on other incentives strategies such as stable economic reforms and stable political climate. Ezera (2016) analysed customs duty incentives on customs revenue mobilization for the period 2009 to 2014 in Zimbabwe. The results from the two separate models confirm that customs duty incentives had negative effects on customs revenues. Andabai (2014) examined the determinants of public policies and the manufacturing sector in Nigeria using 17years time series data spanning for period 1997-2013. The result shows that, there is a negative significant relationship between excise duty, and capacity utilization. There is also a negative significant relationship between employment rate and capacity utilization. The study also reveals a positive significant relationship between lending rate and capacity utilization.

Uwubanmwen and Ogiemudia (2006) examined FDI on economic growth in Nigeria, Employing the Error Correction Model (ECM), annual secondary time series data covering the period of 1979 to 2013 using an ECM technique to determine the short-run and long-run effect of FDI on economic growth of Nigeria. Granger causality methodology was used to analyse and establish the nature of relationship between FDI and economic growth in Nigeria. Empirical analysis reveals that FDI has both immediate and time lag effect on Nigerian economy in the short-run and FDI has a non-significant negative effect on the Nigerian economy in the long-run during the period under review. Thus, FDI has a significant positive effect on the growth as well as the development of the Nigerian economy only in the short run during the period under review. Tea (2010) examined the role and importance of FDI in Georgia after transition period and its' impact on economic growth of the country and also analysed ways for attracting FDI. It focuses on effectiveness of investment climate in Georgia after transition period and on analysis of results of global crisis on Georgia's investment. Despite the improvement of the investment climate in Georgia, there still remain a number of persistent problems on which FDI cannot maximize its impact. Main tendencies of improving investment climate and economic growth of the country are considered. Ehijiele, Sunday and Nuruddeen (2016) investigated FDI on the manufacturing sector in Nigeria. The result suggests a positive and significant relationship between EXRAT and manufacturing output (MOUTPUT) in Nigeria and the recommendations proposed that government should step-up efforts in attracting FDI into the sector by ensuring that investor confidence is protected and also that despite the fact that the importance of FDI cannot be over accentuated, there is the need for government and policy makers to realize the fact that the fundamental element in any successful development strategy ought to be the encouragement of domestic investors first before going after foreign investors.

4. Theoretical Framework

The internalisation theory was developed by Buckley and Casson in 1976 and then by Hennart, in 1982 and Casson, in 1983. Initially, the theory was launched by Coase in 1937 in a national context and Hymer in 1976 in an international context. This theory tries to explain the growth of international companies and their motivations for achieving FDI. Hymer, thus identifies two major determinants of FDI: removal of competition and the advantages which some firms possess in a particular activity. The result meant the same conclusion: transnational companies face some adjustment costs when the investments are made abroad. Hymer recognized that FDI is a firm-level strategy decision rather than a capital-market financial decision.

Production cycle theory developed by Vernon in 1966 was used to explain certain types of FDI made by U.S. companies in Western Europe after the Second World War in the manufacturing industry which believes that there are four stages of production cycle: innovation, growth, maturity and decline (Vintila 2010). Thus, if in the first stage of the production cycle, manufacturers have an advantage by possessing new technologies, as the product develops also the technology becomes known.

The eclectic theory developed by professor Dunning is a mix of three different theories of FDI (O-L-I); Ownership advantages: Monopoly advantages in the form of privileged access to markets, Technology and Economies of large size; Location: The economic benefits of quantitative and qualitative factors of production and costs, Political advantage, Social advantages; Internalisation: Supposing the first two conditions are met, it must be profitable for the company the use of these advantages, in collaboration with at least some factors outside the country of origin(Dunning and Lunda 2008). The characteristics of the eclectic paradigm OLI offers a framework for assessing different ways in which the company will exploit its powers from the sale of goods and services to various agreements that might be signed between the companies (Dunning 2000).

Capital theory was developed on premise that FDI mad by MNCs in other countries was to receive higher return on the capital invested. This position was confirmed by a study conducted by Mundell (1960) where empirical evidence showed how US firm realized higher return on capital invested over and above European investment in home countries.

4.1 METHODOLOGY

Survey research designs and ex-post facto were adopted with population of 74 listed manufacturing companies and 325 questionnaires to the staff of various companies in Nigeria. Multiple regression and one-way analysis of variance were utilized to test the hypothesis; FDI is measure as a function of TI thus:

$FDI = \beta_0 + \beta_1 TH_{it} + \beta_2 CDE_{it} + \beta_3 T_{it} + \beta_4 PS_{it} + e_{it}$

Where: FDI=Foreign direct investment TH = Tax holidays

CDE = Custom duties exemptions T = Transparency

PS = Political Stability β_0 = Regression intercept

P_1, P_2 = Parameters to be estimated e = Error term

4.2 RESULTS AND DISCUSSIONS

Descriptive Statistics

The result of the descriptive statistics involving the mean, minimum, maximum, standard deviation, skewness and kurtosis of the variables is presented.

Table 1: *Descriptive Statistics*

Variables	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
FDI	0.2140	0.31	0.0005	1.4302	1.23	6.3
Tax Holiday	0.6667	0.48	0	1.0000	-0.71	1.50
Custom Du_Exe	0.9290	0.30	0.2570	1.2980	-0.83	2.95
Transparency	2.5000	0.24	2.0000	2.9000	-0.43	2.72
Political Stability	4.5454	0.51	4.0000	5.0000	-0.18	1.03

*Note:*FDI=Foreign Direct Investment; Custom Du_Exe=Custom Duties Exempted

The result of descriptive statistics in table 1 shows the FDI mean value of 0.2140 depicts that on the average, the value of FDI accruing to the economy through the period is two hundred and fourteen million naira while the maximum is one billion, four hundred and thirty million. It shows also that TH with the mean value of 0.6667 portrays that 66.67% of the sectors covers in this study enjoys TH. Moreover, CDE have an average score of 0.9290. Control variables; transparency has the mean score of 2.5 which portrays that it is at the lower ebb, political stability has a mean value of 4.5454 which indicates that the political stability of Nigeria is good.

4.3 Correlation Analysis

The relationship is seen as small where $r = \pm 0.30$ to ± 0.49 and where $r \geq 0.50$ the relationship strength is thought to be substantial. Pearson correlation analysis was carried out to determine the extent and direction of the relationship between the study variables.

Table 2: *Correlation Matrix (Obs=33)*

Variable	1	2	3	4	5
1. FDI	1				
2. Tax Holiday	0.187	1			
3. Custom Du_Exe	0.2391	-0.1402	1		
4. Transparency	0.1223	0.0267	0.3941**	1	
5. Political Stability	-0.1897	0.1291	-0.1911	-0.1514	1

*Note:*** = significant at the 0.05 level. FDI=Foreign Direct Investment

From the Pearson's correlation result presented in table.2, none of the explanatory variables is significantly correlated with the dependent variable. Explicitly, TH has a positive but insignificantly related to FDI (*r*=0.187). Moreover, CDE is positively and insignificantly associated with FDI with correlation coefficient value of 0.2391. Transparency has an insignificant positive association with FDI (r=0.1223), while political stability is negative and insignificantly associated with FDI (*r*= -0.1897). Equally important, there is no issue of multicollinearity among the independent variables since they have correlation coefficients below 0.80

4.3.1 Homoscedasticity Test

Breusch-Pagan/Cook-Weisberg test is used which gives the chi-square value and its probability at 5% significance level.

Table 3: *Breusch-Pagan/Cook-Weisberg Test*

Dependent variable	Chi2 (1)	Prob > Chi2	Null (Ho)
FDI	14.05	0.0002	Rejected

Note: Ho (null): Homoscedasticity. FDI=Foreign Direct Investment

Table 3 specifies that the model for FDI is significant at the 0.05 level with a *p*-value of 0.0002. The result indicates that the variance is widely spread which needs to be corrected. The problem of heteroscedasticity that appeared in the FDI model is handling with Driscoll-Kraay Standard Errors Regression

Cross-section Dependence Test

The test is required to check for contemporaneous correlation, the Pesaran's CD test was employed. Table 4 shows that cross-sectional dependence is not an issue since the probability of the FDI model is greater than the threshold *p*>0. 05.

Table 4: *Pesaran's CD (Cross-section Dependence) Test*

Variables	Pesaran's test of Cross-sectional Independence	Av. Absolute value of off-diagonal element
FDI	-1.013, Pr = 0.3110	0.5976

Serial Correlation Test

Drucker (2003) Wooldridge test is utilized in determining autocorrelation in the idiosyncratic error term in the panel-data model.

Table 5: *Wooldridge Test*

Variables	F (1, 2)	Prob > F	Ho (null) hypothesis
FDI	21.826	0.0429	Rejected

Notes: H0: No first order autocorrelation.

Based on the result Wooldridge test of serial correlation presented above, the regression model suffers from serial correlation problem because it has a significant p-value (p<0.05). The problem of serial correlation inherited for the FDI model is handled using the Driscoll-Kraay Standard Errors Regression as suggested.

Discussion of Driscoll-Kraay Regression Result

The result of pooled Ordinary Least Square Regression is also presented alongside the result of Driscoll-Kraay as delineated.

Table 6: *Result of Pooled OLS and Driscoll-Kraay Standard Errors Regression*

	Pooled OLS			Driscoll-Kraay		
Variables	B	t-stat.	p>t	B	t-stat.	p>t
Intercept	0.3507	0.43	0.668	0.3506	2.25	0.048**
Tax Holiday	0.1578	1.36	0.186	0.1578	3.99	0.003***
Custom Duties Exemption	0.2436	1.24	0.225	0.2436	5.61	0.000***
Transparency	0.0082	0.03	0.973	0.0082	0.24	0.817
Political Stability	-0.1075	-0.97	0.342	-0.1075	-3.80	0.003***
Observations		33		Observations	33	
F (4, 28)		1.10		Group	3	
Prob >F		0.3744		F (4, 10)	11.62	
R^2		0.1362		Prob >F	0.0009***	
Adj. R^2		0.0128		R^2	0.1362	

Note: ** and *** imply statistical significant on the 5 and 10% level, respectively

The OLS regression result in table 6, shows that R^2 has a value of 0.1362 indicating the variations in FDI which is influenced by the explanatory variables with the F-value of 4, 28; 1.10 and a probability value of 0.3744, the OLS model is said to have no goodness-of-fit. TH and CDE have a positive, but insignificant effect on FDI with beta coefficients (β) of 0.1578 and 0.2436 respectively. Transparency also has an insignificant positive effect on FDI (β=0.0082), whereas, political stability has insignificant negative effect on FDI (β=-0.1075).

Driscoll-Kraay Standard Errors regression result in table 6 shows that the model has an R^2 value of 0.1362 which portrays that the explanatory variables explain 13.62% of the variations in FDI. The model is significant based on F (4, 10); $p<0.01$, and indicating the validity and goodness-of-fit of the model utilized, The regression result from table 6 demonstrates that TH has a significant positive effect on FDI at 5% statistical significance level ($\beta=0.1578$, $p<0.05$).

The regression result from table 6 portrays that CDE has a significant positive impact on FDI at 1% statistical significance level ($\beta=0.2436$, $p<0.01$) which means that an increase in CDE by 1% would result in an increase in FDI by 24.36%, or an increase in CDE by 1 would leads to an increase in FDI by 0.2436 (N24.360 billion) as in the study of Bora (2013), Kimberley (2009), and Olaleye *et al.* (2016) but in disagreement with the findings of George and Bariyima (2015), and Millio *et al.* (2016).

Transparency has a positive, but insignificant effect on FDI ($\beta=0.0082$, $p>0.10$); Political Stability has a significant negative effect on FDI at 1% statistical significance level ($\beta= -0.1075$, $p<0.01$), indicating that an increase in political stability would result to a decrease in FDI. However, this result is odd but is in line with the findings of George and Bariyima (2015) and Ezra (2016).

Robustness Test

Table 7: *Driscoll-Kraay Standard Errors Regression for three groups*

Variables	Manufacturing sector		Agricultural sector		Construction Sector	
	Coef.	*t-stat*	*Coef.*	*t-stat*	*Coef.*	*t-stat*
Constant	0.7637	1.89*	0.0989	0.94	0.4330	1.744*
Tax Holiday	0.4277	2.79**	-0.0005	-0.01	0.0844	3.44***
Custom Du_Exe	0.6374	4.01***	0.0937	1.47*	0.1685	4.79***
Transparency	0.1415	0.71	-0.0271	-0.31	-0.2032	-4.94***
Political Stability	-0.3318	-5.33***	-0.0108	-0.21	-0.0163	-0.43
Observations	11		11		11	
Groups	1		1		1	
F (4, 10)	12.28		4.11		48.45	
Prob > F	0.0007		0.0319		0.0000	
R^2	0.5776		0.1783		0.5116	

Note: *, **, and *** implies statistical significance on 10, 5, and 1% level, respectively.

The result is said to be fit and valid since the probability values under the three sectors are significant. Explicitly, the model is significant at 1% level under manufacturing and construction sectors, while 5% under agricultural sector. Moreover, the R^2 values are 0.5776, 0.1783, and 0.5116 for manufacturing, agricultural, and construction sectors respectively.

The result from table 7 depicts that TH has a significant positive effect on FDI at 10% and 5% under manufacturing ($\beta=0.7637$; $p<0.10$) and construction sectors ($\beta=0.04330$; $p<0.05$). However, TH is found to have an insignificant positive effect on FDI under the agricultural sector ($\beta=0.0989$; $p>0.10$). Further, CDE has a significant positive effect on FDI at 1%significance under manufacturing ($\beta=0.6374$; $p<0.05$) and construction ($\beta=0.1685$; $p<0.10$) sectors respectively and 10% statistical significance under agricultural sector.

Transparency has an insignificant positive effect on FDI ($\beta=0.1415$; $p>0.10$) under manufacturing sector, insignificant negative effect on FDI ($\beta= -0.0271$; $p>0.10$) under agricultural sector, while having a significant negative effect on FDI at 1% statistical significance ($\beta= -0.2032$; $p<0.01$) under construction sector; political stability has a significant negative effect on FDI at the 0.01 significant level ($\beta= -0.3318$; $p<0.01$) under manufacturing sector. However, political stability has an insignificant negative impact on FDI under agricultural sector ($\beta= -0.0108$; $p>0.10$) and construction sector ($\beta= -0.0163$; $p>0.10$) as well.

Reliability Test

The measures had a high reliability standard of 0.992 in line with the criterion that a Cronbach alpha coefficient of 0.60 is considered an average reliability while a coefficient of 0.70 or higher indicates that the instrument has a high reliability standard.

Table 8: *Result of Reliability Test*

Scale Name	No. of Items	Cronbach's Alpha Coefficient	No. of items dropped	No. of items retained for main analysis
Foreign Direct Investment	10	0.992	Nil	10

Source: Authors computation.

5. CONCLUSION AND RECOMMENDATIONS

The study arrived at the following conclusions; TI have a significant positive effect on FDI inflow into the Nigerian economy. Specifically, TH and 5CDE have significant positive effects on FDI inflows into the Nigerian economy. The significant positive effect of TI on FDI occurs fully under manufacturing and construction sector while having a partial significant effect under agriculture sector; thus, indicates poor administration of TI in Nigeria. Lastly, TI administration in Nigeria is not adequately and effectively carried out. Based on conclusion, the following recommendations are made; Nigerian government should maintain the elegant of TH alongside CDE and possibly device means of improving them because empirical evidence showed how US firm realized higher return on capital invested over and above European investment in home countries. Government should intensify means of ensuring that the impact of TI on FDI extends to agricultural sectors, so as to gain more value and continuously re-invest the profit with a view to enhancing the capital base of FDI inflow into the Nigerian economy.

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The Influence of Approved Budget on Promoting Outsourced Revenue Collection Performance of Local Government Authorities in Developing Countries

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***Abstract*: Local Revenue collection is very imperatives in sustainable economic development especially in developing countries. This study examined the influence of approved budget in promoting outsourced revenue collection performance of Local Government Authorities (LGAs) in developing countries. The study opted a time series research design where by secondary data were used. The population applied on the approved budgets and actual revenue collections from 2009/10 - 2018/19 financial years (Quarterly data). The sample size of the study was 44 observations. Arusha City Council (ACC) was purposively sampled to be used as a research location of this study. Results revealed that, no long term relationship between approved budget and actual collections; with P- Value of 0.00. Conclusively, there is gap that exists between LGAs approved budgets and the actual revenue collections due poor projections, Poor negations between government and agents, Political interference, poor estimation of rates and charges. The study recommends in order to ensure potential estimated budgets are well organized in order to come up with realistic and attainable approved budgets in LGAs in developing countries. The implication of the study shows that the LGAs revenue collection forecasts for next financial year estimation should consider the previous financial years' revenue collections as the best predictor to aid in their revenue collection.**

***Keywords*: Approved Budget, Outsourced Revenue Collection, Local Government Authorities, Developing Countries, Tanzania**

I. INTRODUCTION

Public Revenue in Tanzania, particularly domestic sources are move up in the borders of the nation by the Local Government Authorities (LGAs) in their own source collections [22, 27]**.** Domestic revenues are collected by the LGAs for the purpose of financing its development projects [26]. For that intention, different domestic sources and techniques of tax collection in the local government councils are involved; among them include fees, licenses, local taxes, market dues and charges [5]. Collection accountability was entirely handled by the local government administration to the LGAs in the basis of Local Government Finances Act of 1982 and Urban Authorities (Rating) Act of 1983 [9]. The LGAs collect its own source revenues from relevant sources [6]. Due to challenges in LGAs revenue collection due to lack of enough resources i.e. manpower, expert, technology and flexibility led the LGAs to outsource their revenue collections to agents [27]. The power for reform, to outsourcing agents to revenue collection, arose because LGAs controlled under harsh financial constraints and under funding [17]. Since 1996, many local government authorities in Tanzania adopted for outsourcing in revenue collection by recruited a private agent as tax collectors [3, 7, 9]. Outsourcing of revenue collection was improved by the guiding principles on outsourcing local government services issued in 2001 by the President's Office – Regional Administration and LGAs [37]. Since of the poor collection of revenue, LGAs relied heavily on [11]. Inter-governmental fiscal transfers, which accounted for more than 90% of total local government financial resources over the years of outsourcing revenue collection [1].

It is believed that the use of confidential agent in revenue collection enhances effectiveness and efficiency therefore more revenue will be realized [20]. The experience in many district councils, the use of private agent was supposed to be efficient but with a countless of problems in forms of political intervention particularly for market dues collection in the market area [8]. The outsourcing of revenue collection was before considered accommodative in many district councils in Tanzania. Mostly, Mwanza city council attempted to enhance revenue by the use of outsourcing method in own source collection since 1997 [21]. The introduction of this technique of collection was championed by the control of people complaints on the local government employees' collection procedures and approaches [2]. It is believed to be cost effective technique towards enhanced dues collection and market charges [34].

Outsourcing of services has become accepted to public institution since public improvement took place in 1992 in purpose of increasing operational efficiency of projects and minimize the burden of loss-making parastatal enterprises on the government budget [10]. The outsourcing process should be changing and not stationary as being imagines [39]. In actuality, changes are expected in the whole own source revenue collection through outsourced or local government employees, this partially depending on the need and character of own source revenue. This has been predictable to reduce social utility rather than disutility survival [19]. It was originated that, more than 70% of the LGAs in the nation did not achieve their revenue collection targets. The highest percentage accomplishment was noted in the financial year of 2015/16, where 81% of the LGAs managed to achieve their annual revenues collection targets. The minimum percentage was in the financial year of 2018/19 in which 73% of the LGAs did not attain their targets for revenue collections [14].

The outsourcing of LGAs is administered to several types of agents, within and crosswise the councils. The progress of LGAs between the councils and private agents show the difficulty of revenue support as compared to others. Arusha City Council (ACC), for example, has connected with countless of problem in achievements of intended collection. It is yet to attain in fully 100% collections [36]. Similarly, the outsourcing of revenue collection in LGAs has been opted to remedy the preceding issues of revenue collections which had been experienced with loss and misconduct of the entire process. This process was highly expected to improve revenue through fiscal independence. In actuality, a small number of LGAs that have outsourced revenue collection have not yielded the predictable answers. On the other hand, it has full-grown to advantage the revenue collecting agents [18]. This recommends that, despite the information that LGAs have outsourced revenue collections to several agents were still unsuccessful to meet their targets. The major research question is whether outsourcing revenue collection in local government authority is effectiveness or not [4]. This has created questions on the influence of the approved budget on the performance of outsourced revenue collection.

II. LITERATURE REVIEWS

According to Tanzania's Public Procurement Act (PPA) No.7 of 2011 Section 121 and with the Public Procurement Regulation of 2013 Section 53 provide important criteria to be adhered to in selecting the vendor when outsourcing services in Tanzania. The criteria include: financial strength of the vendor; current commitment; and compliance with legal obligations as provided by numerous statutes. The results on the study conducted in the United Kingdom confirmed that revenue generation in the local government is focusing on collection of revenue through agents which had some challenges such as low collection, complaints from the citizen on the collection approaches and techniques, poor relationship between tax payers and tax collectors, and the overcome application to collect tax, since the agents are concerned with profit and improved collection of revenue [1, 12]. According to [6] results showed that outsourcing revenue collection in LGAs has been opted to preparation the previous issues of revenue collections. The revenue collection in most of the LGAs in conditions of own source faced problems of loss and mismanagement of the entire process. One of the prospects was once to improve revenue collections which were predictable to give room for fiscal independence. Nonetheless, experience from few LGAs which have outsourced their revenue collection recommends that, the entire method of outsourcing has not yielded the predictable findings particularly on enabled local authorities to have fiscal autonomy; on the other hand it has mature to become a advantage to the non government agent who collected the revenue and hence create job and reduce bias in revenue collection [27].

The method of outsourcing is promoting the personal agent and as a result it is like giving out the part of revenue as a commission or collection fee to the outsourced agent; outsourced source seems to benefit the LGAs by the way of decreasing some responsibilities mainly on tax collection. Most of outsourcing agents' benefit are channeled to non government agent for reason of reducing bias during revenue collection [8]. Consequently, rapidly measures need to be opted which include constructing the capability of LGAs in analyzing the sources of revenue; estimating the real revenue collections so as to have appropriate image of proper estimated revenue to be generated by using the outsourced agents; and what should be the appropriate quantity to be submitted to the local authority [24]. The effect of outsourcing on the performance of LGAs collection was mainly reviewed in terms of revenue collection in Kinondoni Municipal Council (KMC), Morogoro Municipal Council (MMC) and Dar es Salaam City Council (DCC) pre and after outsourcing. The study opted the case study research design and the data collection technique was documentary review. The general results shows that, despite establishing of outsourcing in revenue collection in the studied councils, an improvement of revenue have not been realized at its full potential. This is due to the information the revenue has not been paid in terms of constricted companies due to agreement between local government employees and the outsourced companies [9, 38].

Empirical evidence from DCC, Moshi District Counci and Mwanza City Council shows that outsourcing revenue collection has ended up benefiting non government agents [7, 9, 10]. Breakdown to examine revenue potentials and weak monitoring process has resulted into considerable loss of revenue [5, 29]. Literature criticized that the increasing of government revenue is attached to the plans and efficient plan to collect resources from the public [17, 23]. These are based on the efficiency, integrity and effectiveness to achieve the goal of collecting public resources [2]. The allocation is related to the provision of social services to the most efficient ways. It must take into account on the supply of education, health and water services in the most efficient ways [7, 31]. The relevant means of revenue collection either by the agents or local government staff must be persistent to the interest of the public [6]. This has to be controlled by the goal of collection which in most instances it is difficult to accomplish because of existing circumstances in revenue collection. This specifically needs a demand in improvement of revenue collection for the purpose of reaching the target set by the LGAs [3, 23].

Revenue collection in LGAs is needed to increase social services such as health service, education and infrastructures [2, 9]. The amount collected and the amount owed in the social services is relatively significant in the development of individual management authorities [5, 12, 38]. LGAs have been given duties to collect tax and express services to citizens but citizens are uncertain to pay the tax due to displeasure on the way LGAs devote on the collected revenues. Similarly people are particularly interested with the usefulness of the scheme and approach that is used to collect revenue that will increase social services [9, 13].

The key difference between a approved budget and a estimated budget is that a budget lays out the plan for what a industry wants to achieve, while a estimated budget states its actual expectations for results, usually in a much more summarized arrangement [15, 16, 25]. The advantages of approved budget are manage LGAs money efficiently, allocate suitable resources to projects, monitor performance, meet your objectives and improve decision making while advantages of estimated budget are organizing spending and control the LGAs money [32].

III. RESEARCH METHODOLOGY

This study adopted quantitative research approach since involve the approved budgets and actual revenue collection from Arusha City Council. The study opted a time series research design where by secondary data were used. The population of the study was approved budgets and actual revenue collections from 2009/10 - 2018/19 financial years (Quarterly data). The sample size of the study was 44 observations. Purposive sampling was used to select the Arusha City Council (ACC) as a research location of the study; the reason for selecting Arusha City Council as study area is due to the fact that the ACC has many sources of outsourced revenue collection (24 sources) compared to other councils in Tanzania.

Econometric Model Development: Multiple Linear Regression model was used to examine the influence of the approved budget on the outsourced revenue collection of local government Authorities in developing countries. The reason of selecting the multiple linear regression model is due to the fact that the dependent variable of the study is *"continuous"* so that, the multiple linear regression model is suitable for this study.

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_1 \beta X_1 + \varepsilon \dots \dots \dots \dots \dots (1)$$

Whereby, $Y_t = CurrentRevenue, Y_{t-1} = OneYearPreviousRevenue, X_1 = Budget, \varepsilon = ErrorTerm$

IV. RESULTS AND DISCUSSION

Figure 1 indicates that all variables were non stationary, because in the outsourced revenue there is fluctuation increase as the time goes on top of from 2009 up to 2019 even as for the budget there was also fluctuation goes up as the time goes from 2009 up to 2019.This entails that, there is no constant variance and mean therefore all variables were non stationary at their level form. This draws for undertaking transformation in arranged for the data to be stationary.

Table 1 indicates that the review of statistics for 44 observations which were from 2009 to 2019 in quarterly basis. From these observations, the revenue holds the maximum average percentage was 0.647 with lowest 0.423 and highest 0.841 and Budget shows the lowest average percentage 0.03878 with smallest 0.014 and highest 0.093.

TABLE 1: DESCRIPTIVE STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
Budget	44	0.03878	0.01921	0.014	0.093
Revenue	44	0.64666	0.1046	0.423	0.841

Source: Field Data, 2020

H0: The time series is non-stationary or there is unit root.

H1: The series is stationary or there is no unit root

Testing for Stationarity: Augmented Dickey-Fuller (ADF) Test In this test we consider the following hypotheses:

TABLE 2: LAG TEST

Variables	Lag	FPE	AIC	HQIC	SBIC
Revenue	0	0.011128	-1.66046	-1.64519	-1.61824
	1	0.002723*	-3.06805*	-3.03751*	-2.9836*
	2	0.002863	-3.01832	-2.97252	-2.89165
	3	0.00301	-2.96874	-2.90767	-2.79985
Budget	4	0.003045	-2.95755	-2.88121	-2.74644
	0	0.000381	-5.0358	-5.02053	-4.99357
	1	0.000143	-6.01278	-5.98225*	-5.92834*
	2	0.000143*	-6.01517*	-5.96937	-5.8885
	3	0.00015	-5.96517	-5.90411	-5.79628
	4	0.000158	-5.91866	-5.84233	-5.70755

Source: Field Data, 2020

Prior to estimating the Autoregressive distributed lag model, Level model and Error Correction Model (ECM), it is forever suggested to examine the time series properties of the data in arrange to find out whether data are stationary or not. consequently, both Phillips - Perron (P-P) and Augmented Dickey - Fuller (ADF) tests were carry out in order to find out the existence of the unit root.

Table 3 indicates the ADF test and PP test findings for approved budget and Revenue. All variables were non stationary in level form at 5% levels of significance. On the additional hand, after first differences all variables were stationary at 5% levels of significance. Therefore, these variables were integrated of order one 1(1).

Table 4 shows the highest lag for all variables was lag one because at that lag it has the lowest AIC, HQIC and SBIC compared to all other value at different number of lag.

TABLE 3: TEST FOR STATIONARITY BOTH AUGMENTED DICKEY FULLER TEST AND PHILLIPS PERRON

ADF Test

Variable	Level		First difference		Order of integration
	Test statistics	Critical value	Test statistics	Critical value	
Revenue	-1.398	-2.952	-4.875	-2.955**	I (1)
Budget	-1.741	-2.952	-5.069	-2.952**	I (1)

The PP Test

Variable	Level		First difference		Order of integration
	Test statistics	Critical value	Test statistics	Critical value	
Revenue	-1.582	-2.950	-6.978	-2.952**	I (1)
Budget	-2.390	-2.950	-7.602	-2.952**	I (1)

Source: Field Data, 2020

The findings for influence of approved budget on outsourced revenue had an F – value of 65.00. This shows that the model used significantly ($P < 0.001$) account for the variation of the independent variable with the dependent variables. The R2 value of the variables 76.47% means that independent variables were capable to give details about the variations in revenue by 76.47%. consequently, the budget has 76.47% influences on the amount of revenue collected. Lag one revenue significantly ($P < 0.01$) affect the currently revenue with coefficient of 0.873. This entails that, there is positive association between lag revenue and current revenue so for each percent increase in lag revenue, the currently revenue increase by 0.873 percent. Budget was significantly ($P < 0.05$) affecting the revenue with coefficient of 0.0735. This entails that for each percent improved in approved budget the revenue increase by 0.0735 percent.

Also, actual collection has a positive association with previous year collection but not with the approved budget. The autoregressive distributed lag model was further used to examine the influence of approved budget on the outsourced revenue in the study location. The findings are as indicated in table 6.

Table 4: Lag Test for Overall Variables

Lag	FPE	AIC	HQIC	SBIC
0	3.60E-06	-6.8698	-6.8393	-6.7854
1	4.1e-07*	-9.04176*	-8.95016*	-8.78843*
2	4.30E-07	-8.9866	-8.834	-8.5644
3	4.90E-07	-8.8698	-8.6561	-8.2787
4	5.20E-07	-8.8103	-8.5356	-8.0503

Source: Field Data, 2020

Consequently, the findings in Table 6 indicates that the variables were not co-integrated given that the test statistics for trace statistics and max statistics was less than their critical values so the null hypothesis was accepted there is no co-integration. This apply that, there is no long - term connection between approved budget and actual collection because p - values is greater than 0.05.

Table 5: Johansen's test for Co-integration (long run relationship)

Null Hypothesis	Trace Statistics	Critical Value	Max Statistics	Critical Value
$r = 0$	11.1365*	15.41	9.901	14.07
$r \leq 1$	1.2355	3.76	1.2355	3.76

H_0= No co-integration test

Source: Field Data, 2020

Table 6 indicates that, finding for autocorrelation test, as the null hypothesis state that there is no autocorrelation, consequently the data does not suffer with the dilemma of autocorrelation. The p-value for the Breusch-Godfrey LM test for autocorrelation was greater than 0.05 so the null hypothesis was not rejected. Results for Durbin Watson d-statistic recommend the same as the durbin -Watson is approximate to 2 (Durbin-Watson d-statistic (3, 43) = 2.041144). Table 9 shows findingt for heteroscedasticity test, since the null hypothesis states that there is homoscedasticity therefore, the data does not suffer with the challenge of heteroscedasticity since the p-value for the Cameron and Trivedi's decomposition of IM-test for heteroscedasticity was greater than 0.05 so the null hypothesis is not rejected. This applied that there is constant variance in error term (homoscedasticity). Table 10 indicates that for normality test, since the null hypothesis state that the data is normally distributed, therefore the data does not

experience with the problem of non-normality since the p-value for Skewness/Kurtosis tests for normality test, for normality was greater than 0.05 so the null hypothesis is not rejected. These applied that these data go behind normal distribution. To check whether the model is reliable, the stability test was performed. Figure 1 shows that, the model was stable since the error term for the model was lying between lower and upper boundary.

Table 6: ARDL Short Run Estimates for Revenue (Autoregressive distributed lag model)

Revenue	Coef.	Std. Err.	T	P>t
L1.	0.8727532	0.0835646	10.44	0.000***
Budget	0.0735325	0.4627455	0.16	0.875
Cons	0.0843087	0.0503213	1.68	0.102

R^2 = 0.7647, F- value = 65.00, P < 0.001, ** Significant at P< 0.05 and *** = Significant at P < 0.01

Source: Field Data, 2020

Prior to shaping whether the data are stationary or non-stationary it is important to decide the highest lag for each variable in purpose of include it in the test of stationarity [11].

Table 7: Skewness/Kurtosis Tests for Normality

Variable	Obs	Pr (Skewness)	Pr (Kurtosis)	Adj chi 2(2)	Prob > chi2
Residual	44	0.2722	0.9966	1.27	0.53

Source: Field Data, 2020

Table 2, shows that the highest lag for revenue was lag one since it has the lowest AIC, HQIC and SBIC as compared to all value at different number of lag and finally approved budget has highest lag one because it has the lowest HQIC and SBIC although the AIC at that lag does not have the lowest value. prior to determining whether they have long term association (co-integrated) or they do not have the long term connection (not co-integrated) it is important to determine the highest number of lag for cummulative variable in order to include it in the test of Johannes's co-integration test [7, 35].

Table 8: Breusch-Godfrey LM Test for Autocorrelation

Lags (p)	chi2	df	Prob> chi2
1	0.027	1	0.8684

Source: Field Data, 2020

Co-integration test is normally engaged to find out whether the variables have long-term association. The co-integration test is normal performed after testing the stationarity and determining the best number of lags for all cumulative variables. This is the co-integration test which is normally performed in order to recommend the suitable model to be opted between error corrections models (ECM), long run equation with least squares and autoregressive distributed lag model.

Table 9: Cameron & Trivedi's Decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	1.55	5	0.9073
Skewness	1.61	2	0.4472
Kurtosis	0.1	1	0.7492
Total	**3.26**	**8**	**0.9169**

Source: Field Data, 2020
Figure 2: Model Stability (cusum chart)
Source: Field Data, 2020

Before determining whether the data are stationary or non-stationary it is vital to establish the highest lag for each variable in order to comprise it in the test of stationarity. According to [8] From table 2, shows that the maximum lag for revenue was lag one since it has the lowest AIC, HQIC and SBIC as compared to all value at different number of lag and lastly budget has highest lag one since it has the lowest HQIC and SBIC although the AIC at that lag does not have the lowest value. Before determining whether they have long term association (co-integrated) or they do not have the long term connection (not co-integrated) it is important to establish the highest number of lag for cumulative variable in order to comprise it in the test of Johannes's co-integration test [12].

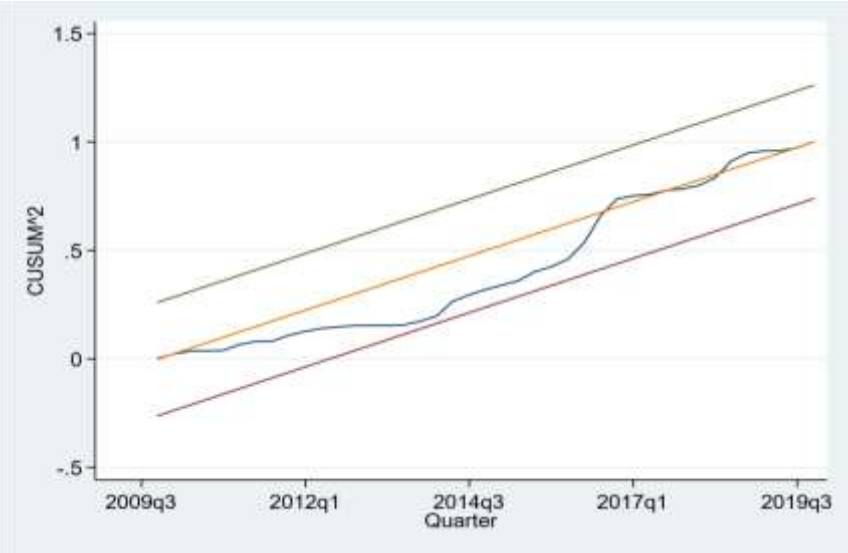

Figure 1: Model Stability
Source: Field Data, 2020

Co-integration test is forever engaged to find out whether the variables have long-term association. The co-integration test is always performed after testing the stationarity and determining the optimum number of lags for all overall variables. This is the co-integration test which is always performed in order to suggest the appropriate model to be adopted between error corrections models (ECM), long run equation with least squares and autoregressive distributed lag model.

In this objective, the Johansen's test for co-integration was employed since the variable was integrated at order one which implies that the order of integration was homogeneous for all variables I (1).

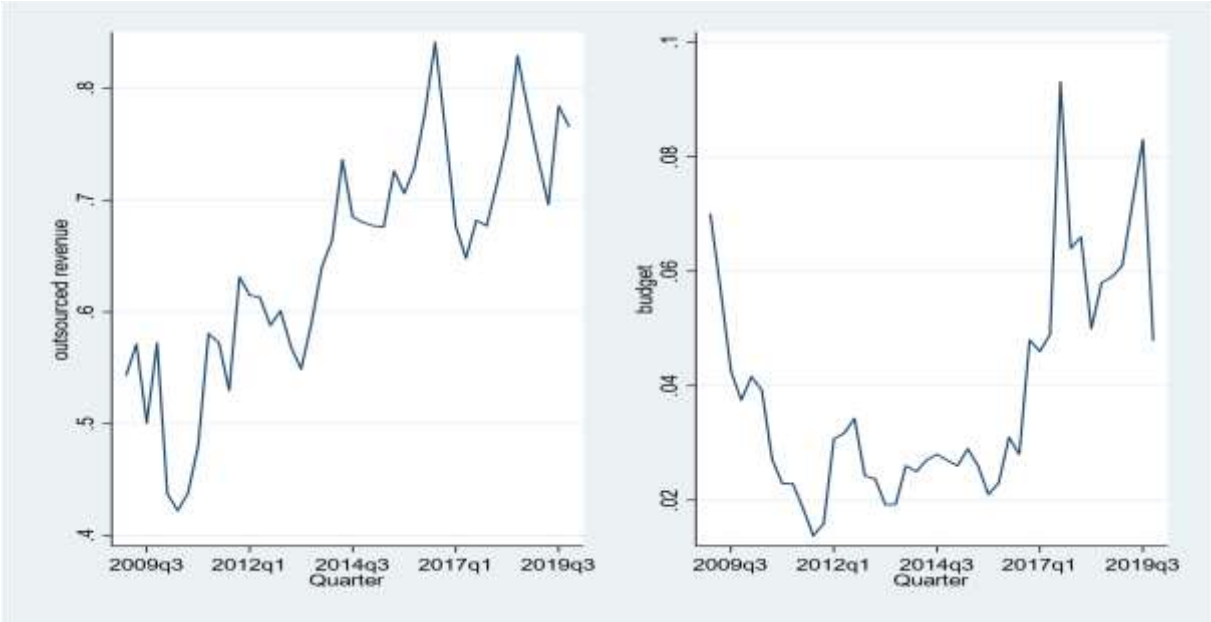

Figure 2: Time Series Plot for Budget on Revenue Collection
Source: Field Data, 2020

On the other hand, according to [6] LGAs do not attain goals set for revenue collection from their own sources. This is because LGAs are not set correctly and realistic revenue collection goals. In mainly cases, the targets are also more than or below predictable most important to important variations between set and actual targets for most of the revenue sources. Lack of efficient and dependable revenue source database; unproductive mechanisms for setting revenue targets; and insufficiently conducted feasibility studies are among the points contributing to setting unrealistic revenue collection targets. Therefore, to make certain effectiveness of revenue collection by private agents ACC must make sure that targets are precisely set in order to correctly measure their performance. concomitantly, according [28, 40] there is a gap that exists between LGAs approved budgets and revenue collections due to lack of involvement of revenue staff during budgeting development so as a result budget officers create unrealistic approved budget.

V. CONCLUSION

Finding shows that there is no long-term association between approved budget and actual collection when LGAs collect revenue itself while there is long - term association between approved budget and actual collection when LGAs collect by agents. This conclusion supported by different scholars [2, 8, 12]. Actual collection has a positive connection with previous year collection but not with the approved budget. According to [4, 49] there is a gap that exists between LGAs budgets and the actual revenue collections due poor prediction. The implication of the study shows that the LGAs revenue collection forecasts for next financial year estimation should consider the previous financial years' revenue collections as the best predictor to aid in their revenue collection; this can aid in the evaluation of the performance of the revenue collection. The study recommends in order ensuring potential estimated budgets are well organized in order to come up with realistic and attainable approved budgets in LGAs in developing countries.

The researchers suggest that the study like this should be conducted in different councils in Tanzania since LGAs differ in terms of revenue sources.

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Smart Classroom Knowledge of the Higher Secondary School Teachers in Vellore District

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***Abstract*: Technology is very important in today's world because it serves a variety of purpose in the most important aspects of society like communication, education, scientific progress, healthcare and business. Smart class contains each subject content materials with a real teacher in virtual classroom, teaching chapters in an interesting way which makes studies as exciting as watching movies along with distinctive features like quiz, multiple choice questions series and mind map for revision purposes. The smart classroom and e-learning is a one stop resource for learners to get diverse ideas related to their interest and subject enquiries. Web-based multimedia e-learning environments has added new dimension in designing course content as well as generating new dimensions in the teaching learning processes at school level. Smart classrooms are generally technologically and electronically enhanced classrooms in which teaching learning practices are manifested by the method of e-Learning. In smart classroom potential opportunities are created for active cognitive and social participation. Random sampling technique has been used in the selection of the sample of 600 higher secondary teachers working in the higher secondary schools situated in Vellore District of Tamilnadu, India. The tool namely Smart Classroom Knowledge Test (SCRKT) constructed and validated by investigator has been used and the findings of the investigation reveal that the majority of the higher secondary teacher shows average level of smart classroom knowledge. Moreover, no significant difference was observed in smart classroom knowledge in respect of their demographical variables.**

***Keywords*: Smart Classroom, Higher Secondary School, School Teachers**

INTRODUCTION:

Technology benefited us in every aspect of life from communication to education. In this age computers play a big role in our education. If a topic is understood by a visual method, it becomes more beneficial to understand to students. So the demand of using smart classes is being forcefully raised. "Smart Classes" provides education better through presentations and videos. A student can learn better through visualization. All the students may not understand the teaching methodology of a teacher, but can understand by smart classes. This can be seen in case of movies, i.e. students remember movies better than the lessons taught in classroom. This type of teaching creates an attention called as interest in them. So smart class technique is absolutely better. Such teaching helps to maintain the student's interest and focus by engaging them fully for the entire learning experience. Secondly, from the teacher's point of view, with the arrival of this digital initiative which is so practical to modern time and friendly to use, teachers can instantly evaluate/assess the learning achieved by their students in his/her class. If a concept taught is not understood then teacher can repeat with greater clarity and emphasis.

He/she can identify areas of student's strength as well as weaknesses. These ultimately help the student's for better understanding. Smart classrooms are very much beneficial in teaching-learning process in a school. Use of an appeal to audio-visual senses of students in using smart boards has been made. These smart boards are like a computer screen which is finely handled by a teacher and also by students to provide active participation. Some of the advantages for Smart board used inside a classroom. All the renowned institutions are setting a benchmark for using this concept. The concept of digitized classroom has not only made the education easy but it gave the students power to enhance their performance. This paper highlights the smart classroom knowledge of the higher secondary school teachers working in the schools situated in Vellore district.

LITERATURE REVIEW:

Vaiyapuri Raja P, Saveetha N conducted a study on Smart Classroom Knowledge of the higher secondary teachers. Random sampling technique has been used in the selection of the sample of 300 higher secondary teachers working in the higher secondary schools situated in Tiruvannamalai District of Tamilnadu, India. The Smart Classroom Knowledge Test (SCRKT) constructed and validated by Prabhu H, Vaiyapuri Raja P (2019) has been used and the findings of the investigation reveal that the majority of the higher secondary teacher shows average level of smart classroom knowledge. Moreover, the sex and the teachers' medium of instruction show a significant difference in smart classroom knowledge whereas their school locality and residential area do not show significant difference in smart classroom knowledge.

Anita Menon (2015) conducted a study on effectiveness of smart classroom teaching on the achievement in chemistry of secondary school students. The study investigated 320 Class IX students from Amritsar city. Achievement test in Chemistry of 50 items was used to collect the data. Experimental group was taught in smart classrooms and control group was taught by conventional mode of instruction. The results revealed that students achieved higher when taught in smart classes as compared to conventional mode of instruction. Learning styles of students did not affect their achievement in experimental and control group. No interaction effect of instructional strategies and learning style was found.

OBJECTIVES OF THE STUDY:

1. To study the level smart classroom knowledge of the higher secondary school teachers.
2. To study the significance of the difference in smart classroom knowledge between the male and female higher secondary school teachers.
3. To study the significance of the difference in smart classroom knowledge between the higher secondary school teachers working in the school located in the urban area and in the rural area.
4. To study the significance of the difference in smart classroom knowledge between the higher secondary school teachers residing in the urban area and in the rural area.
5. To study the significance of the difference in smart classroom knowledge between the higher secondary school teachers where medium of instruction was in the English medium and in the Tamil medium.
6. To study the significance of the difference in smart classroom knowledge between the higher secondary school teachers teaching the subjects belonging to arts group and science group.
7. To study the significance of the difference in smart classroom knowledge between the married and unmarried higher secondary school teachers.
8. To study the significance of the difference in smart classroom knowledge between the higher secondary school teachers from nuclear family and from the joint family.
9. To study the significance of the difference in smart classroom knowledge between the higher secondary school teachers having teaching experience up to 10 years and above 10 years.

HYPOTHESES OF THE STUDY:

1. The smart classroom knowledge of the higher secondary school teachers is high.
2. There is no significant difference in smart classroom knowledge between the male and female higher secondary school teachers.
3. There is no significant difference in smart classroom knowledge between the higher secondary school teachers working in the school located in the urban area and in the rural area.
4. There is no significant difference in smart classroom knowledge between the higher secondary school teachers residing in the urban area and in the rural area.
5. There is no significant difference in smart classroom knowledge between the higher secondary school teachers where medium of instruction was in the English medium and in the Tamil medium.
6. There is no significant difference in smart classroom knowledge between the higher secondary school teachers teaching the subjects belonging to arts group and science group.
7. There is no significant difference in smart classroom knowledge between the married and unmarried higher secondary school teachers.
8. There is no significant difference in smart classroom knowledge between the higher secondary school teachers from nuclear family and from the joint family.
9. There is no significant difference in smart classroom knowledge between the higher secondary school teachers having teaching experience up to 10 years and above 10 years.

METHODOLOGY:

The investigator used the normative survey method of study as it aims at identify the level of smart classroom knowledge which is possible only through the normative survey method.

SAMPLE:

600 higher secondary school teachers were selected as the sample for the present study using random sampling technique in the process of data collection.

RESEARCH INSTRUMENT:

Smart Classroom Knowledge Test (SCRKT) was constructed by the investigator the scale consists of 38 multiple choice items, for 38 marks and needs 30 minutes. The level of the Smart classroom knowledge has been given below one who score up to 30 have low level of smart classroom knowledge, one who score above 30 and up to 32 have an average level of smart classroom knowledge and one who score above 32 and up to 34 have high level of smart classroom knowledge. The smart classroom knowledge test has construct validity as the items were selected following rigid item analysis procedure described above. Its intrinsic validity was found to be 0.90. The reliability of the test by test – retest method is found to be 0.81. Thus the smart classroom knowledge test has validity and reliability.

STATISTICAL TECHNIQUES

- **Mean:** Mean of smart classroom knowledge of different groups was calculated.
- **Standard deviation:** S.D. of smart classroom knowledge of different groups was calculated.
- **'t' - test:** It has been used to calculate the significant difference of mean of different groups.

PROCEDURE

The data was collected by administering smart classroom knowledge test (SCRKT) on selected sample of higher secondary school teachers. The scoring procedure was done according to the manual of the scale. Data were treated statistically to find out the result and calculation. Mean, Standard deviation and t-test were used to find out the results. The results were as follows:

Table-1

The Mean and the Standard Deviation of the Smart Classroom Knowledge Scores of the Entire Sample and its Sub-Samples

Samples	Sub-Samples	N	Mean	Standard Deviation	'T' Value	Significant At 0.05 Level
Entire sample		600	31.68	3.63	-	
Sex	Male teachers	272	31.56	3.87	0.69	Not Significant
	Female teachers	328	31.78	3.42		
School locality	Rural area	281	31.79	3.57	0.71	Not Significant
	Urban area	319	31.58	3.67		
Residence	Rural area	277	31.40	3.82	1.76	Not Significant
	Urban area	323	31.92	3.43		
Medium of instruction	Tamil medium	332	31.81	3.33	0.96	Not Significant
	English medium	268	31.52	3.97		
Subject group	Arts group	317	31.53	3.40	1.03	Not Significant
	Science group	283	31.84	3.87		
Marital status	Married teachers	341	31.62	3.94	0.45	Not Significant
	Unmarried teachers	259	31.76	3.17		
Family type	Nuclear family	291	31.43	3.65	1.60	Not Significant
	Joint family	309	31.91	3.60		
Teaching experience	Up to 10 years	287	31.56	3.69	0.80	Not Significant
	Above 10 years	313	31.79	3.57		

FINDINGS:

The Table-1 shows majority of the higher secondary school teachers have an average level of smart classroom knowledge. Moreover from the Table-1 the higher secondary school teachers shows there is no significant difference in respect of their sex, locality, residence, medium of instruction, subject group, marital status, family type and teaching experience.

CONCLUSION:

On the basis of analysis of data it may be concluded that entire sample value lie in the average level hence the investigator conclude the higher secondary school teachers shows an average level of smart classroom knowledge, based on the data analysis the higher secondary school teachers shows there is no significant difference in respect of their demographical variables. This will help the policy makers to design the curriculum in such a way that it will help the teacher to teach the subject in an effective manner and maintain pace with the modern education.

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A Survey on Machine Learning Algorithms for Cardiovascular Diseases Prediction

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***Abstract*: Heart is the most important part in all living organisms. Cardiovascular diseases or heart related diseases are at its peak in today's world. Cardiovascular diseases prediction in a living being is a critical challenge analysis in the medical field. Machine learning algorithms are used in effective decision making, perfection and correctness because of little fatigue problem. In this work a survey has been done among various machine learning algorithms such as SVM, Decision Tree, K-Nearest Neighbor (KNN), Artificial Neural Networks (ANN) and Random Forest with linear model to predict out of this heart disease. In performance level 92% is achieved through Support Vector Machine prediction model for heart diseases. Support Vector Machine method aims at finding large amount of feature by applying machine learning algorithm to improve the accuracy in the prediction of cardiovascular diseases.**

***Keywords*: Heart Disease classification, Support Vector Machine, Decision Tree, K-Nearest Neighbor, Artificial Neural Networks, Random Forest.**

1. INTRODUCTION

Heart disease is a dangerous health problem and several people have been suffered by this disease around the world. The Heart disease occurs with common symptoms of chest pain, chest tightness, breath shortness, physical body weakness and, feet are swollen. We are using this project as a mean to come across an efficient technique using for the recognition of heart disease, because the current diagnosis techniques of cardiovascular disease are not effective in early time identification. In Model world, everyone is running out of time. So it is important to diagnose and give proper treatments to save more people around the world. The traditional treatment for diagnosis of heart disease is done by the analysis of the medical history of the patient; consist only of the physical examination report and analysis of related symptoms by a physician. So, that the result of obtained diagnosis methods are not accurate in identifying the patient of heart disease. Furthermore, it is computation and expensively difficult to analyze.

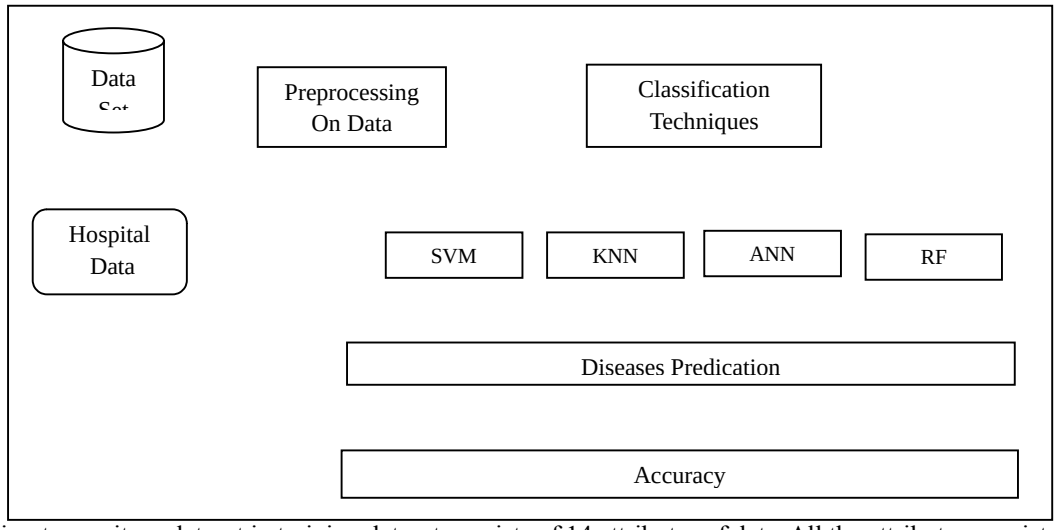
Specialist decision system based on machine learning method and features are used to effectively diagnosis the heart disease as a result, except for decreasing the ratio of death. The machines learning using predictive model need proper data for training and testing. However, the performance of machine learning method can be used if balanced dataset is used for training and testing of the model. Furthermore, the model predictive capabilities can improve by using proper and related features from the data. Therefore, data balancing and feature selection is significantly important for model performance improvement. The identification of disease in most cases depends on a complex combination and huge volume of medical data. The algorithms have been effective assisting in making decisions and predictions from the traditional machine learning algorithms that aims in improving the accuracy of heart disease and prediction has been applied. In diseases, accurate diagnosis is primary. Although, this method is used to predict and diagnosis.

2. LITERATURE REVIEW

In literature various machine learning based diagnosis techniques have been proposed by researchers to diagnos heart diseases. We are using research paper to study some current machine learning based diagnosis techniques in order to explain the important of the proposed work. [1] Naïve Bayes classifier is based on Bayes theorem. It is based on the Probabilities of the class attribute based on the product of prior probability of class attribute and the possible conditional probabilities involving the values of a single attribute. Logistic Regression (LR) is one of the classification method used to diagnose heart diseases. LR is similar to the Linear Regression but it is appropriate to use when the dependent variable is binary means only having 2 possible outcomes. The outcome is determined by set of independent variables call as predictor or explanatory variable. Like all other regression analyses, this method is also a predictive analysis. [2] so that it classifies heart diseases correctly without errors. Hence they intend to propose a model with highest accuracy, precision and with minimum root mean square error. The KNN algorithm has low accuracy in this scenario but it has good results for large number of samples. Considering these statistics, we have concluded that most efficient amongst all the algorithms studies are SVM, ANN and KNN for heart disease prediction. [3] The back propagation algorithm is a technique used in developing multilayer perceptron (MLP) neural networks in a supervised manner. The BP algorithm is also called as error back propagation algorithm which is based on the error correction learning rule. In forward pass an activity pattern is applied to the input nodes and it propagates through the network layer by layer. As a result, a set of outputs is produced as the actual response of the network. The weights at the functional points of the network are fixed in the forward pass. For the duration of the backward pass, the synaptic weights are all adjusted in accordance with an error-correction rule. [4] A method is based on neural network and genetic algorithm is proposed for the prediction of heart syndrome by exploiting main detrimental features. The proposed technique predicts the threat of heart syndrome by precision of 89%. Therefore, by using this technique a smart system is able to predict the syndrome.

3. PROPOSED SYSTEM

The subsequent diagram represents this heart disease prediction system Architecture. Processing of system starts with the data collection. The data-aspirant repository dataset is used in this work.



Data-aspirant repository dataset in training dataset consists of 14 attributes of data. All the attributes consist of numeric values. The initial 13 variables will be used for predicting 14th variables. The decision making of variable is at index 14.

3.1 Dataset Selection

Attribute of dataset is a property of dataset which is used by the system for heart disease prediction. The performance of machine learning model can be increased, if balanced dataset is used for training and testing. The initial step of the predication system is, the data collection and deciding about the training and testing dataset. We have used 70% of training dataset and 30% of dataset as testing dataset. Furthermore, the model predictive capabilities can be improved by using proper and related features from the data. Therefore, data balancing and feature selection are significantly important for model performance improvement.

3.2 Pre-Processing

The data-spirant dataset is loaded and the data becomes ready for pre processing. The subset of 13 attributes take in age, sex, cp, treetops, chol, restecg, thalach, exang, olpeak, slope, ca, that is decision making from the pre-processed data set of heart disease. Support Vector Machine, K-Nearest Neighbors, Artificial Neural Network, Decision Tree, Random Forest, and Linear Model are used to develop the classification model. Confusion matrix method using the performed of model.

3.3 Classification

The different types of various features selection and modeling keep on repeating combinations of attributes. Training data should have used as in regression operation for predicting and comparing the output. Training data is loaded into classification operation and uses SVM, KNN, ANN, RF and Decision tree algorithms are classification that match the parameters with dataset and reduced the complexity.

3.4 Support Vector Machine

CART stands for Classification and Regression Trees methodology. R has a package to access the REST API called CARET. Open R-Studio generate a new R Script. Once you have done this, you will need to install and load the CARET.

```
> library(caret)
Loading required package: lattice
Loading required package: ggplot2
```

3.5 Import Data

Open up R-Studio, in the Files tab, click Upload, and choose your csv file. Click on the Workspace tab, on "*Import Dataset*" -> *"From heart_df*". A document program will open up, find the Csv record and click open. Click "Import".

3.6 Training Data

Data slicing splits method for data into train dataset and test dataset. Training data set can be used specifically for our model building by using prediction of heart disease. Even during consistency, we should not standardize our test set. The Following Figure 4.3 Represents for Summary. The caret package inbuilt a method of *createDataPartition()* for partitioning our data into train dataset and test dataset. We have been on passing three parameter values. The "y" parameter values take in variable giving into dataset using the separated. So that is in our case, decision making variable is at V14, so we are passing in dataset of sri_heart$V14. The

last on the attributes of the value is $V14 for "p" parameters hold on value range upto 0 to 1. It is shown on dataset of the split. We are using the value of p=0.8. So that is dataset split range in 80:20 ratios.

4. Machine Learning Algorithms

4.1 Support Vector Machine

The initial steps of implementation, the training dataset are used to learn the ML model. It helps to divide the data into k equal subsets and to give a chance for each subset to be a part of training and testing phase. The working of cross validation operator considers as an efficient, as it repeats the learning phase k times, where every time the testing data selection is different from previous. Finally, it repeats the experiment k times and uses the average results. For training data SVM classifier, "*svmLinear*". method using than parameter passing through into the *train*() method. We are passing our decision making variable V14. The "V14~." denotes a formula for using all attributes in our classifier and V14 as the target variable.

4.2 K-Nearest Neighbor

It works on the basis of distance between the location of data and on the basis of this distinct data that are classified with each other. All the other groups of data are called neighbor of each other and the number of neighbor are decided by the user which, Play very crucial role in analysis of the dataset. Each cluster represented in two dimensional space whose coordinates are represented as (Xi,Yi) where Xi is the x-axis, Y represent y axis and i = 1,2,3,….n.

4.3 Artificial Neural Network

Artificial Neurons or Processing Elements (PE) are highly basic models of biological neurons. Each one neuron in ANN receives a number of inputs and an output which can be connected to other artificial neurons. Artificial neural networks are closely interconnected networks of Processing Elements; to accurate the strength of the connection between the units in response to externally supplied data. The network has 2 binary inputs I0 and I1.. One binary output Y. Connection Weights are W0 and W1..

4.4 Random Forest

Random forest model using in caret package. Now, our model is trained with K value as dataset. We are go to check the predict classes for our test dataset. Here, the two parameters using of *predict*() method. The first and second parameters are our training and testing model, held our testing data frame. Finallyss, the list of positive case return in method of predict(), We are saving it in a test_pred variable.

Training Set	Accuracy Result Using SVM	Accuracy Result Using KNN	Accuracy Result Using RF	Accuracy Result Using ANN
50%	85.93	82.96	83.70	81.48
55%	87.60	84.30	85.12	85.12
60%	87.96	85.19	86.11	85.19
65%	88.30	88.30	90.43	88.3
70%	90.12	86.42	90.12	80.25
75%	91.04	86.57	89.55	82.09
80%	92.59	83.33	90.74	81.48
85%	87.50	77.50	85.19	80.00
90%	85.19	76.92	85.00	77.78
95%	76.92	70.37	76.92	76.92

Table 1: Accuracy Result

5. Result

We have implements in SVM method of confusion matrix using in accuracy results. It shows that SVM method accuracy for testing dataset in 92.59%. A survey has been done among various range of training Data value from 50% To 95% are accuracy result for prediction of Machine Algorithm using heart diseases. Heart diseases prediction SVM, ANN, KNN and RF algorithm using in survey has been done among Training Data Range of Value in start 50% To 95%. The following Table 1 represents the Heart diseases prediction using Support Vector Machine.

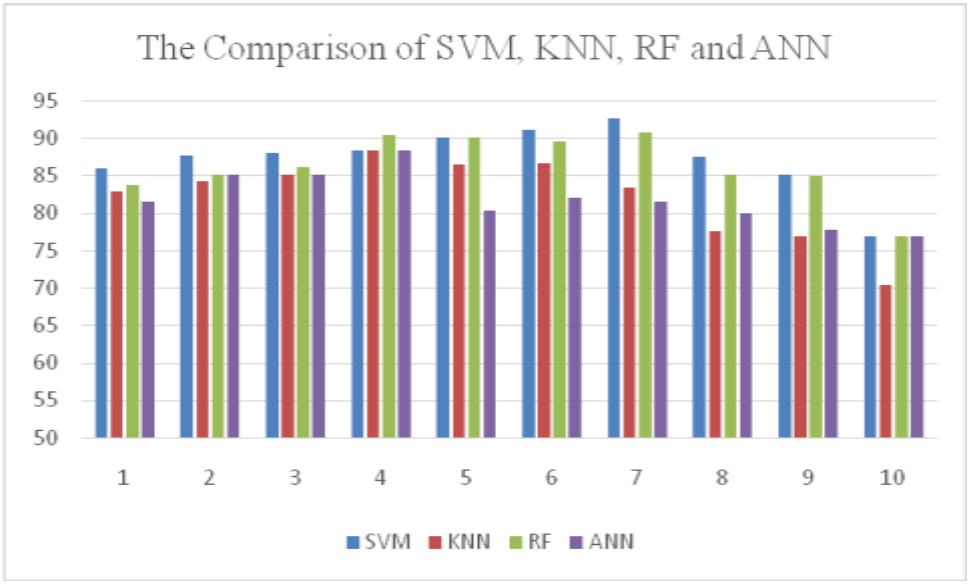


Figure 2: Comparison chart

Above Figure 2 represents the comparison chart of SVM, KNN, RF and ANN Algorithms Using Heart Diseases Prediction.

6. CONCLUSION

Identifying the processing of raw healthcare data of heart information will help in the long term saving of human lives and early detection of abnormalities in heart conditions. Machine learning algorithms techniques were used in this work to process raw data and provide new project to heart disease. We have cardiovascular diseases prediction is essential of medical field. However, the mortality rate can be high level has been controlled if the disease is detected at the early stages and preventive processes are adopted as soon as possible results. Further extension of this studying the method of using to through the surveys to real-world datasets instead of just theoretical approaches and simulations, our project proved to be quite accurate in the prediction of heart disease, the future course of this research analytics after applied. It can be performed with various method in mixtures of machine learning techniques for better prediction techniques. Furthermore, new feature selection methods can be developed to get a broader perception of the important features to increase the performance of heart disease prediction.

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Performance Analysis of 2x2 MIMO using V-blast Coding Architecture

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***Abstract*: MIMO systems have now become a key technology in wireless communications as it provides significantly high data rates. It creates multiple paths between the transmitter and receiver to enable more data to travel in a single unit of time thus leading to increase in data rates. V-BLAST scheme has got multiple transmitters. The data stream is divided in substreams and is transmitted independently through multiple transmitters. This paper will give an overview of V-BLAST technique from theoretical point of view and its practical implementation. It envisages on the selection of desirable modulation scheme in terms of BER, system throughput and outage probability for SISO and MIMO channel with V-BLAST architecture.**

***Keywords*: Bit error rate (BER), Multiple-Input Multiple-Output (MIMO), Phase shift keying (PSK), Successive Interference Cancellation (SIC), Zero Forcing (ZF)**

I. Introduction:

Multiple-Input Multiple-Output (MIMO) can offer high capacity to wireless systems, and the capacity is increased as the number of bits that are transmitted per second are increased and it keeps on increasing till the number of receiving antennas is greater than equal to the number of transmitting antennas. [1] There are many different schemes that can be applied to the MIMO system, the V-BLAST algorithm has become a potential alternative due to its excellent complexity performance tradeoff besides the complexity performance tradeoff, the V-BLAST algorithm is also considered to be a scheme which effectively exploits the MIMO potentials. This paper aims to exploit the V-BLAST algorithm [2] introduce many ideas regarding coding and design principles for the V-BLAST system, for example, Space-Time Coding reference proposed a low-complexity Zero Forcing (ZF) decoding approach for the V-BLAST Space Time Block Codes (STBC) system. Some V-BLAST systems perform detection and decoding layer by layer in a successive way at the receiver, a low-complexity detector with Successive Interference Cancellation (SIC) is used. The interest is on the bit error rate and performance while using different detection methods. Zero Forcing (ZF) is used as detection algorithms [3]. SIC is introduced instead of joint detection in order to reduce the complexity. We also investigated several methods to minimize the influence of the error propagation, which is considered to be the key problem to SIC for a given channel matrix H, zero-forcing enhances the noise. V-BLAST is a practical approach to achieve spatial multiplexing. Its decoder consists of ordering , interference cancelation, and interference nulling. There is a trade-off between the complexity of the decoding and the achieved diversity going from linear decoding methods to V-BLAST and to ML decoding, the diversity gain and the decoding complexity increase simultaneously [4-6]. The objective is to demonstrate the concept and feasibility of a V-BLAST channel coding architecture system, and investigate how its performance is changed by varying some of its major parameters like various M-PSK schemes. This objective is met by developing a MATLAB program to simulate a basic V-BLAST system. The flow chart to design the MATLAB code is as shown in Fig.1.

II. Performance Analysis for Different m-ary Schemes for SISO Channels

The first step is defining all the parameters in our system: the number of symbols to be transmitted (N), the SNR range for the simulation in dB (ebno) after defining all the parameters the modulator is set to M-PSK dimension, the random value generator is randomized and a random input is generated according to the number of symbols, and the interleaver is initialized. Then the simulation starts from the first SNR point. Uuencoded bits (a frame) are generated and they are modulated using M-PSK (BPSK, QPSK, 16PSK and 8PSK).

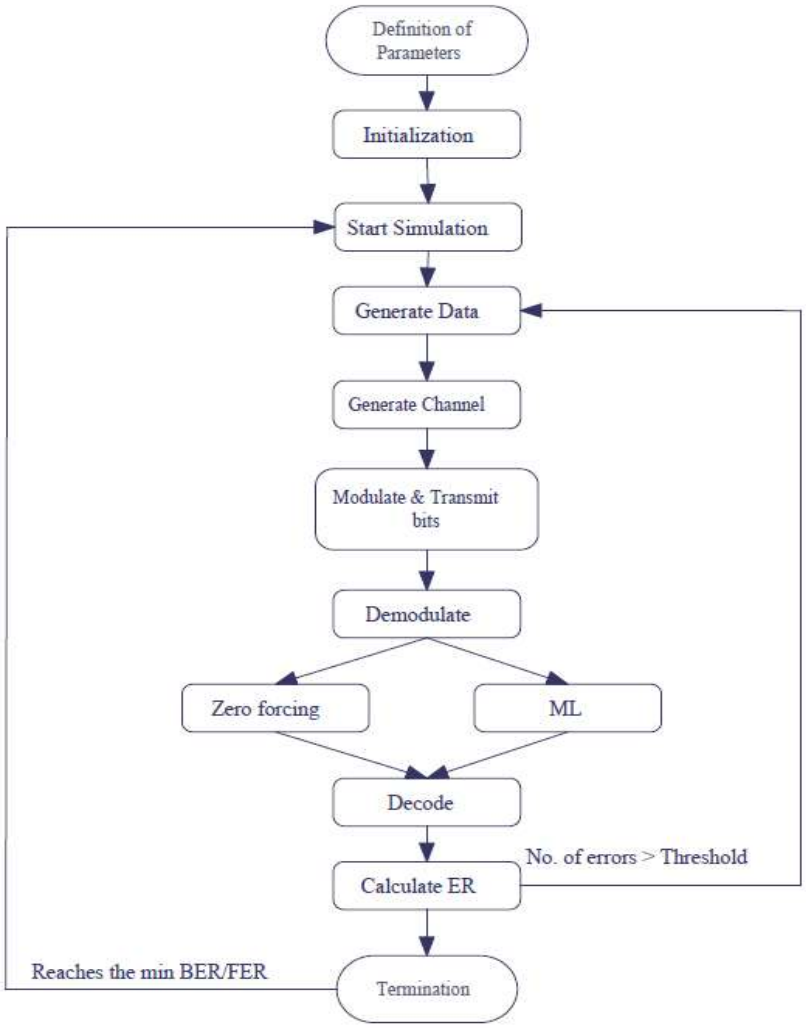
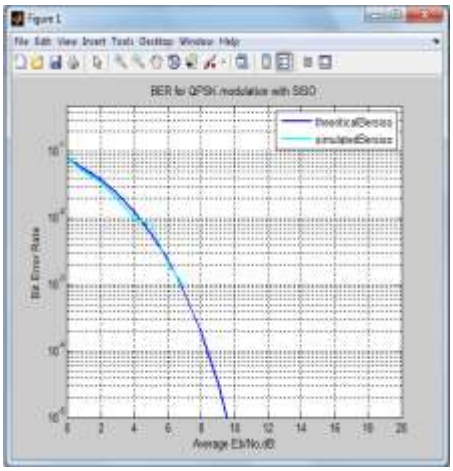
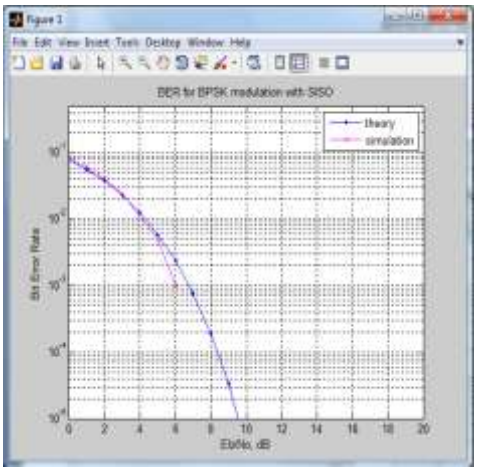


Fig. 1. Flowchart of general MIMO structure

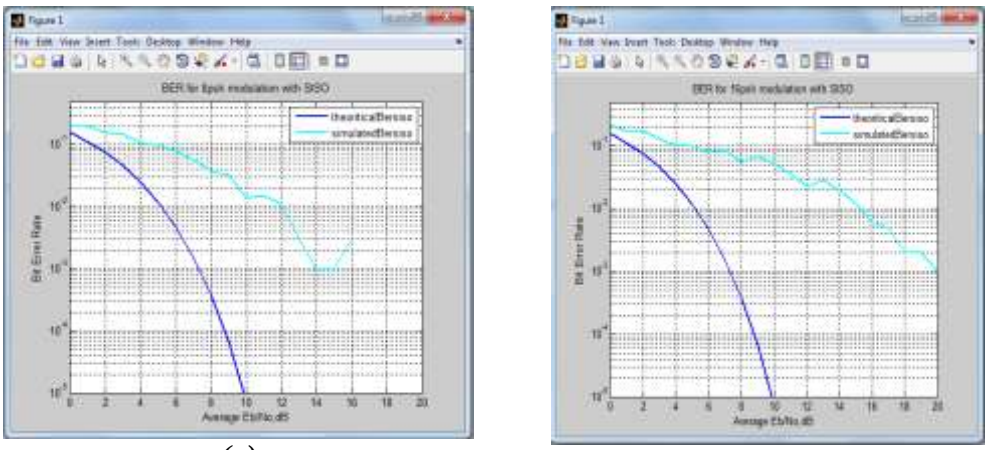
The bit errors are counted by comparing the output bit stream from the input stream transmitted. Further, the graphs are plotted between bit error rate and signal to noise ratios (dB), the graphs show the variation of theoretical BER and simulated BER with signal to noise ratio (dB). The comparison of the BER of different modulation schemes for SISO Channel using MATLAB is as shown in Fig. 2. The input parameters are: Number of symbols = 1000, ebno= 0:1:20 dB.



(a)



(b)



(c) (d)

Fig. 2. Performance analysis of SISO (a) BPSK (b) QPSK (c) 8 PSK (d) 16 PSK

III. Performance Analysis for Different m-ary Schemes for MIMO Channels

The V- BLAST detection technique is used for the MIMO system. The algorithm includes three steps: Ordering, Interference cancellation, Interference nulling. Symbols are detected one by one. The purpose of the ordering step is to decide which transmitted symbol to detect at each stage of the decoding. The symbol with highest SNR is the best pick in this step. The goal of the interference cancelation is to remove the interference from the already detected symbols in decoding the next symbol. Finally, interference nulling finds the best estimate of a symbol from the updated equations. This step is called interference nulling since it can be considered as removing the interference effects of undetected symbols from the one that is being decoded. We use the first Zero-Forcing detector to detect the first data stream x1, decode it and then subtract this decoded stream from the received vector. Assuming the first stream is successfully decoded, and then the second Zero-Forcing detector only needs to deal with streams x_2……, x_{Nt} as interference, since x1 has been correctly subtracted off. This process is continued until the last Zero-Forcing detector does not have to deal with any interference from the other data streams. We assume subtraction is successful in all preceding stages. This is called the successive interference cancellation zero forcing detecting technique used at the receiver as shown in Fig. 3.The zero forcing equalization technique is used at the receiver. The received symbols is given by (1):

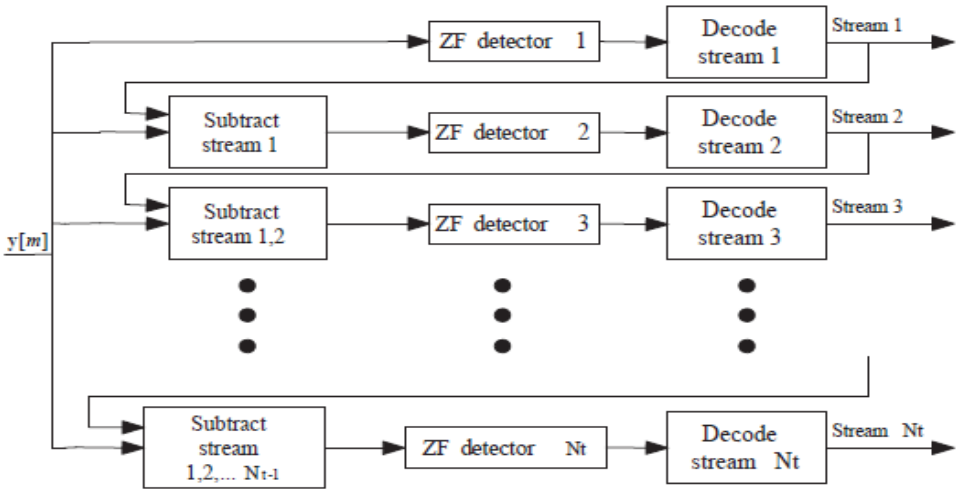
$$y = Hx + n \quad \ldots. (1)$$

Where: y = Received symbols, H = channel matrix, x = transmitted symbol, and n = noise

Now, to solve for x, we need to calculate a matrix W satisfying the equation WH = I. The Zero Forcing (ZF) linear detector for meeting this constraint is given by (2):

$$W = (H^H H)^{-1} H^H \quad \ldots. (2)$$

Where: H^H is the conjugate matrix of H



The comparison of the BER of different modulation schemes for MIMO channel using MATLAB is done. The theoretical BER is calculated for the two different receivers separately and finally the output from two receivers is combined as one simulated BER is also compared as in Fig. 4:

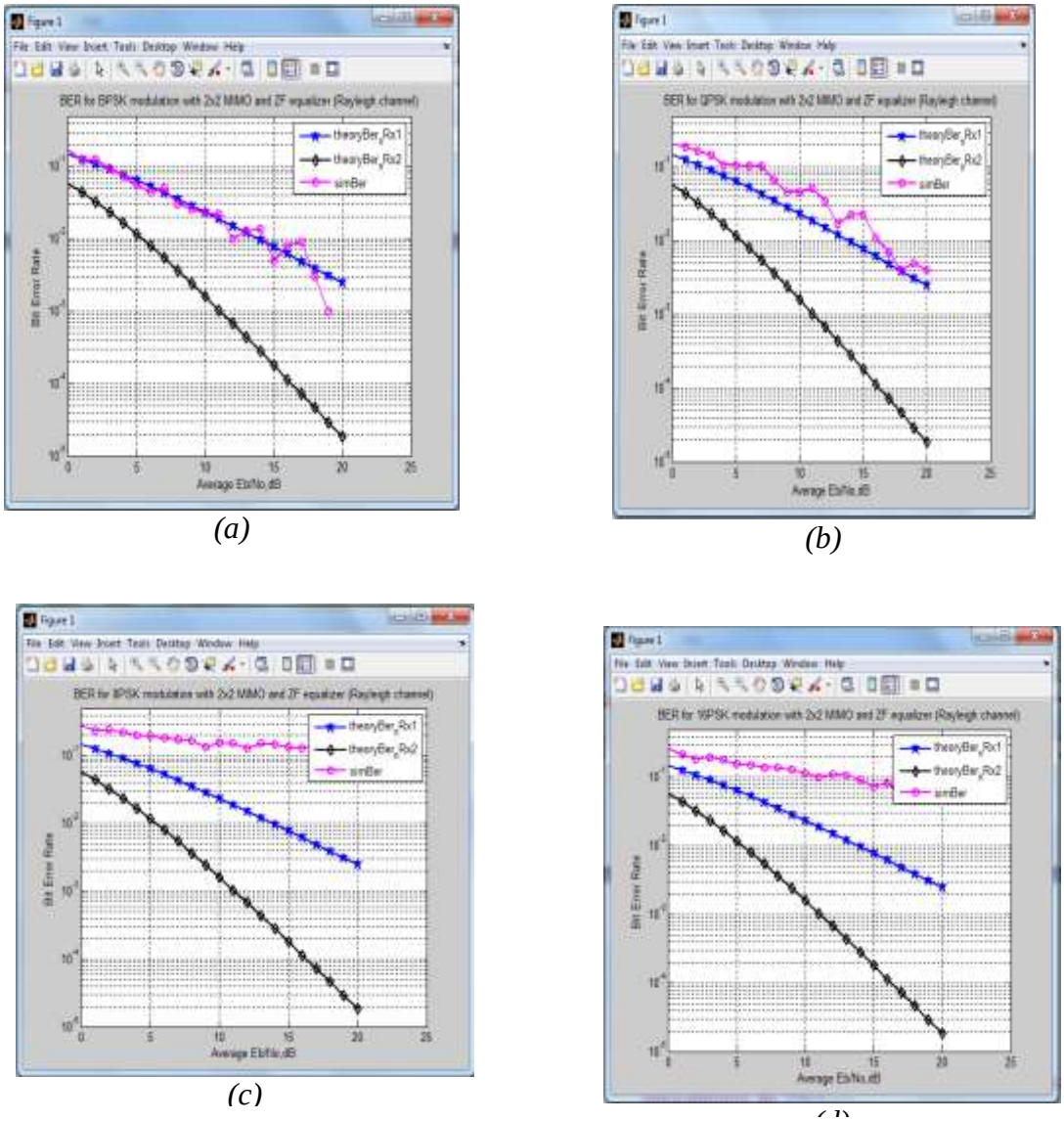


Fig. 4. Performance analysis of MIMO (a) BPSK (b) QPSK (c) 8 PSK (d) 16 PSK

IV. Comparison of Different m-ary Modulation Scheme for V-Blast MIMO and SISO

A GUI code is written on MATLAB, the input parameters to be supplied are as following: No. of transmitted symbols is "N" in the program, No. of transmitting antennas is "nTx = 2", No. of receiving antennas is "nRx = 2", EbNo_ratio_dB is signal to noise ratio, after entering the required input variables as specified, tick the modulation scheme to be used. The GUI window on MATLAB is as shown in Fig.5. The modulation schemes are: BPSK, QPSK, 16PSK, 8PSK, after inserting the input parameters the comparison of theoretical BER of two receivers of MIMO and single receiver of SISO system is compared with the simulated BER of MIMO and SISO case separately as in Fig. 6.

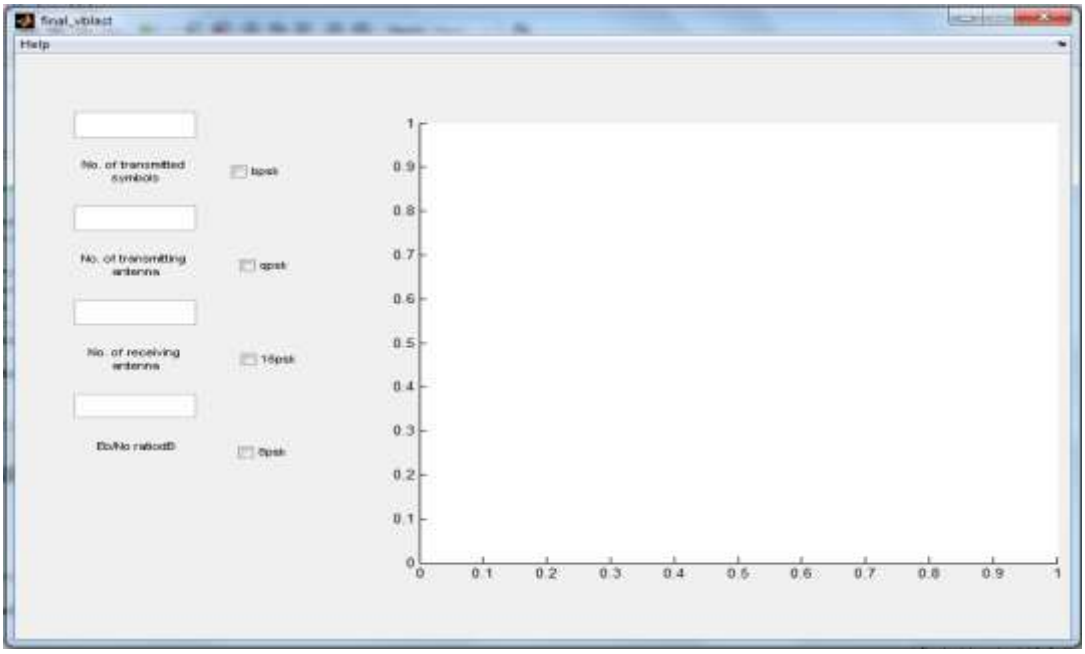
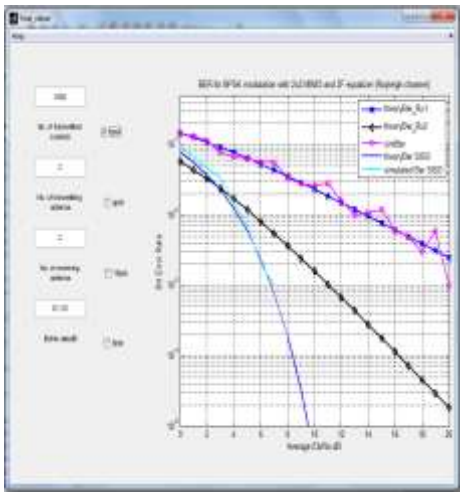
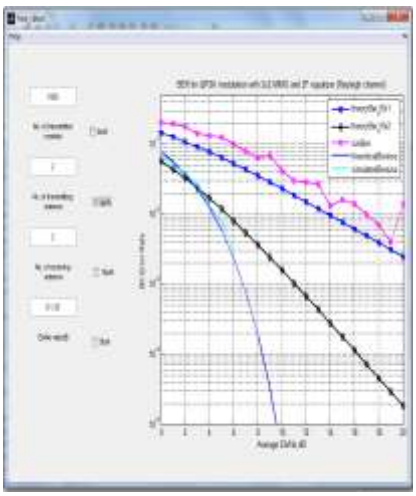


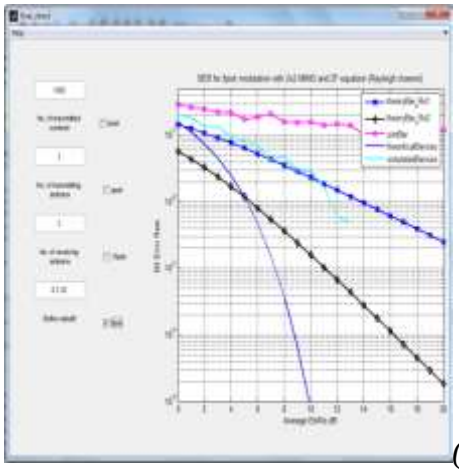
Fig. 5. MATLAB GUI Window



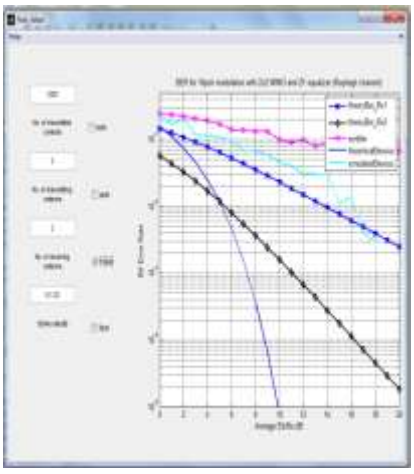
(a)



(b)



(c)



(d)

Fig. 6. Comparison analysis (a) BPSK (b) QPSK (c) 8 PSK (d) 16 PSK

V. Conclusions

We have studied the behavior of channel over various modulation schemes in SISO and MIMO channel for SISO and MIMO, performance of BPSK is better than other modulation schemes because of low BER. Bit Error Rate of all schemes decreases with increase in SNR. Probability of BER increases as M increases. Bandwidth requirement decreases as the M increases, thus decreasing the symbol rate. The selection of the Modulation scheme depends on the available bandwidth and the maximum data rate required. The bit error rate is least for BPSK modulation but as we know the data rate is least in BPSK modulation so higher order modulation techniques are used and also the bandwidth decreases for higher values of M.

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A Study to Assess The Knowledge Regarding Non-Pharmacological Management Of Labour Pain Among Final Year GNM Students At St Joseph's College of Nursing, Hoshangabad With A View To Develop A Self Instructional Module

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ABSTRACT:
Labour pain is a universal phenomenon and it is associated with the contraction of uterus. Rather than making the pain disappear with pharmacotherapy, the nurses can assist the labouring women to cope up with, build their self-confidence and maintain a sense of mastery of well-being. Thus, nurses must have knowledge to assess pain to implement pain relief strategies.

OBJECTIVES: The present study was conducted with the objectives to assess the existing knowledge regarding non-pharmacological management of labour pain among final year GNM students at St Joseph's College Of nursing, Hoshangabad with a view to develop a self-instructional module".
MATERIAL & METHODS: Descriptive survey approach was adopted to collect data With 40 sample. Convenience sampling technique was used for the sample section.
RESULTS: The findings indicate that the overall mean knowledge of respondents found to be 9.7, Median is 9, standard deviation as 3.9 and the range is 15.There was a significant association between knowledge regarding non-pharmacological management of labour pain with their Age, education and Source of information
CONCLUSION: The findings of the study revealed that educating the students would be effective in updating the knowledge and skills regarding non-pharmacological management of labour pain.

Keywords: Knowledge, Final year GNM students, Nursing institution, Non-pharmacological management, Labour pain.

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.[1] Labour Pain is a pain and discomfort associated with the contraction of uterus during labour. The extent of pain elimination depends upon how much the spinal cord is blocked.[2] The majority of women though need some sort of pain relief drugs during childbirth, but safety of the child takes the first priority[3]. The alleviation of pain is important commonly it is not the amount of pain a woman experiences, but whether she meets her goals for herself in coping with the pain that influences her perception of the birth experience as "good" or "bad". The observant nurse looks for cues to identify the women's desired level of control in the management of pain and goes into the development method of pain control that brings effective relief for the mother without harm to the child. The perfect solution is yet to be found therefore at times the safety of the child must take precedence over the comfort of the mother[4]. Many women would like to have labour without using drugs and find alternative methods to manage the pain. These methods include acupressure, breathing technique, massage therapy, music, and warm compress. Labour pain and methods to relive it are concerns of childbearing women and families. Approximately 4 million women and families annually in the United States alone are undergoing this problem. The subject of labour pain is relatively neglected in the health and medical literature. National data is unavailable to describe both childbearing women's access to and use of drug free pain relief measures in the united State which appears to be quite limited and far from commensurate with this universal relevance[5]. A systematic review of Non-Pharmacologic relief of pain during labour, the authors suggested for research and recommendations to help hospitals and caregivers make the non-pharmacologic method more widely available[6].

NEED OF THE STUDY:

Natural child birth is a beautiful experience with many safe options and benefits. Women usually dream of a perfect birth. One unique aspect of childbirth is the association of physiologic process with pain and discomforts requiring appropriate pain management. Intervention of pain and discomfort during labour and childbirth is a major part of modern obstetric care of labouring women[7]. Many women would like to avoid pharmacological or invasive method of pain management in labour and this may contribute towards the popularity of complementary methods of pain management. One of such complimentary approach is the non-pharmacological method used in labour.
The World Health Organization lists non-invasive, non-pharmacological treatments as a category. A classification. "Practices that are demonstrably useful and should be encouraged." Specifically, the WHO classifies massage and relaxation techniques as category A. Although music therapy is not expressly listed in the WHO classification of practices in normal birth, it certainly serves as a non-invasive and often relaxing treatment during labour. Other non-pharmacological interventions such as herbs, immersion in water, and nerve stimulation are practices for which insufficient evidence exists to support a clear recommendation[8].

STATEMENT OF PROBLEM:- A Study To Assess The Knowledge Regarding Non-Pharmacological Management Of Labour Pain Among Final Year GNM Students At St Joseph's College of Nursing Hoshangabad With A View To Develop A Self Instructional Module .

OBJECTIVES OF THE STUDY:

1. To assess the existing knowledge regarding non-pharmacological management of labour pain among final year GNM students.
2. To find the association between the existing knowledge and the selected demographic variables.
3. To develop a self-instructional module regarding non pharmacological management of labour pain.

OPERATIONAL DEFINITIONS

Assess: In this study assess refers to the procedure of judging the level of knowledge of students regarding non pharmacological management of labour pain.
Knowledge: In this study knowledge refers to response of subjects for the items of knowledge questionnaire regarding non-pharmacological management of labour pain.
Non-pharmacological management of labour pain: In this study it refers to the measure of non-invasive painless selection method of reducing labour pain. These methods are acupressure, breathing techniques, massage, music therapy and warm compress.
Final year GNM Students: In this study it refers to 3rd year GNM students of St Joseph's College of Nursing, Hoshangabad
Self-Instructional Module: Which is self-explanatory based on the findings of the study.

ASSUMPTION:

The study was based on the following assumption:

1. Final year GNM students may have minimum knowledge about non-pharmacological management of labour pain.
2. Final year GNM student will willingly participate and give reliable information needed for the study.

DELIMITATION OF THE STUDY:

The study is limited to the GNM students who:

- are studying final year GNM at selected school of nursing.
- have completed midwifery postings
- are willing to participate in the study
- are present at the time of data collection

MATERIAL & METHODS:

- **Research approach**- Survey approach was adopted to collect data.
- **Research design –** Descriptive research design
- **Setting –** St Joseph's College of Nursing, Hoshangabad
- **Sampling**- Nonprobability Convenient Sampling method
- **Sample size**-The sample for the present study includes 40 final year GNM students.
- **Sample technique**-Convenience sampling technique was employed for the sample selection.

DESCRIPTION OF THE TOOL:

A structured knowledge questionnaire is constructed into two sections.
Section A. Demographic variable consist a set of questions related to age, religion, academic qualification, and sources of previous knowledge regarding non pharmacological management of labour pain.
Section B. Consists of 30 items / statements penetrating to the knowledge aspect regarding non-pharmacological management of labour pain, it has 6 aspects which is mentioned below. Each statement provided with multiple option questions all of which were scored, each correct answer was given a score of one and wrong answers a score of zero. The total score was 30. The knowledge of the respondents was arbitrarily characterized as follows.

RESULTS

Classification of Respondents by Knowledge level on Non-Pharmacological management of labour pain

N = 40

Knowledge Level	Score	Frequency	Percentage
Inadequate	0-10	29	72.5
Moderate	11-20	11	27.5
Adequate	21-30	0	0.0
Total		40	100

Section B (a): Aspect wise and overall mean knowledge score and level of respondents.

Classification of respondents by knowledge level on non-pharmacological management of labour pain shows in above table. The results indicate that 72.5% of the respondents noticed with inadequate knowledge Level as compared to 27.5% of respondents found to be moderate knowledge level on non-pharmacological management of labour pain.

Aspect wise Mean Knowledge of Respondents on Non-Pharmacological management of labour pain.

N=40

No.	Knowledge Aspects	Statements		Respondents Knowledge		
			Mean	Median	SD	Range
I	General Information	5	9.7	9	3.9	15
II	Acupressure	5				
III	Breathing Technique	6				
IV	Massage Therapy	6				
V	Music Therapy	4				
VI	Warm Compress	4				
	Combined	30				

Section B (b): Establish the aspect wise mean knowledge score of respondents on non-pharmacological management of labour pain. The findings indicate that the overall mean knowledge of respondents found to be 9.7, Median is 9, standard deviation as 3.9 and the range is 15.

CONCLUSION:

The following conclusion were drawn on the basis of the findings of the study were as follow

- All the respondents were females.
- Most (84%) of the respondents were in the age group of 18-21 years.
- All the respondents were single.
- About (49%) of the respondents had obtained information from health professional on non-pharmacological management of labour pain.
- The sample criteria reveal that the overall mean knowledge score was found to be 9.7 and S.D 3.9.
- Significant association was found between the knowledge of final year GNM students regarding non pharmacological management of labour pain with their age, education and Source of information.
- Significant association was not found between the knowledge of final year GNM students regarding non pharmacological management of labour pain with their regional and source of information.
- Overall findings reveal that the knowledge regarding non-pharmacological management of labour pain among final year GNM students was inadequate.

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Application of X-bar and R Control Chart on The Quality of The Final Product of Goat Milk Powder

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***Abstract*: Dairy products are prone to quality problems, including contamination by bacteria, microbes, and other harmful elements. Bumiku Hijau is a producer of goat milk powder with various flavors in Yogyakarta. This study aimed to determine the quality control process and the identification of the factors causing failure at the re-weighing stage of the final product of goat milk powder at Bumiku Hijau Yogyakarta. Data analysis used statistical quality control methods, which are the X-bar and R control chart to analyze the quality control of the final process of re-weighing goat milk powder. The causal diagram is used to identify the factors that cause the failure at the re-weighing step of the final product of goat milk powder. The results of the X-bar and R control chart analysis in the final product re-weighing process show that the overall final process of goat milk powder production is under statistical control. Identification of the factors that cause failure in the final process of goat milk powder production at Bumiku Hijau is the weight variability of the final product, where the variability of the weight of the final product is caused by human factors (employees), and machines (weighing the final product).**

***Keywords*: Goat Milk Powder, Quality Control, Control Chart**

1. INTRODUCTION

The development of the livestock sub-sector is part of the development of the agricultural sector which has strategic value in meeting the food needs which continues to increase over time. The increasing need for food is due to, among other things, an increase in population and an increase in the level of income of the population. One of the components of the livestock sub-sector that has many benefits and has the potential to be developed in Indonesia is dairy agribusiness [1]. However, according to the demand side, domestic milk production is still insufficient to meet the consumption needs of the Indonesian people. This is following data on milk consumption in Indonesia which is compiled in the [2], where the level of consumption of the Indonesian people is 11.09 liters per capita per year. This level of consumption is categorized as quite low compared to several countries in ASEAN whose milk consumption reaches 20 liters per capita per year.

In the current era of globalization and trade liberalization, competition in both service and manufacturing industries is no longer only focused on company scale or human resources, but also prioritizes the quality of the products produced. The quality of a product plays an important role in fulfilling consumer wants and needs. One of the positive impacts that will be obtained by a company that consistently maintains the quality of its products is to make the company able to compete with other competitors in maintaining customer satisfaction and loyalty [3]. According to [4], determined the Dairy Processing Industry in Indonesia as one of the industries that will continue to be prioritized.

One of the products that require strict quality control efforts is pure milk products and their derivatives. Milk is a product that is easily damaged, this is due to its high nutrient content and water activity, which is a very supportive place for the proliferation of harmful microbes [5]. This condition makes milk and its derivative products vulnerable to bacterial and microbial contamination. Good quality milk can be seen from the value of the protein, fat, and mineral content in the milk itself [6].

Previous research that discusses product quality control, whether products in the form of whole milk or processed products, has been widely applied. For example, research on quality control of pure cow's milk [7]; [8]; [9], quality control and business analysis of pure goat milk with Etawa breeds [10], quality control white tofu production process [11], quality control of tempe products [12], quality control of the ice cream production process [13], evaluation of the quality of the goat milk powder production process [14]. None of these studies have analyzed the quality control of goat milk powder. Research on quality control of goat milk powder raw materials has been previously researched by [15], but has not explained in more depth how quality control is in the production process and the final product. Based on this background, it is important to study the quality control of the final goat milk powder. The purpose of this study was to analyze the quality control of goat milk powder and identify the factors that cause the failure of the final product of goat milk powder in Bumiku Hijau Yogyakarta.

2. STUDY AREA

Bumiku Hijau is one of goat milk powder's producer in Yogyakarta, Indonesia. Bumiku Hijau was established since 2009. It is located on North Ring road No. 100, Yogyakarta city. Bumiku Hijau only produce goat milk powder with three flavour variants, there are original, chocholate, and vanilla.

3. RESEARCH METHODOLOGY

Data collection was carried out in January to May 2019, where during the implementation of the research testing the quality standards at the re-weighing step of final product weight. The research was conducted at Bumiku Hijau, which is one of the

producers of goat milk powder with various flavors (original, chocolate, and vanilla) in Yogyakarta. The research location is determined using the purposive sampling method, which is the deliberate taking of the research location.

Table 1. Quality Standard of Final Product Weight in Bumiku Hijau

Indicator	Testing Standards	Target	Information
Product Weight	Weight analysis (Final product reconsideration)	> 205 gr	*Rework*
		200gr – 205gr	Normal
		< 200gr	*Rework*

Source: Bumiku Hijau, 2019

The average production of goat milk powder in Bumiku Hijau in one month reaches 2,500 packs per week with a size of 200 grams per one pack. The number of samples studied refers to the ANSI/ASQC ZI.9-1993 rules, normal inspection level 3 (adjusting the population) as presented in the following table:

Table 2. Sample Size According to ANSI/ASQC ZI.9-1993, normal inspection level 3

Number of Products (Unit)	Sample Size
91 – 150	10
151 – 280	15
281 – 400	20
401 – 500	25
501 – 1.200	35
1.201 – 3.200	50
3.201 – 10.000	75
10.001 – 35.000	100
35.001 – 15.000	150

Source: Ariani, 2004

The distribution of goat milk powder production at Bumiku Hijau in one week is 1,250 packs of original flavor, 750 packs of vanilla flavor, and 500 packs of chocolate flavor. Based on the table for determining the number of samples above, the samples studied in controlling the quality of the final product are as follows:

Table 3. The number of samples studied for each flavor variant of goat milk powder of Bumiku Hijau

Flavor variants	Sample (Pack)
Original	50
Vanilla	35
Chocolate	25

Quality control on the final product of goat milk powder, which is measured is the result of re-weighing the goat milk powder of each flavor variant that has been packaged in 200 grams of aluminum foil. The final product re-weighing process is carried out once a week, that is, every Friday. Analysis of data on the quality testing of the final product of Bumiku Hijau goat milk powder using the $\overline{X}$ and R control charts, where the analysis steps are as follows [16] :

a. Calculating the $\overline{X}$ Control chart

$$\overline{X} = \frac{\sum X}{n}$$

Information:

$\overline{X}$ = average value of recalculating product weight calculation per one re-weighing process

$\sum X$ = the total value of product weight re-weighing data per month

n = the number of repetitions of the product weighing re-weighing process per month

b. Calculating the centerline for computation of final product re-weighing data

$$\acute{X} = \frac{\sum \overline{X}}{n}$$

Information:

$\acute{X}$ = centerline recalculation of final product weight per one re-weighing process

$\sum \overline{X}$ = total average value of each final product reconsideration per month

n = the number of repetitions of the final product weighing process per month

c. Calculating the control limits from the $\overline{X}$ control chart
By using a 3 sigma limit, the control limit for the $\overline{X}$ graph is:
Upper Control Limit = $\acute{X}$+ $A_2\,\overline{R}$
Lower Control Limit = $\acute{X}$ - $A_2\,\overline{R}$
Where $\overline{X}$ is the centerline of the control of $\overline{X}$ chart, A_2 is the control limit factor of the $\overline{X}$ chart controller, and $\overline{R}$ is the centerline of the control chart R.

d. Calculating the R control chart
$\overline{R} = \frac{\sum R}{n}$
Information:
$\overline{R}$ = Centerline of R control chart
$\sum R$ = The total range of data values per one re-weighing process ($R_{max} - R_{min}$)
n = Number of re-weighing processes per month

e. Calculating the control limit of the R control chart using the 3 sigma limit
Upper Control Limit = $\overline{R}$. D_4
Center limit = $\overline{R}$
Lower Control Limit = $\overline{R}$. D_3

f. Assessment criteria in analyzing process capability (only used for $\overline{X}$ and R control chart)
a. If Cp > 1,33, the process capability is very good
b. If 1,00 ≤ Cp ≤ 1,33, then the process capability is in good condition
c. If Cp < 1,00, then the process capability is low, so the performance needs to be improved

In identifying the possible factors causing the failure of the final product quality of goat milk powder in Bumiku Hijau, a causal diagram is used. In determining the possible factors causing the problem of product failure, it will be related to various existing theoretical references, including human factors, production tools, and machines, methods during the production process (method), the raw materials used for the process, production (materials), and work environment factors [17].

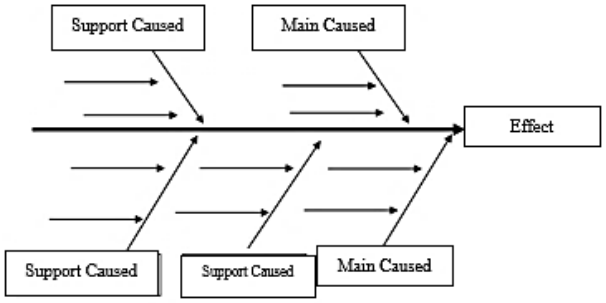

Figure 1. Identify the Dominant Causes of Product Failure with a Cause and Effect Diagram

4. RESULTS AND DISCUSSION

Quality Control of the Final Product

The quality control test on the final product is carried out at the time of re-weighing the product after packaging the aluminium foil. Variable data were measured for analysis using $\overline{X}$ and R-chart, namely in the form of product weight in goat milk powder with original flavor variants, chocolate, and vanilla. Weighing the final product every Friday. At the stage of re-weighing the final product before being packaged in cardboard packaging.

Re-weighing of Chocolate Flavor Variants

In the previous discussion, it has been explained that Bumiku Hijau produces goat milk powder with three flavors, which are chocolate, original, and vanilla. Based on the results of the re-weighing data analysis of the final product of goat milk powder of Bumiku Hijau, chocolate flavor variants using the $\overline{X}$ and R control chart from January to May 2019 are as follows:

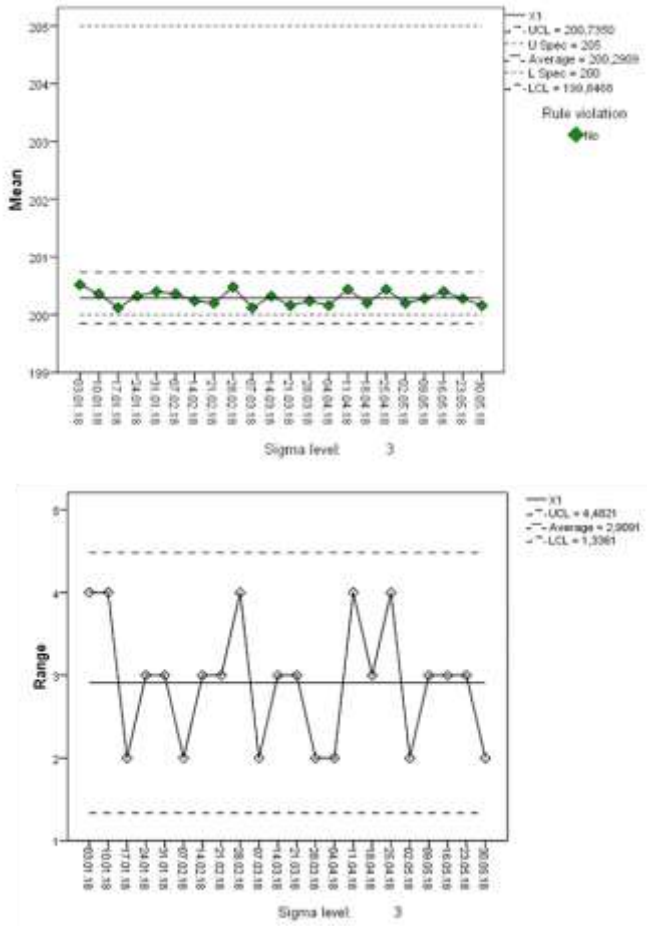

Figure 2. Control chart $\overline{X}$ and R Weighing Final Product of Chocolate Flavor Variants January - May 2019
Source: Primary data processed, 2019

Table 4. Capability index of the re-weighing process of goat milk powder with chocolate flavor variants in January – May 2019

Months	Process Capability Index (CP)
January	0,862
February	0,873
March	1,310
April	1,008
May	1,365
January - May	**1,126**

Source: Primary data processed, 2019

From January to May 2019, there were 22 re-weighing processes of goat milk powder Bumiku Hijau with a chocolate flavor variant, wherein each weighing there were 25 samples. In the graph above, it can be seen that the UCL and LCL values on the $\overline{X}$ control chart are 200.73 and 199.84, with a mean value of 200.29. The UCL and LCL values on the R control chart are 4.48 and 1.33, with a mean value of 2.90. The graph of the $\overline{X}$ and R control chart shows that there are no measurement points that exceed the upper control limit or the lower statistical control limit, thus the whole process of re-weighing the final product of goat milk powder with chocolate flavor from January to May 2019 is within the control limit statistics.

When viewed from the process capability index for each month, it can be seen that in January and February the process capability was in a low condition (0.8 <1.00). According to the information the researchers got from the Head of Processing and Sales of Liquid and Powdered Milk, the low capability index for the two months was due to the inaccuracy of the weighing device owned by Bumiku Hijau, because the condition of the weighing equipment needed to be updated, but it was also caused by inaccuracy of weighers. product, because in those two months the weighing of the product is more often conducted by vocational students who are doing industrial work practice at Bumiku Hijau.

Even though in January and February the process capability index was low, when viewed as a whole from January to February, the process capability index (CP) value was 1.126. Based on the test criteria, because $1.00 \leq Cp\ (1.126) \leq 1.33$, it can be concluded that the capability of the re-weighing process of goat milk powder of Bumiku Hijau in chocolate flavor from January to May is already in good condition.

Re-weighing of Original Flavor Variants of Final Products

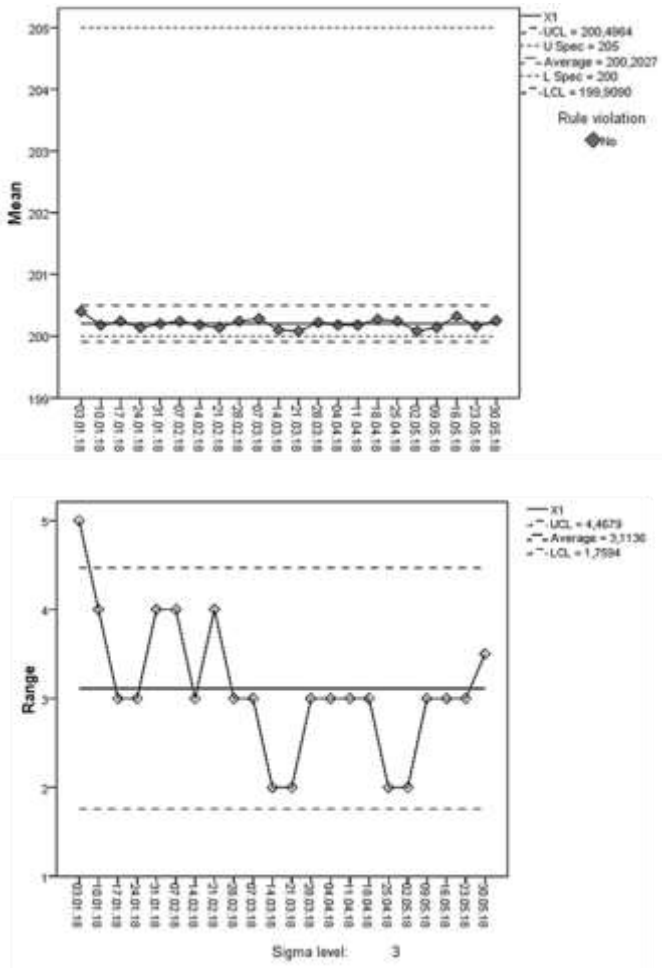

Figure 3. Control chart $\overline{X}$ and R Weighing Original Flavor Variant Final Product January-May 2019
Source: Primary data processed, 2019

Table 5. Capability index of the re-weighing process of goat milk powder with original flavor variants in January-May 2019

Months	Process Capability Index (CP)
January	0,872
February	1,071
March	1,499
April	1,170
May	1,293
January - May	**1,204**

Source: Primary data processed, 2019

It was recorded that there were 22 times the process of re-weighing the original flavor variant of goat milk powder Bumiku Hijau, wherein each weighing there were 75 samples. In the graph above, it can be seen that the UCL and LCL values on the $\overline{X}$ control chart are 200.49 and 199.90, with a mean value of 200.20. The UCL and LCL values on the R control chart are 4.46 and 1.75, with a mean value of 3.11. The $\overline{X}$ control chart graphic image shows that the overall re-weighing process of the original flavor variant powdered goat's milk from January to May 2019 is within statistical control limits, but the R control chart image shows that there is one point that exceeds the upper control limit. statistics (UCL), namely on January 3rd.

When viewed from the process capability index for each month, it can be seen that in January the process capability was in a low condition (0.872 < 1.00). According to the information the researchers got from the Head of Processing and Sales of Liquid and Powdered Milk, the low capability index for the two months was due to the inaccuracy of the weighing device owned by Bumiku Hijau, because the condition of the weighing equipment needed to be updated, but it was also caused by inaccuracy of weighing product because in those two months the weighing of the product is more often done by vocational students who are doing industrial work practice at Bumiku Hijau.

Even though in January and February the process capability index was low, when viewed as a whole from January to May 2019, the process capability index (CP) value was 1.204. Based on the test criteria, because 1.00 ≤ Cp (1.204) ≤ 1.33, it can be concluded

that the capability of the process of re-weighing the original flavor variant of Bumiku Hijau goat milk powder from January to May 2019 is in good condition.

Vanilla Flavor Variant Final Product Re-weighing

The results of the re-weighing data analysis of the final product of goat milk powder Bumiku Hijau with vanilla flavor using the $\overline{X}$ and R control chart from January to May 2019 are as follows:

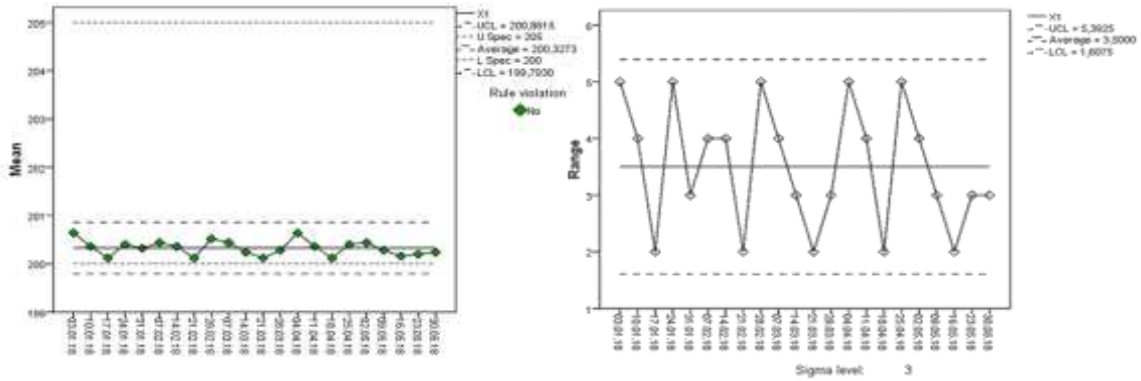

Figure 4. Control chart $\overline{X}$ and R Weighing Final Product Vanilla Flavor in January-May 2019

Table 6. The capability index of the re-weighing process of goat milk powder with vanilla flavor variants in January-May 2019

Month	Process Capability Index (CP)
January	0,862
February	0,936
March	1,170
April	1,363
May	1,170
January - May	**0,936**

Source: Primary data processed, 2019

From January to May 2019, there were 22 re-weighing processes of vanilla-flavored goat milk powder of Bumiku Hijau, wherein each weighing there were 35 samples. In the graph above, it can be seen that the UCL and LCL values on the $\overline{X}$ control chart are 200.86 and 199.79, with a mean value of 200.32. The UCL and LCL values on the R control chart are 5.39 and 1.60, with a mean value of 3.50. The graph of the $\overline{X}$ and R control chart shows that there are no measurement points that exceed the upper control limit or the lower statistical control limit so that the whole process of re-weighing the final product of vanilla-flavored goat milk from January to May 2019 is within the control limit. Statistics.

When viewed from the process capability index for each month, apart from January and February, all process capabilities are in good condition. The result of the overall process capability index from January to May 2019 (CP) was 0.936. Based on the test criteria, because 0.936 > 1.00, it can be concluded that the capability of the process of re-weighing the powdered vanilla-flavored goat milk of Bumiku Hijau from January to May 2019 is already in a low condition.

In line with the previous explanation regarding the reasons why the process capability index was low in January and February 2019, the inaccuracy of the weighing equipment owned by Bumiku Hijau, and the inaccuracy of product weighers that were not on the part of Bumiku Hijau staff itself were the main factors causing the low process capability.

Identification of Causes of Low Process Capability in Final Product Reconsideration in Bumiku Hijau

Based on the information obtained from Bumiku Hijau management regarding the causes of low process capability and variability of the results of re-weighing of goat milk powder for each flavor variant (original, chocolate, and vanilla), the priority of problems and factors causing low process capability and variability of weighing results. The final product of Bumiku Hijau can be organized into a cause-and-effect diagram (fishbone diagram). The preparation of a fishbone chart of the low process capability during the production process is the result of direct field observations and interviews with related parties, including the head of processing and sales of liquid and powder goat milk, and staff of the processing of goat milk powder.

The results of compiling the dominant factors causing variability of the final product weighing back into the cause and effect diagram (fishbone diagram) are presented in the image below:

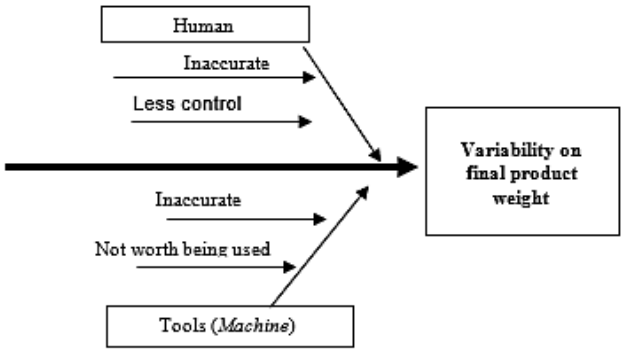

Figure 5. Cause and Effect Diagram of Weight Variability of the Final Product of Goat Milk Powder of Bumiku Hijau
Source: Primary data processed, 2019

The re-weighing variability of the final product is caused by 2 main factors, which are human factors and machine factors.

a. From the human factor (man), it is caused by a lack of accuracy when reconsidering the weight of the final product. Based on information obtained from Bumiku Hijau, the cause of the low capability of the final product weighing re-weighing process that occurred in January and February was because in that month the weighing process was more often carrie out by vocational students who at that time carried out Industrial Work Practices at Bumiku Hijau. Observers' inaccuracy and lack of supervision from the staff of the goat milk powder processing section at Bumiku Hijau are the main causes of variability in the re-weighing of the final product.

b. According to the machine factor, the condition of the weighing equipment owned by Bumiku Hijau needs to be recalibrated, or a tool update should be held. Product weighers that have not been calibrated for a long time can result in inaccuracies in the weighing results so that it affects the low process capability when re-weighing the final product.

5. CONCLUSION

Overall, from twenty-two observation points, the re-weighing process of goat milk powder for each flavor variant was under statistical control. In re-weighing the final product, the dominant factor causing the variability of the weight of the final product in Bumiku Hijau is due to human factors (weighers), and machine. In increasing the capability of the low-end product reconsideration process, the management of Bumiku Hijau needs to carry out evaluations in the form of direction, training, and guidance regarding procedures or ways to minimize the variability of the final product weight.

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