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Editorial:
10th Issue – Journal of Electronic Systems and Programming

We are delighted to announce the publication of the 10th issue of the Journal of Electronic Systems and Programming (JESP).

Numerous numbers of original submissions have received, all of which have gone through a rigorous review process. The accepted articles have been published in 10th issue.

In this issue, we are pleased to report that JESP is recognized as the one of the useful journals for dissemination of high-quality research within the Libyan academic community.

Finally, we thank our reviewers and authors for their fundamental contribution to the 10th release of the Journal. We still hope authors could consider JESP to be a place where to publish their work.

Editorial Board

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The Intelligence System for Wheelchair Control

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The Intelligence System for Wheelchair Control

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Abstract

The electroencephalogram (EEG), a smart wheelchair control system designed to help the elderly and disabled, is presented in this research. To prevent the wheelchair from malfunctioning or moving on its own, the system consists of a NeuroSky Mind Wave EEG sensor coil that is paired with Android and connected to a voice interrupt circuit. The HC-05 Bluetooth Device control device is used to couple the Android smartphone with the Arduino Uno. The connections between the Android EEG sensor and the Arduino board are via Bluetooth, which provides a low consumption and portable electric chair solution. Allows the system to allow on and off Wheelchair drives to use flash and attention levels. Electroencephalogram was tested, and the results were in good agreement with the matter. Operating modes can

implementation of this system developed easily to help this category of society so that they can enjoy it.

Keywords: NeuroSky Mind Wave; EEG; relay; L298N Motor Driver; Microcontroller.

1. Introduction

Roughly 15% of people worldwide live with a handicap, according to the World Health Organization [1]. These conditions include cerebral palsy, multiple sclerosis, brainstem stroke, amyotrophic lateral sclerosis, myasthenia gravis, and damage to the brain or spinal cord [2]. Paralyzed people face many difficulties in their daily lives, it is difficult for them to make use of motor neurons to control muscles. People with motor disabilities can sometimes be so stiff they can't speak as well as they want to. They need the help of others to perform daily activities. Patients who are completely paralyzed may need someone to help control a wheelchair. In the past, many technologies were made ready for disabled people to interact with physical devices, brine wave controller (BWC), Anger gestures and a voice-controlled wheelchair are recognized. [5] That, most of them rely on muscles, body movements, or speech commands. These cases are people who suffer from certain diseases. Developments in neural communication. [6] Using BCI technology Depending on the.

points of waves from the user's brain or by the cortex is the brain's outer layer, that produces an electroencephalogram, or EEG. Real-time electroencephalography (qEEG) can provide information on brain function in medical settings by displaying electrically active regions of the brain [10] at the Peak Performance Institute. These devices record an individual's brain wave activity (EEG) while they perform daily tasks like reading, arithmetic problems, or relaxation. The process of making a brain map with qEEG A qEEG brain map is a device that uses electrodes woven into a cap to track brain activity

while you remain motionless as shown in Figure 1, A certified doctor reviews the test findings after they have been completed with both eyes open and closed and compared to a neutral baseline [10].
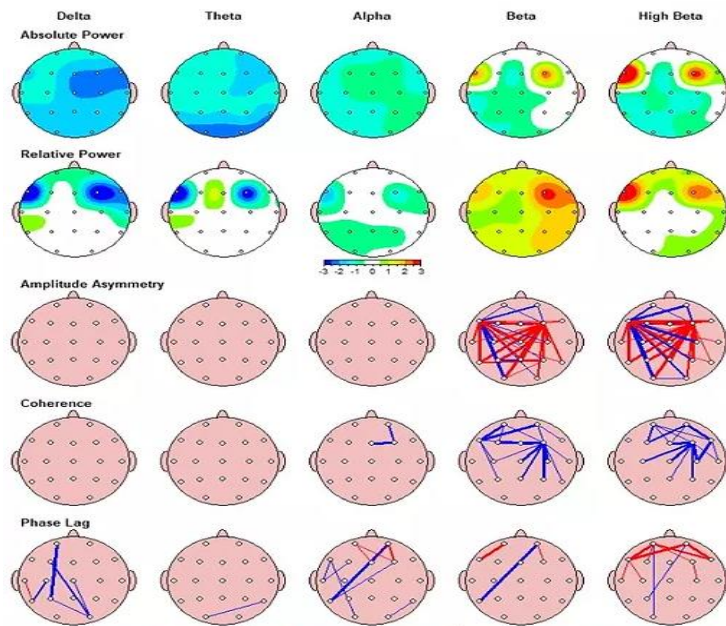
Figure 1: QEEG brain map

In this paper we used all these waves (any waves) to converts to operations usual to complete all need from user we will makes to user a wheelchair controlled by human waves using BCI technology. Arduino Mega (Unio) was selected [7] that will capture the wave of the human brain using a neural head [8]. Previous techniques, commerce, and we will also incorporate immediate guidance to stop the wheelchair as software interrupt but using circuit Voice Recognition. The time duration for each microcontroller selection should be less than 1 second. In terms of simplicity. Section 2 present of system components, Section 3 present of theory and design, Section

4 display simulation results، while Section 5 present conclusion, and section 6 future work.

2. SYSTEM COMPONENTS

2.1 Neuro Sky Mind Wave headset

The headset's low total weight of approximately 90 g, powered by a single 1.5 dc volt battery, makes it ideal for a range of remote and portable applications as well as wireless biomedical applications [3–4]. With a sampling rate of 512 Hz, the headset's dry sensor captures 12-bit raw brainwaves between 3 and 100 Hz. The Think Gear chip integrated within the headset facilitates the processing and filtering of brainwaves obtained from the sensor, as well as Bluetooth device   as illustrated the in Figure 2.

Figure 2: Neuro Sky Mind Wave headset

connectivity. By detecting the electrical potential between the electrode applied to the forehead and the reference point (ear clip), sensing is accomplished. The Neuro Sky EEG programmed can

process signals to determine the power spectrum density of seven different frequency bands: alpha, theta, delta, low beta, middle beta, high beta, and gamma. As seen in Table -1 and Figure 3, the amplitude of these bands varies in response to both internal and exterior stimuli.

Table 1: Details wave

Frequency band	Frequency	Brain states
Gamma (γ)	& gt;35 Hz	Concentration
Beta (β)	12–35 Hz	Anxiety dominant, active, external attention, enjoy
Alpha (α)	8–12 Hz	Very relaxed, passive attention
Theta (θ)	4–8 Hz	Deeply relaxed, inward focused
Delta (δ)	0.5–4 Hz	Sleep
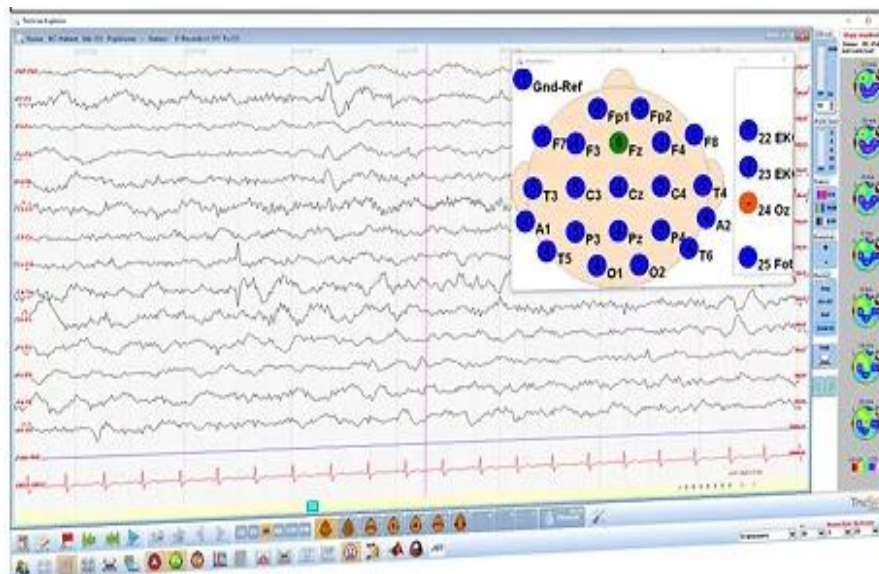
Figure 3: Brain activity

The electrical voltages in the brain that oscillate during brain waves are only a few millionths of a volt. The primary frequencies of human EEG waves correspond to five commonly identified brain waves as shown in the Figure 4.
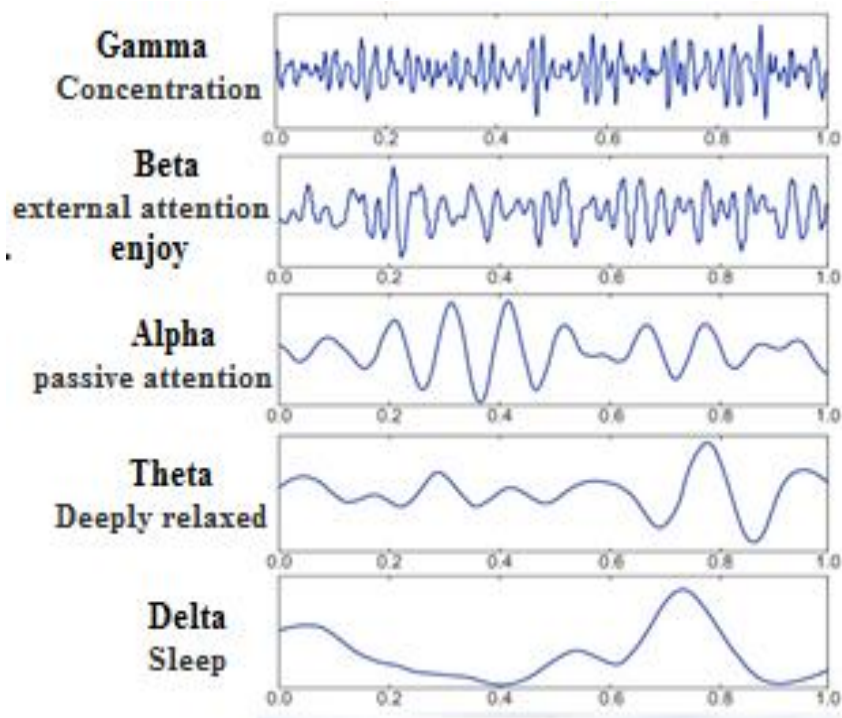
Figure 4: Waves Neuro Sky

2.2 Microcontroller (Arduino).

In comparison to other microcontrollers, this electronic circuit serves as a miniature computer that can interact with and control its surroundings, as illustrated the in Figure 5.

Figure 5: Arduino UNO

The Arduino UNOs bigger sibling is the Arduino Mega. It has sixteen analogue inputs. fifty – four digital input /output pins, a USB port, a power connector, and a reset button as shown in the Figure 6. Everything you need to get started with the microcontroller is included; all you have to do is hook it into a computer via USB or Power it is using a battery or an AC – to -DC convertor Because of its massive pin count, this board is perfect for applications requiring a lot of digital inputs or outputs (like a lot of LEDs or buttons) a

Figure 6: Arduino Mega

2.2 Bipolar Digital Integrated Circuit ULN2803

For the entire feed to be received, the ULN2803 connects the ground line to the relay upon receiving a signal from the Arduino Figure 7. Display this kind of circuit.
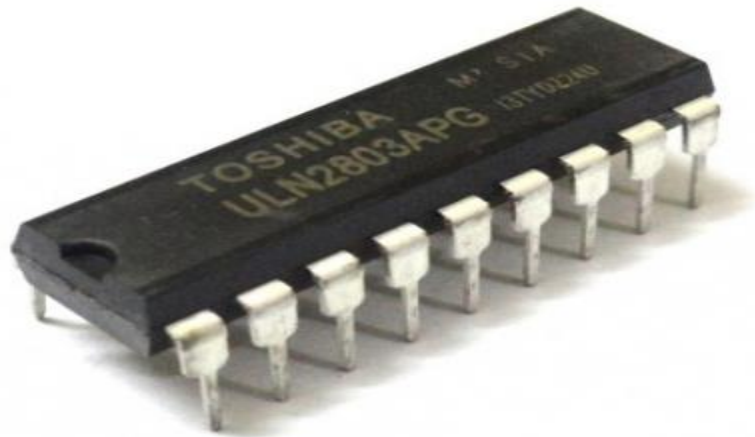
Figure 7: ULN2803 piece full of transistor

Uln2803 this has Eight darling tons with common emitters make up ULN2803. Each Darlington can handle up to 500 mA of load current. A 50V output voltage is possible with this chip. To keep the circuit simple, inputs and outputs are pinned opposite one other. For a larger current rating, the output pins can be paralleled Figure 8 shows that .
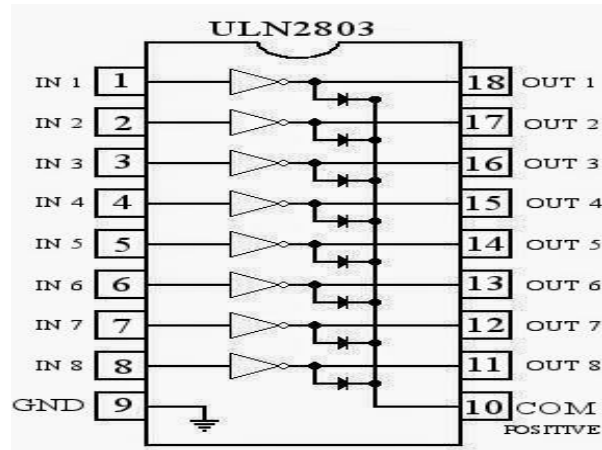
Figure 8: ULN2803 circuit

2.3 L298N Motor Driver

The controller shown in Figure 9 makes it easy to control the direction and speed of up to two DC motors using an H-Bridge.
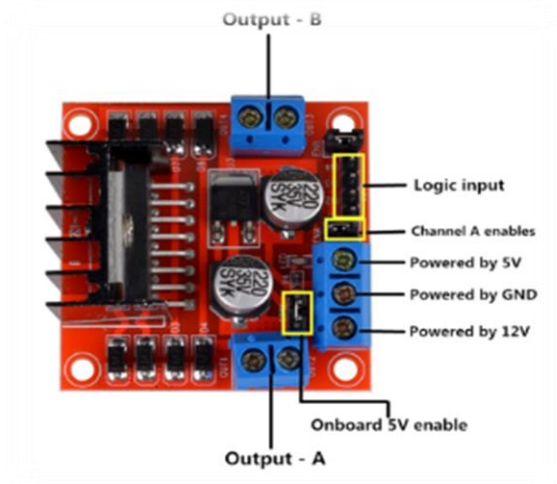
Figure 9: L298N Motor Driver

A DC motor can be made to run at a different speed by adjusting its input voltage. Pulse Width Modulation (PWM) is a commonly used technique to achieve this. The Figure 10 shows PWM involves sending out a series of ON-OFF pulses to modify the average voltage of an input voltage. Duty Cycle, which is proportional to the pulse width, calculates the average voltage. When the duty cycle grows, the average voltage applied to the DC motor (High Speed) increases, while when the duty cycle lowers, the average voltage applied to the DC motor (Low Speed) decreases.
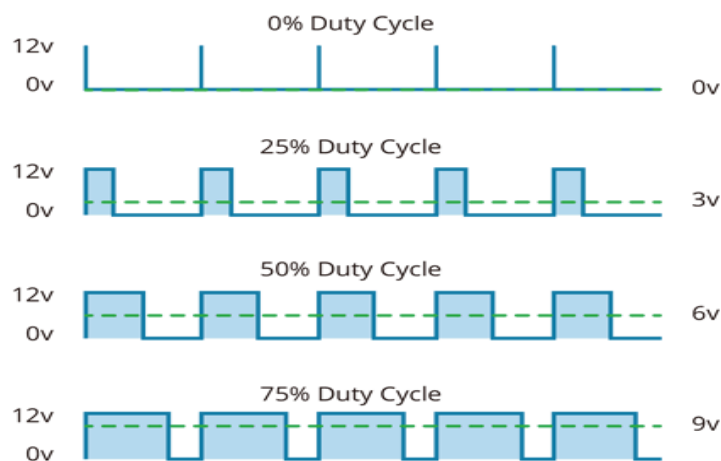
Figure 10: Pulse-width modulation

2.4 HC-05 Bluetooth Module

The HC-05 module uses the Serial Communication protocol to communicate with the Arduino because it is a Bluetooth SPP (Serial Port Protocol) module   Its appearance is shown in Figure 11.
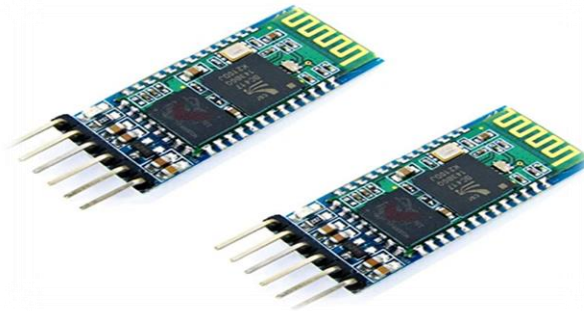
Figure 11. HC-05 Bluetooth

Bluetooth serial modules enable wireless communication between all serial-enabled devices. The Bluetooth module can be switched to the AT commands mode with this instruction. If the Key/EN pin is set to high, this module will operate in command mode; otherwise, data mode is the default. The HC-05's default baud rate in data mode is 9600bps, while in command mode it is 38400bps., 9600bps is the speed. On the HC-05 module, there are two modes. Data transmission between devices is the first mode, while command mode is the second. The HC-05's parameters can be changed with AT commands. These commands are delivered via the module serial (USART) port, Command Mode,If we would like to modify the baud rate, name of the Bluetooth device, connection password, or any other configuration for the HC-05 Bluetooth module,HC-05 contains AT instructions to accomplish this.The default baud rate of the HC-05 Bluetooth module in command mode is 38400bps. The following AT commands is commonly used to modify the settings of the Bluetooth module, as shown in Table- 4. To utilize the HC-05 Bluetooth module in AT command mode, connect the "Key" pin to High (VCC). To send these orders, we must use a serial to USB converter to link the HC-05 Bluetooth module to the PC and then broadcast the commands using the PC's serial interface. The

interface between the Bluetooth and Brine Wave sensor is controlled by all commands.

Table 2: Command Mode

Command	Description	Response
AT	Checking communication	Ok
AT+PSWD =XXXX	Set Password e.g.AT e.g.AT + PSWD= 4567	OK
AT +NAME =XXXX	Set Bluetooth Device Name e.g.AT+ Name = MyHC -05	OK
AT + UART=Baud rate, Stop bit, parity bit	Change Baud rate e.g.AT+ UART=9600,1,0	Ok
AT + VERSION?	Respond version no. of Bluetooth module	Version: xx ok e.g +version :2.0 20130107 OK
AT +ORGL	send detail of setting done by Manufacturer	Parameters: device type, module mode, serial parameter, passkey, etc.

2.6 voice recognition

The ability of a machine or programmed to receive and interpret spoken commands or to comprehend and execute dictation is known as voice or speaker recognition, as shown in Figure 12.

Figure 12: Voice recognition

The Speak (Voice) Recognition Module V3 product is a voice recognition module that is dependent on the speaker. It is a compact

and easy-to-use speech recognition board for Arduino. It can handle a maximum of 80 voice commands overall. A maximum of seven voice commands might be in use at once. It is possible to script any sound to function as an order. Users must first teach the module to recognize any spoken command. This board can be controlled using the Serial Port (full function) or the General Input Pins (part of a function). When the corresponding voice command was acknowledged, a range of waves might be generated via the board's General Output Pins.

3. Theory and design

The components of the approved system will be assembled, so that at the forefront of the system will be the voice gate that will act as the interrupt commands of the system that we been entered words stop as well as the voice clapping hand for once and more than once All of these inputs are processed by microcontroller within the system as executive orders So that a signal is sent to the processor output to which the relay, which has the role of turning off and turning on to the system ,This is one of the advantages of this system in order to avoid making a mistake resulting from the sudden change of waves emanating from the user's brain, which in turn will give random movements or functions to the wheelchair, but after controlling to stop the system by sound and with several audio inputs, we will excellently overcome the obstacle to changing the waves, after that we will contacted the hc-05 Bluetooth with micro controller and contacted the Transmitter and receiver pins, next we Mack protocol remotely between the hc-05 and the mind wave, nyorske.

After the explained a head of the headset that picks up brain waves from user , then we constanted waves operation ,beta wave (β) Activated this wave when makes the user appear at the beginning or think or think negatively in the sense of fear, This means for a system as Command To send a signal to the relay by using the L298N Motor Driver for the purpose of connecting the power supply to motor No.

1 to operate it to movement the wheelchair to right and Alpha wave (α)   Active this wave in user brain when he makes himself or his senses enjoying So happy until the smile appears on the face, This means for a system as Command To send a signal to the relay by using the L298N Motor Driver for the purpose of connecting the power supply to motor No. 2 to operate it that means movement the wheelchair to left, Theta (θ)- Active this wave in user brain when he makes himself or his senses in a way that indicates relaxation and reassurance, This means for a system as Command To send a signal to the relay by using the L298N Motors Driver for the purpose of connecting the power supply to motor No. 1 and 2 to operate it that means movement the wheelchair to forward , Delta wave (δ)- Active this wave in user brain when he makes himself or his senses in a sleepy, This means for a system as Command To stop sending any signal to Motors Driver m this case turning off system , The following Figure 13 shows the block diagram of the system and Figure 14 display mechanism of communication between the user's mind and the system .
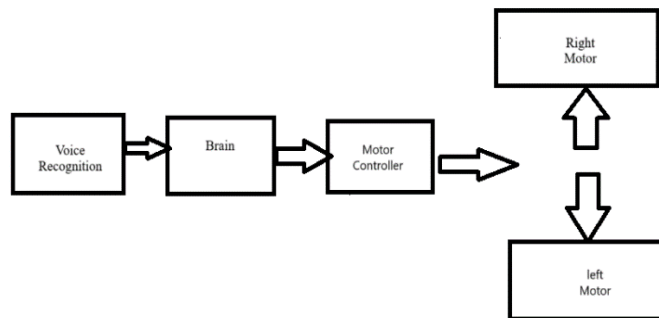
Figure 13: Block diagram of the system
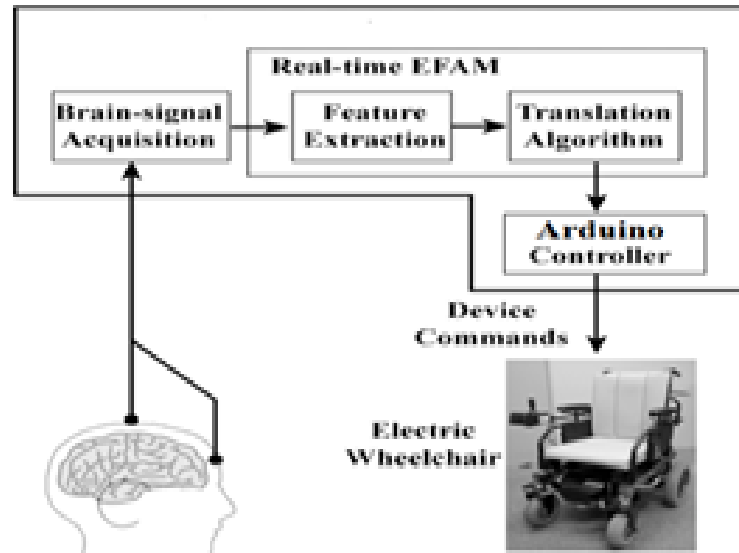
Figure 14: Mechanism of communication

4. Simulation Results

Electronic electrical workshops usually verify the functioning of any electrical circuit to ensure the circuit's performance for the function specified for her to obtain. Matching findings in order to establish a link between them. The proteus program, which is one of the most well-known research projects in the subject of control engineering, has an electronic library that contains most of the electronic parts required by the designer. The pieces are chosen and then connected to the microcontroller, with the accuracy of the connection to the concerned parties whose tasks are determined during programming, and this software allows users to write and compile programs, with the programs compiled in micro-Basic being directly uploaded into the Proteus design suite's microcontroller chip. As a result, the So, the

microcontroller-based circuit analysis is easy and simple in Proteus [9]. with EEG sensor is used to control the wheelchair, as illustrator in the Figure 15.
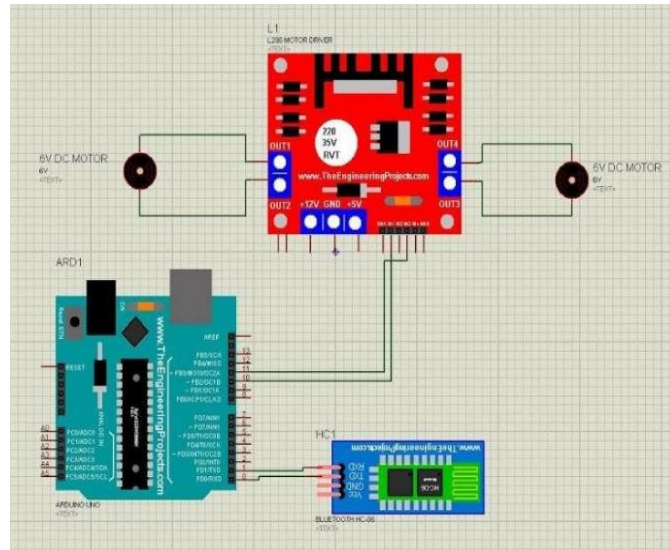
Figure 15: Proteus simulation

The data in Figure 16 was received from the system on the Arduino programming window. This data represents variables generated when converting waves in real-time. The microcontroller processes these waves using analog-to-digital conversion technology and then sends the converted data to the specified outputs in the code, according to the format required by the underlying hardware of the wheelchair.
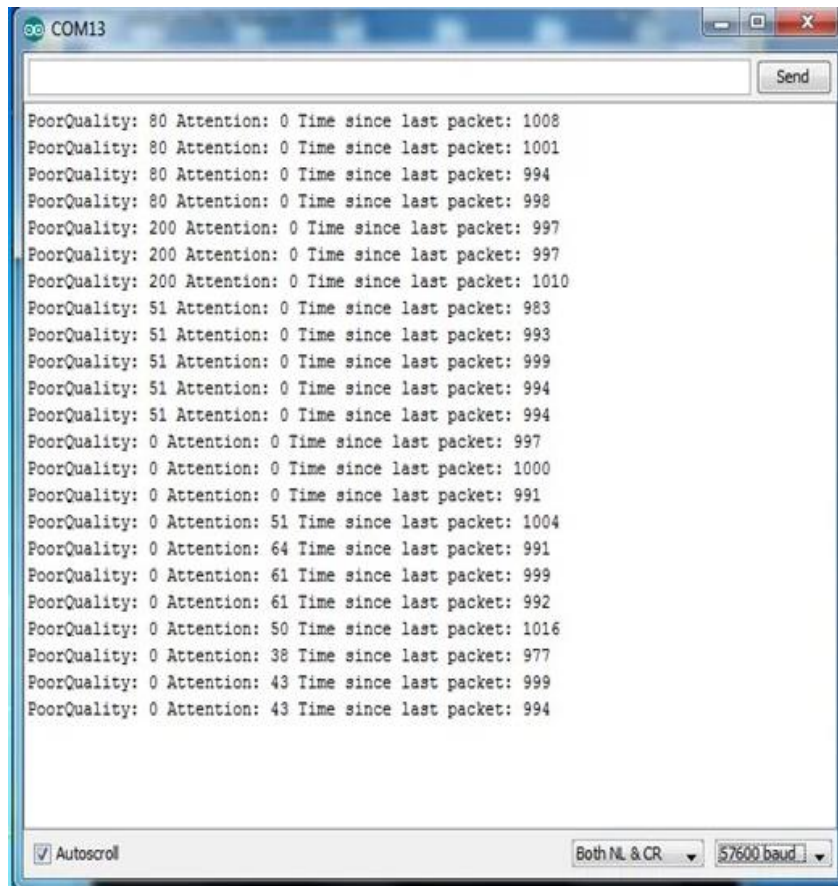
Figure 14: Data received

5. Conclusions

The designed intelligence wheelchair system aims to help people of determination overcome obstacles caused by a disability, whether it is a partial or complete disability, interact with society comfortably, and serve themselves without the need for the assistance of others. One of the advantages of this system is that it is cheap and easy to use in practical life. This system will be developed in the future to include

several other functions to overcome all the obstacles facing the disabled with the help of technology and to interact with the surrounding environment as if there is not disability.

6. Future Work

Since using brain waves is currently one of the most effective ways to help individuals with disabilities meet their needs independently, encryption and filtering algorithms can be employed to refine these waves with programming commands that cover various functions. Consequently, these controllers can also be utilized for home automation, allowing control over most household electrical devices, similar to a smart home model.

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A Review on The Effect of Project Management Tools on Increasing the Productivity of Product

2

A Review on The Effect of Project Management Tools on Increasing the Productivity of Product

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ABSTRACT

This review paper describes the relationship between the use of project management tools and product productivity. More precisely, it explains the important role that project management plays in improving the productivity of industrial products. The latest research on the topic and more effective ways to conduct project management to achieve product-related organizational goals are briefly presented. It is then suggested that the generic project management block diagram can be applied to any type of industry to improve the productivity of the product. Emphasizing self-management and incorporating multiple project management team roles in manufacturing processes, along with effective project planning, scheduling, and controlling, are essential elements for achieving project success and product quality. By adopting clear objectives,

proper resource allocations, and continuous improvement strategies, organizations can significantly enhance overall productivity and respond adaptively to customer demands, ultimately contributing to sustained success and competitiveness.

Keywords: Project Management tools, Quality, increase productivity, the product.

1. INTRODUCTION

Project management history is said to be known for ages. It`s said through Craig B. Smith in his book "How the Great Pyramid became constructed" that the first rate pyramid of Giza could now no longer had been constructed without a few shape of assignment management. Even to the extent that a WBS more likely was used [1]. Project management has emerged as an essential tool to improve the management effectively for all types of organizations, manage successful projects providing a vision and techniques which can be improved and workflow redesign to make it more efficient and adaptable to the needs of customers. Project management is a structured methodology that can be used in all industries regardless of service or product it's designed to deliver. Project management has a remarkable value beyond its basic application across industries. When project management is implemented effectively, it increases the success of the intended delivered product or service.

The most important thing of the product is that product contact with customer satisfaction directly. This reason makes the increasing of the

productivity of product very sensitive. Usually, the producing enterprise drew advantages from validated manufacturing control techniques so they invest a lot of money in this field research. Improvement productivity needs from us to know the factors that influence productivity and looking for proper ways and techniques for each firm. These techniques and elements can be divided to industry-level, company-level, and challenge level. In our review, it will show and focuses on the company level and project management level. For example, In Canada exactly in 1994 there was a study shows, planning and scheduling consider it as the first factor that drive the productivity in the waste water treatment plant field [2].

The Methodology of this study mainly depends on secondary data collection sources.

The prime objective of this paper is to review literature and case studies related to the relationship between the project management and productivity of the product. This study will help us to explore the techniques in the project management that affect the productivity of product at industry.

2. Materials and Method

Most of the studies in this field depend on the quantitative method for collecting data and analyzed it. Some of these studies were used a computer program to get the results such SPSS program (Statistical Package for the Social Sciences). Some of them were used time series to show the effect of the factor within two different period of time.

The comparison between project management models was applied. Whatever the way was used in these studies. The clear picture about the relationship between project management tools and productivity of the product is being provided by the results from these methods that we are focusing on.

3. Literature Review

3.1 Techniques and factors to increase the productivity of the product

Since the industry revolution, increasing the productivity considered as main element which can play an important part to the countries' economy. There are very important factors to improve industrial competitiveness and productivity of product such as to broaden techniques round product design, making use of the idea of excellence in all its degrees and focusing in innovation field.

There is study regard to this issue published in 2013. This study aims to show process of product design is an important part to put the criteria of the excellence of product to meet the demands of customers in the global competitive markets. The methodology of this study is comparison study between European regulatory paradigms on the design of products, standard BS 7000-2: 2008 with models predictive of project management, mainly international PMBOK (Project Management Body of knowledge) guide and the model developed in Europe, PRINCE2. This comparison will create integrated vision for all level of process in project management. The main contribution of

this study is taken the benefit of each model it will enhance the product design. From this study it was found that the PMBOK manual describes uniquely venture control approaches that make sure that the venture progresses successfully for the duration of its existence, which includes those approaches, the gear and strategies worried with inside the utility of abilities and skills which might be defined with inside the regions of knowledge. The British Standard BS 7000-2: 2008 offers a predictive technique for venture control with an excessive diploma of similarity to the PMBOK manual, with reference to the outline of the venture control approaches, figuring out each the approaches which have been identified as top exercise for almost all of projects. This does now no longer imply that the defined approaches have to usually be implemented uniformly on all projects, the venture supervisor and his crew may be answerable for figuring out what approaches are appropriate and what diploma of accuracy suitable for every process. However, the PRINCE2 version enables a sequence of approaches that designate what have to manifest and while with inside the venture in order that any venture guided via way of means of this approach ought to contain those approaches in a way, however greater importantly, is to regulate the version approaches to the necessities of that unique venture you're working.

A PRINCE2 project is planned, monitored and controlled phase to phase, is focused on the definition and delivery of products, in particular its quality requirements, processes diverge widely . Moreover, from this study it can be concluded that the utility of

undertaking control procedures will increase the possibilities of fulfillment of a huge form of projects. It is recommended to make a comparative evaluation of undertaking-stage control of a number of the predictive fashions used for undertaking control, with European guidelines for dealing with the layout of synthetic products. In technologically extra superior countries, technical productiveness improvements which mark the variations among organizations belonging to numerous monetary sectors presently are associated with enterprise of work. In this regard, continuous process improvement has evolved into a new integrated management approach. Total management system by processes as illustrated in Figure 1 shows the main difference between PMBOK process and PRINCE2 phase process. The main income knowledge was taken from this study how to take the benefit of different standardized model to increase the productivity of product [3].

Figure 1. Compare between (a) PRINCE2 and (b) PMBOK.

A strength of PRINCE2 is its detailed and wide-ranging description of multiple project management team roles. Whereas in the PMBOK

Guide the emphasis is mainly on what the project manager does, in PRINCE2 there is a whole appendix providing detailed descriptions of the responsibilities for seven distinct project management team roles.

Table 1: Different roles between Compare between (a) PRINCE2 and (b) PMBOK

PRINCE2 project management team roles	PMBOK Guide equivalent
executive	project sponsor
senior user	no equivalent
senior supplier	no equivalent
project assurance	no equivalent
project manager	project manager
team manager	no equivalent
no equivalent	change control board (CCB)

According to a study published in 2020, The primary objective of any manufacturing entity is the attainment of customer satisfaction, which can be realized through the provision of high-quality products, delivered punctually, and offered at a competitive price point. Any organization, whether engaged in manufacturing or providing services, will thrive and maintain its competitive edge if it possesses the requisite flexibility to adaptively and systematically respond to customer demands, thereby enhancing the value of its offerings. The costs associated with equipment, materials, and labor are subject to inflationary pressures, which serve as critical factors influencing the pricing of products. Inefficient use of equipment, materials, and labor results in direct financial losses. Therefore, it is imperative to

prioritize the optimal utilization of these key factors, followed by efforts to minimize waste in manufacturing processes. Lean manufacturing practices have become essential across various sectors, including automotive, electronics, plastics, textiles, food, dairy, foundry, stamping, and maintenance. The advantages noted following the adoption of individual or integrated lean manufacturing techniques include a decrease in cycle time, the removal of non-value-adding activities, and the establishment of a clean, organized, and sanitary work environment. Additionally, these techniques facilitate a seamless production flow, enhance productivity, lower production costs, promote employee engagement, ensure proper order documentation, decrease inventory levels, and improve both intra- and inter-departmental connectivity for expedited decision-making and rapid responses. This review examines various manufacturing sectors to assess the impact of implemented lean manufacturing techniques on process improvement and waste reduction [4].

Figure 2. Lean Manufacturing Tool [4].

Another study published in 2012 talks has the title "Significance of depth of inspection and inspection performance metrics for consistent defect management in the software industry". It talks about how the production of high-quality software can improve the productivity of products through an effective defect management system. This study focuses on how inspection and testing which are parts of the defect management system play an important role in increasing the quality of the production line then it will increase the productivity of the product as well. This study provides a case study involving empirical analysis of projects from a leading product-based software industry. The study strongly indicates the need for awareness and use of quality

measurement of processes and people in realizing effective defect management. Moreover, this study explains how to implement high-quality software by using process metrics, inspection performance metrics, and quality metrics for development more supplement the quality and productivity in the process line. This software will be able to reduce the expensive rework time, cost, and rebinding of resources. This study takes the silicon market as a case study for this implementation because it is considered highly competitive in modern days. This study suggests that software organizations can improve their quality within estimated cost and schedule with a good understanding of effort distribution of quality assurance activities such as reviews, process audits, and testing which lead to process improvement. In addition, this study shows the effect of the skill level or experience of the participants has to be one of the important project factors, that can influence the productivity of the product. Since effective defect management is one of the successful paths to producing high-quality software, the industry follows several defect management strategies to address defect-associated issues. They primarily include defect detection and defect prevention strategies. Defect detection and prevention aims to provide quality software that reduces the cost and time to fix a defect, increases productivity, and enables to achieve total customer satisfaction.

This study shows that high-quality a product is the only method for achieving customer satisfaction. Implementation of quality metrics therefore reflects continual process improvement of the company and

enhances their productivity. The application of pair metrics as an effective defect management tactic is a potential hope for saving a billion dollars across the industries by annulling expensive defect-associated rework in the projects. This approach provides an opportunity for the business houses who outsource work to software factories, to have a firm grip on the quality of the inspection process and save inadvertent cost escalation, usually arising out of test forecast failure, and increase productivity as well [5].

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implemented by this study, productivity could be associated with modifications in material inputs, changes in the design of the operating process, improvements in control systems, and alterations in the design of products. This study shows if the firm was working close to capacity, increases in the number of projects would be expected to decrease productivity. Although there are problems that might be anticipated in using the methodology, it is asserted that managers of multi-project firms would be better at trying it. At the very least, it reflects on the productivity of major inputs and the project mix of the firm [6].

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products or services. It concluded that members have to become personally responsible for adequately representing and integrating their technical contributions into the final product [7].

3.2 Project management in the manufacturing field

When applying project management practices, tools, and techniques to the manufacturing process, it can ensure that the time to market is efficient and the quality standards are met. Project management techniques such as scheduling, planning, risk management, quality assurance, quality management, and quality control are essential to achieve these factors.

There are three phases of project management that are considered while managing projects which are planning, scheduling, and controlling. Below is a brief review of each element [8].

3.2.1 Project Planning

Project planning comes at the initial and early stages of manufacturing of software development. Project planning also includes planning, organizing, directing, and controlling project tasks and activities. There are many signs of unplanned projects. Two of these indicators are financial loss and project delay [9].

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The engineers, project managers, team players, and software developers all play an important role adhere the project schedule and meeting the obligation of completing the product according to the designated timelines. The project might be delayed as a risk if not adhere to the schedule which would cause project completion interruption and financial loss. [9].

3.2.3 Project Controlling:

Project controlling is a very important phase of project management to allocate resources, budget, equipment, and time into a time frame to achieve the project's objectives without compromising the performance and outcome [10]. Project controlling involves project objectives control, design control, budgeting, cost control, authority and approving control as well as financing control and control costs [11]. Hence, in short, no project can be successful without clearly defined objectives, and proper allocations are made for the essential resources, and material or equipment.

There is a direct effect of the incident of result process administration and control of product quality from the outlook of the study sample at the Libyan Iron and Steel Company in Misrata, and mathematical reasoning habitual this friendship. This result reveals the consideration of the Libyan Iron and Steel Company - Misrata in the constant happening of administration of result processes during the whole of the Diversified stages of production, at the time of the discovery and

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4. Discussion

It can be concluded from this review that a clear relationship exists between the productivity of the product and the project management tools and techniques. That means if any organization prepares the best approach to scheduling, planning, controlling, and project management overall, it will reach better productivity. On the other hand, if the organization enhances the productivity of a specific company or field restricted by the quality of the manufacturing process it will increase the whole system productivity which is the requirement for any organization or plant. After this literature review, a general project management framework (including techniques and factors) that can be applied to any industry to increase productivity is ended with. The relationship between project management and the productivity of a

product with consideration of time value can be summarized by the block diagram below:

Figure 2. The relationship between project management and productivity of product

5. Conclusion

This review paper shows the strong relationship between the project management tool and the productivity of the product. The result block

diagram from this review paper shows increasing productivity must have some steps, tools, techniques, and considerations from each organization. Therefore increase productivity any firm needs to look at recent techniques and considerations such as cost consideration, self-management technique, and a model of processing design and make the organization work as a multi-project organization.

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A Review on The Effect of Project Management Tools on Increasing the Productivity of Product

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ABSTRACT

This review paper describes the relationship between the use of project management tools and product productivity. More precisely, it explains the important role that project management plays in improving the productivity of industrial products. The latest research on the topic and more effective ways to conduct project management to achieve product-related organizational goals are briefly presented. It is then suggested that the generic project management block diagram can be applied to any type of industry to improve the productivity of the product. Emphasizing self-management and incorporating multiple project management team roles in manufacturing processes, along with effective project planning, scheduling, and controlling, are essential elements for achieving project success and product quality. By adopting clear objectives,

proper resource allocations, and continuous improvement strategies, organizations can significantly enhance overall productivity and respond adaptively to customer demands, ultimately contributing to sustained success and competitiveness.

Keywords: Project Management tools, Quality, increase productivity, the product.

1. INTRODUCTION

Project management history is said to be known for ages. It`s said through Craig B. Smith in his book "How the Great Pyramid became constructed" that the first rate pyramid of Giza could now no longer had been constructed without a few shape of assignment management. Even to the extent that a WBS more likely was used [1]. Project management has emerged as an essential tool to improve the management effectively for all types of organizations, manage successful projects providing a vision and techniques which can be improved and workflow redesign to make it more efficient and adaptable to the needs of customers. Project management is a structured methodology that can be used in all industries regardless of service or product it's designed to deliver. Project management has a remarkable value beyond its basic application across industries. When project management is implemented effectively, it increases the success of the intended delivered product or service.

The most important thing of the product is that product contact with customer satisfaction directly. This reason makes the increasing of the

productivity of product very sensitive. Usually, the producing enterprise drew advantages from validated manufacturing control techniques so they invest a lot of money in this field research. Improvement productivity needs from us to know the factors that influence productivity and looking for proper ways and techniques for each firm. These techniques and elements can be divided to industry-level, company-level, and challenge level. In our review, it will show and focuses on the company level and project management level. For example, In Canada exactly in 1994 there was a study shows, planning and scheduling consider it as the first factor that drive the productivity in the waste water treatment plant field [2].

The Methodology of this study mainly depends on secondary data collection sources.

The prime objective of this paper is to review literature and case studies related to the relationship between the project management and productivity of the product. This study will help us to explore the techniques in the project management that affect the productivity of product at industry.

2. Materials and Method

Most of the studies in this field depend on the quantitative method for collecting data and analyzed it. Some of these studies were used a computer program to get the results such SPSS program (Statistical Package for the Social Sciences). Some of them were used time series to show the effect of the factor within two different period of time.

The comparison between project management models was applied. Whatever the way was used in these studies. The clear picture about the relationship between project management tools and productivity of the product is being provided by the results from these methods that we are focusing on.

3. Literature Review

3.1 Techniques and factors to increase the productivity of the product

Since the industry revolution, increasing the productivity considered as main element which can play an important part to the countries' economy. There are very important factors to improve industrial competitiveness and productivity of product such as to broaden techniques round product design, making use of the idea of excellence in all its degrees and focusing in innovation field.

There is study regard to this issue published in 2013. This study aims to show process of product design is an important part to put the criteria of the excellence of product to meet the demands of customers in the global competitive markets. The methodology of this study is comparison study between European regulatory paradigms on the design of products, standard BS 7000-2: 2008 with models predictive of project management, mainly international PMBOK (Project Management Body of knowledge) guide and the model developed in Europe, PRINCE2. This comparison will create integrated vision for all level of process in project management. The main contribution of

this study is taken the benefit of each model it will enhance the product design. From this study it was found that the PMBOK manual describes uniquely venture control approaches that make sure that the venture progresses successfully for the duration of its existence, which includes those approaches, the gear and strategies worried with inside the utility of abilities and skills which might be defined with inside the regions of knowledge. The British Standard BS 7000-2: 2008 offers a predictive technique for venture control with an excessive diploma of similarity to the PMBOK manual, with reference to the outline of the venture control approaches, figuring out each the approaches which have been identified as top exercise for almost all of projects. This does now no longer imply that the defined approaches have to usually be implemented uniformly on all projects, the venture supervisor and his crew may be answerable for figuring out what approaches are appropriate and what diploma of accuracy suitable for every process. However, the PRINCE2 version enables a sequence of approaches that designate what have to manifest and while with inside the venture in order that any venture guided via way of means of this approach ought to contain those approaches in a way, however greater importantly, is to regulate the version approaches to the necessities of that unique venture you're working.

A PRINCE2 project is planned, monitored and controlled phase to phase, is focused on the definition and delivery of products, in particular its quality requirements, processes diverge widely . Moreover, from this study it can be concluded that the utility of

undertaking control procedures will increase the possibilities of fulfillment of a huge form of projects. It is recommended to make a comparative evaluation of undertaking-stage control of a number of the predictive fashions used for undertaking control, with European guidelines for dealing with the layout of synthetic products. In technologically extra superior countries, technical productiveness improvements which mark the variations among organizations belonging to numerous monetary sectors presently are associated with enterprise of work. In this regard, continuous process improvement has evolved into a new integrated management approach. Total management system by processes as illustrated in Figure 1 shows the main difference between PMBOK process and PRINCE2 phase process. The main income knowledge was taken from this study how to take the benefit of different standardized model to increase the productivity of product [3].

Figure 1. Compare between (a) PRINCE2 and (b) PMBOK.

A strength of PRINCE2 is its detailed and wide-ranging description of multiple project management team roles. Whereas in the PMBOK

Guide the emphasis is mainly on what the project manager does, in PRINCE2 there is a whole appendix providing detailed descriptions of the responsibilities for seven distinct project management team roles.

Table 1: Different roles between Compare between (a) PRINCE2 and (b) PMBOK

PRINCE2 project management team roles	PMBOK Guide equivalent
executive	project sponsor
senior user	no equivalent
senior supplier	no equivalent
project assurance	no equivalent
project manager	project manager
team manager	no equivalent
no equivalent	change control board (CCB)

According to a study published in 2020, The primary objective of any manufacturing entity is the attainment of customer satisfaction, which can be realized through the provision of high-quality products, delivered punctually, and offered at a competitive price point. Any organization, whether engaged in manufacturing or providing services, will thrive and maintain its competitive edge if it possesses the requisite flexibility to adaptively and systematically respond to customer demands, thereby enhancing the value of its offerings. The costs associated with equipment, materials, and labor are subject to inflationary pressures, which serve as critical factors influencing the pricing of products. Inefficient use of equipment, materials, and labor results in direct financial losses. Therefore, it is imperative to

prioritize the optimal utilization of these key factors, followed by efforts to minimize waste in manufacturing processes. Lean manufacturing practices have become essential across various sectors, including automotive, electronics, plastics, textiles, food, dairy, foundry, stamping, and maintenance. The advantages noted following the adoption of individual or integrated lean manufacturing techniques include a decrease in cycle time, the removal of non-value-adding activities, and the establishment of a clean, organized, and sanitary work environment. Additionally, these techniques facilitate a seamless production flow, enhance productivity, lower production costs, promote employee engagement, ensure proper order documentation, decrease inventory levels, and improve both intra- and inter-departmental connectivity for expedited decision-making and rapid responses. This review examines various manufacturing sectors to assess the impact of implemented lean manufacturing techniques on process improvement and waste reduction [4].

Figure 2. Lean Manufacturing Tool [4].

Another study published in 2012 talks has the title "Significance of depth of inspection and inspection performance metrics for consistent defect management in the software industry". It talks about how the production of high-quality software can improve the productivity of products through an effective defect management system. This study focuses on how inspection and testing which are parts of the defect management system play an important role in increasing the quality of the production line then it will increase the productivity of the product as well. This study provides a case study involving empirical analysis of projects from a leading product-based software industry. The study strongly indicates the need for awareness and use of quality

measurement of processes and people in realizing effective defect management. Moreover, this study explains how to implement high-quality software by using process metrics, inspection performance metrics, and quality metrics for development more supplement the quality and productivity in the process line. This software will be able to reduce the expensive rework time, cost, and rebinding of resources. This study takes the silicon market as a case study for this implementation because it is considered highly competitive in modern days. This study suggests that software organizations can improve their quality within estimated cost and schedule with a good understanding of effort distribution of quality assurance activities such as reviews, process audits, and testing which lead to process improvement. In addition, this study shows the effect of the skill level or experience of the participants has to be one of the important project factors, that can influence the productivity of the product. Since effective defect management is one of the successful paths to producing high-quality software, the industry follows several defect management strategies to address defect-associated issues. They primarily include defect detection and defect prevention strategies. Defect detection and prevention aims to provide quality software that reduces the cost and time to fix a defect, increases productivity, and enables to achieve total customer satisfaction.

This study shows that high-quality a product is the only method for achieving customer satisfaction. Implementation of quality metrics therefore reflects continual process improvement of the company and

enhances their productivity. The application of pair metrics as an effective defect management tactic is a potential hope for saving a billion dollars across the industries by annulling expensive defect-associated rework in the projects. This approach provides an opportunity for the business houses who outsource work to software factories, to have a firm grip on the quality of the inspection process and save inadvertent cost escalation, usually arising out of test forecast failure, and increase productivity as well [5].

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Comparison Among Tests of Normality for the Error Term in Regression Analysis

3

Comparison Among Tests of Normality for the Error Term in Regression Analysis

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ABSTRACT

Assessing the assumption of normality is required by most statistical procedures. Parametric statistical analysis is one of the best examples to show the importance of assessing the normality assumption. Parametric statistical analysis assumes a certain distribution of the data, such as the normal distribution. If the assumption of normality is violated, interpretation and inference may not be reliable or valid. Therefore, it is important to check for this assumption before proceeding with any relevant statistical procedures. There are significant amount of normality tests available in the literature. However, the most common normality test procedures available in statistical software are the Shapiro-Wilk (SW) test, Kolmogorov - Samirnov (KS) test, Anderson-Darling (AD) test, Cramer Von Mises (CVM) test and Pearson's chi-squared (PC) test. Some of these tests can only be applied under a certain condition or assumption. Moreover, different test of normality often produce different results .i.e. some tests reject while others fail to reject the null hypothesis of normality. The contradicting results are misleading and often confuse practitioners. Therefore, the choice of test of normality to be used should indisputably be given tremendous attention. This study focuses

on comparing the power of five normality tests for the error term in Regression Analysis; SW, KS, AD, CVM and PC tests. The simulation process was carried out by using R programming language. The tests require different sample size to detect the non-normality assumption. As the sample size increases the power of these tests become close to each other.

Keywords: Shapiro-Wilk (SW) Test, Kolmogorov -Samirnov (KS) Test, Cramer-von Mises (CVM) Test, Anderson-Darling (AD) Test, Pearson's Chi- squared (PC) Test.

1. Introduction

The assumption of normality is very important because it used in many statistical procedures such as analysis of variance, linear regression analysis. There are many tests of normality. The asymptotic distributions of one-sided statistics T^{+} and T^{-} were obtained by Smirnov (1939). The exact distribution of the test statistics for finite (small) sample sizes was studied by Waldand Wolfowitz (1939) and tabulated by massey (1950a). The distribution function of T for finite sample size was derived by Birn-baum and Tingey (1951), and comparisons were made between the exact quantiles obtained from their distribution function and the asymptotic quantiles given by Smirnov (1939,1948). It was found that use of the asymptotic quantiles leads to a conservative test. The two-side Kolmogorov test has the desirable property of being consistent against all differences between F(x) and $F^{*}(x)$, the true and hypothesized distribution function. However, it is biased for finite sample sizes (Massey,1950). A lower bound for the bower of the two-sided test is given by Massey (1950). The greatest lower bound for the power, under a certain class of alternative hypotheses was obtained by Birnbaum (1953), and another greatest lower bound for the power, under a different class of alternative hypotheses. was obtained by Lee (1966). Other power

comparisons were made by van der Waerden (1953), Anderson (1954), Suzuki (1968), Shapiro, Wilk, and Chen (1968), and Kott (1970). Note that if a deviation from the hypothesized variance exists instead of deviation from the hypothesized mean, as before, the normal test powerless to detect the difference, and the Kolmogorov test is more powerful than the normal test.

Other papers on Kolmogorov test similar goodness-of-fit tests are by Finkelstein and Schafer (1971), Maag and Dicaire(1971), Carnal and Riedwyl(1972), and Stephens(1974). Barr and Davidson (1973) and Pettitt and Stephens (1976) present modifications for censored data, while Baar and Shudde (1973) discuss a modification for observations on a circle. Govindara-julu and Klotz (1973) present a note on the asymptotic distribution. Another goodness- of- fit test is the Cramer-von Mises test. developed by Cramer (1928), Von Mises (1931), and Samirnov(1936). The Cramer-von Mises test given by Anderson and Darling (1952), Razali, Nornadiah; Wah, Yap Bee (2011)."Power comparisons of Shapiro–Wilk, Kolmogorov–Smirnov, Lilliefors and Anderson–Darling tests" (PDF).

2. Normality Test

In statistic, normality tests are used to determine if a data set is normally distributed. The null-hypothesis of this test that the population distributed as Normal. Thus, if the p-value is less than the chosen alpha level, then the null hypothesis is rejected and there is evidence that the data listed are not from a normally distributed population. In other words, the data are not normal. On the contrary, if the p-value is greater than the chosen alpha level, then null hypothesis that the data came from a normally distributed population cannot be rejected. However, since the test is biased by sample size, the test may be statistically significant from a normal distribution in any large samples. Thus, a Q-Q plot (quantile -quantile) plots required for

verification in addition to the test. There are several tests for normality to test:

H_0: The error is normally distributed.

H_1: The error is not normally distributed.

1) Shapiro-Wilk (SW) Test,
2) Kolmogorov -Samirnov (KS) Test,
3) Cramer-von Mises (CVM) Test,
4) Anderson-Darling (AD) Test
5) Pearson's Chi- squared (PC) Test.

3. Simulation Study

In this study, the simple linear regression was considered with different sample sizes. For given x values (x=1, 2..., n), The y values were generated using a set of predetermined values of parameters, allowing only values of ε_i(i=1, 2,...,n) were generated from different distribution, Gamma (4,5), Beta (5,5), W(2,3), Lognormal(0,1) , Bin(5,0.5) and poisson (8). The true values of the parameters can take any values in the parameters space, and will give the same results. In this study the true values of the parameters are taken the be $\beta_0 = 6.1$, $\beta = 3$.

One thousand data sets were used in each simulation study. Each data set was fitted by least squares and the mean of simulated power at α = 0.05 for different values were computed.

3.1 Comparison of simulated power for different Normality tests when the data is simulated from Gamma (4,5)

From table (3.1) and figure (3.1), it is clear that the simulated power at $\alpha = 0.05$ is an increasing function of the sample size n, when the data for the error term is simulated from Gamma (4,5) distribution.

Detecting the non-normality of the error term by using (SW) test, the sample size needs to be at least 50, by using (AD) test the simple size(n) required to be at least 60. While by using (KS) test (n) needs to be at least 90, but by using (PC) test (n) needs to be at least 140 and finally, by using (CV) test (n) needs to be at least 70.

Thus, according to the simulation study we concluded that the best test in order is (SW), (AD), (CV), (KS) and (PC).

Table 3.1: The Power of different Normality Tests when the data is simulated from Gamma (4,5)

Sample size n	The simulated power at $\alpha = 0.05$				
	(SW)	(AD)	(KS)	(PC)	(CV)
10	0.095	0.08	0.077	0.094	0.076
20	0.254	0.22	0.155	0.11	0.204
30	0.393	0.325	0.236	0.16	0.295
40	0.562	0.464	0.319	0.221	0.417
50	0.64	0.536	0.357	0.251	0.483
60	0.768	0.655	0.473	0.309	0.576
70	0.811	0.709	0.509	0.352	0.636
80	0.895	0.792	0.593	0.422	0.715
90	0.913	0.826	0.634	0.417	0.767
100	0.942	0.881	0.678	0.481	0.828
120	0.977	0.942	0.75	0.577	0.893
140	0.989	0.966	0.837	0.669	0.938
160	0.995	0.983	0.887	0.741	0.961
180	0.998	0.993	0.928	0.815	0.986

200	1	0.998	0.95	0.856	0.995
250	1	1	0.991	0.946	0.998
300	1	1	0.993	0.975	1
350	1	1	0.996	0.988	1
400	1	1	1	0.996	1
450	1	1	1	1	1
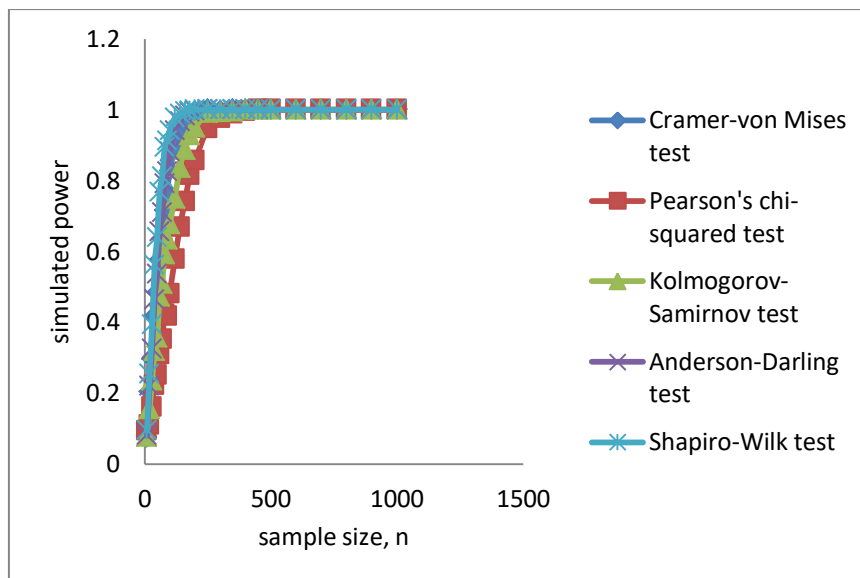
Figure 3.1: A plot of the power for different Normality tests vs the sample size when the data is simulated from Gamma.

Table 3.2: The Power of different Normality Tests when the data is simulated from Beta (5,5)

Sample size	The simulated power at α = 0.05				
N	(SW)	(AD)	(KS)	(PC)	(CV)
10	0.048	0.044	0.047	0.065	0.04
20	0.048	0.055	0.049	0.051	0.055
30	0.04	0.041	0.052	0.05	0.041
40	0.05	0.053	0.048	0.055	0.048
50	0.047	0.051	0.051	0.059	0.053
60	0.036	0.044	0.043	0.034	0.044
70	0.029	0.034	0.048	0.058	0.047
80	0.059	0.054	0.056	0.052	0.061
90	0.05	0.061	0.055	0.062	0.059
100	0.052	0.061	0.044	0.054	0.055
120	0.088	0.093	0.074	0.085	0.089
140	0.083	0.079	0.066	0.06	0.07
160	0.082	0.094	0.076	0.058	0.079
180	0.109	0.109	0.072	0.064	0.089
200	0.111	0.099	0.073	0.061	0.092
250	0.169	0.137	0.089	0.086	0.118
300	0.185	0.149	0.086	0.075	0.12
350	0.281	0.192	0.118	0.096	0.164
400	0.323	0.231	0.125	0.093	0.183
450	0.385	0.254	0.133	0.091	0.194
500	0.43	0.292	0.154	0.095	0.245
600	0.582	0.381	0.184	0.129	0.298
700	0.669	0.419	0.188	0.123	0.323
800	0.747	0.515	0.251	0.136	0.410
900	0.817	0.566	0.284	0.177	0.452
1000	0.874	0.623	0.3	0.177	0.492
1200	0.96	0.75	0.399	0.207	0.628
1400	0.98	0.83	0.444	0.258	0.716

1600	0.995	0.894	0.486	0.292	0.784
1800	0.997	0.924	0.559	0.346	0.815
2000	0.999	0.959	0.627	0.377	0.879
2500	1	0.987	0.748	0.513	0.938
3000	1	0.997	0.847	0.615	0.975
3500	1	1	0.898	0.733	0.990
4000	1	1	0.953	0.817	0.998
4500	1	1	0.972	0.865	0.998
5000	1	1	0.987	0.908	1

3.2 Comparison of simulated power for different Normality tests when the data is simulated from Beta (5,5)

From table (3.2) and figure (3.2), it is clear that the simulated power at α = .05 is an increasing function of the sample size n, when the data for the error term is simulated from Beta (5, 5) distribution.

Detecting the non-normality of the error term by using (SW) test, the sample size (n) needs to be at least 700, by using (AD) test (n) needs to be at least 1000. While by using (KS) test (n) needs to be at least 2000, but by using (PC) test (n) needs to be at least 3000 and finally, by using (CV) test (n) needs to be at least 1200.

Thus, according to the simulation study we concluded that the best test in order is (SW), (AD), (CV), (KS) and (PC).

Figure 3.2: A plot of the power for different Normality tests vs the sample size

3.3 Comparison of simulated power for different Normality tests when the data is simulated from Weibull (2,3)

From table (3.3) and figure (3.3), it is clear that the simulated power at α = .05 is an increasing function of the sample size n, when the data for the error term is simulated from Weibull (2,3) distribution.

Detecting the non-normality of the error term by using (SW), the sample size needs to be at least 80, by using (AD) test the sample size (n) should be at least 120. While by using (KS) test (n) needs to be at least 180, but by using (PC) test (n) needs to be at least 250 and finally, by using (CV) test (n) needs to be at least 140.

Thus, according to the simulation study we concluded that the best test in order are (SW), (AD), (CV), (KS) and (PC).
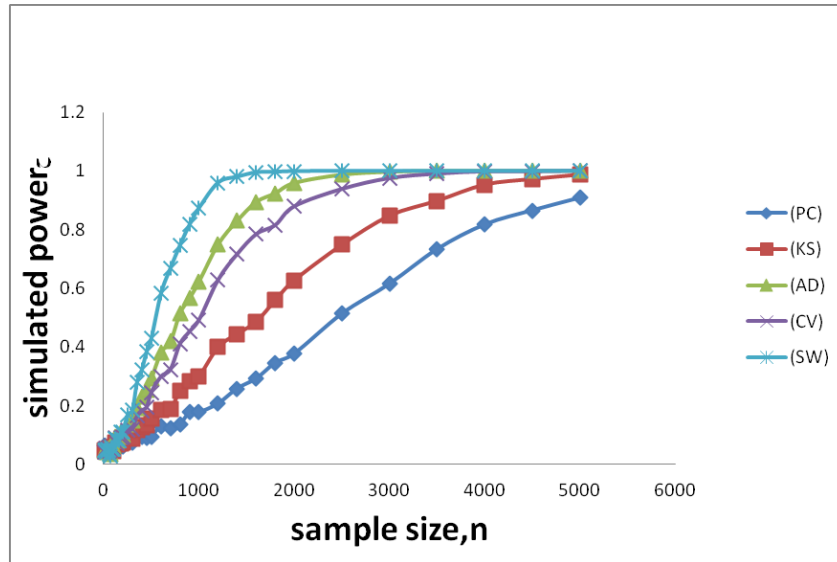
Table 3.3: The Power of different Normality Tests when the data is simulated from Weibulle

Sample size	`				
n	(SW)	(AD)	(KS)	(PC)	(CV)
10	0.07	0.067	0.051	0.088	0.055
20	0.138	0.115	0.084	0.075	0.101
30	0.192	0.155	0.116	0.079	0.131
40	0.28	0.228	0.157	0.129	0.196
50	0.366	0.291	0.203	0.129	0.251
60	0.446	0.336	0.222	0.156	0.276
70	0.534	0.392	0.27	0.143	0.337
80	0.643	0.47	0.312	0.195	0.409
90	0.708	0.531	0.354	0.241	0.451
100	0.771	0.582	0.374	0.266	0.475
120	0.867	0.678	0.457	0.295	0.578
140	0.936	0.772	0.525	0.361	0.664
160	0.959	0.844	0.595	0.425	0.439
180	0.985	0.893	0.656	0.47	0.799
200	0.984	0.925	0.685	0.565	0.844
250	0.999	0.971	0.807	0.69	0.927
300	1	0.993	0.879	0.804	0.965
350	1	0.996	0.925	0.842	0.984
400	1	1	0.964	0.93	0.996
450	1	1	0.982	0.954	0.999
500	1	1	0.989	0.97	1
600	1	1	0.996	0.996	1
700	1	1	1	0.999	1
800	1	1	1	1	1

Figure 3.3: A plot of the power for different Normality tests vs the sample size when the data is simulated from Wiebll

3.4 Comparison of simulated power for different Normality tests when the data is simulated from lognormal (0,1)

From table (3.4) and figure (3.4) it is clear that the simulated power at $\alpha = .05$ is an increasing function of the sample size n, when the data for the error term is simulated from Lognormal distribution.

Detecting the non-normality of the error term by using (SW) test, (AD) test, (CV) test, (KS) test and (PC) test the sample size (n) needs to be at least 20.

Thus, according to the simulation study we concluded that the best test in order is (SW), (AD), (CV), (KS) and (PC).

Table 3.4: The Power of different Normality Tests when the data is simulated from LN (0,1)

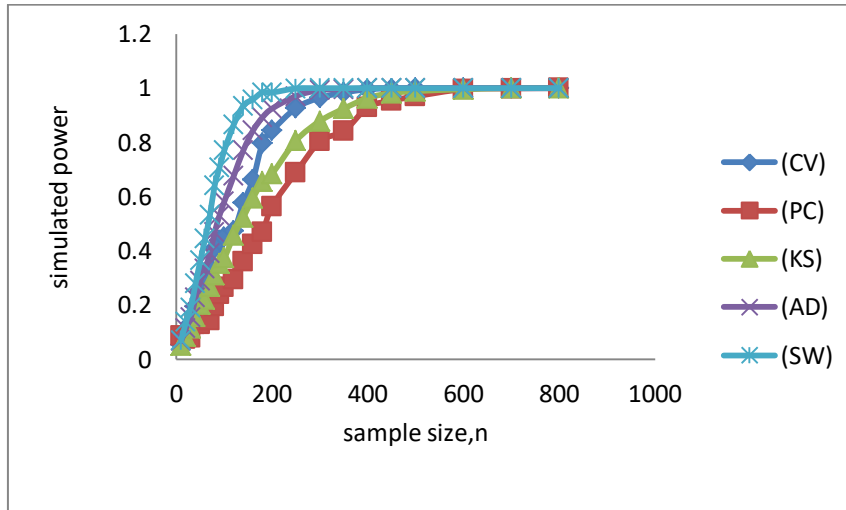| Sample size	The simulated power at $\alpha = 0.05$				
n	(SW)	(AD)	(KS)	(PC)	(CV)
10	0.393	0.377	0.308	0.318	0.359
20	0.835	0.792	0.691	0.632	0.776
30	0.966	0.9848	0.878	0.859	0.938
40	0.995	0.994	0.971	0.95	0.99
50	0.999	0.999	0.993	0.986	0.999
60	1	1	0.998	0.994	1
70	1	1	0.999	0.998	1
80	1	1	1	1	1
90	1	1	1	1	1
100	1	1	1	1	1

Figure 3.4: A plot of the power for different Normality tests vs the sample size when the data is simulated from Log normal.

3. 5 Comparison of simulated power for different Normality tests when the data is simulated from Bin (5,0.5)

From table (3.5) and figure (3.5), it is clear that the simulated power at α = .05 is an increasing function of the sample size n, when the data for the error term is simulated from Bin (5, 0.5) distribution.

Detecting the non-normality of the error term by using (SW), the sample size needs to be at least 60, by using (AD) test, (CV) test and (KS) (n) should be at least 50, and finally, by using (PC) test (n) needs to be at least 40.

Thus, according to the simulation study we concluded that the best test in order are (PC), (CV), (AD), (KS) and (SW).

Table 3.5: The Power of different Normality Tests when the data is simulated from Bin (5,0.5)

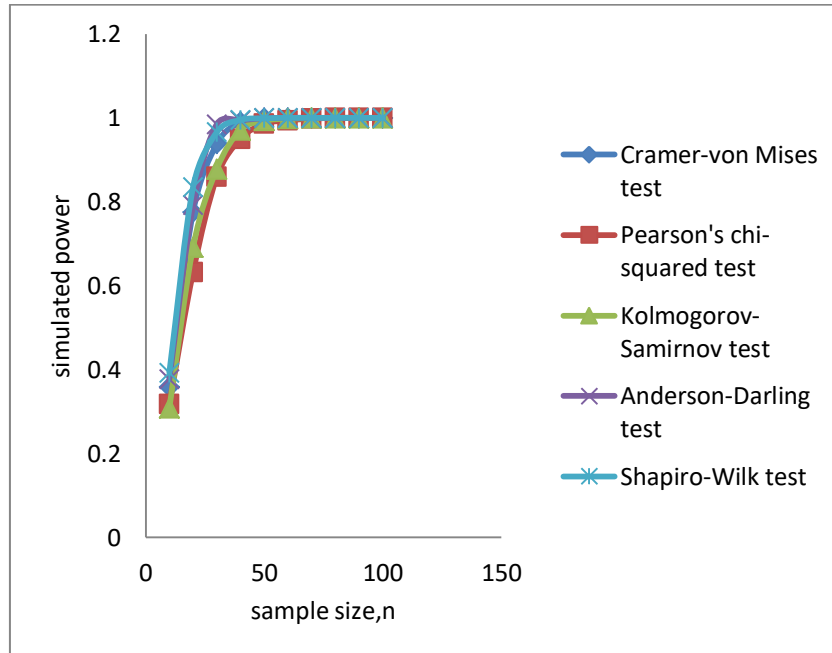| Sample size N	The simulated Power at α = 0.05				
	(SW)	(AD)	(KS)	(PC)	(CV)
10	0.091	0.103	0.121	0.187	0.112
20	0.149	0.196	0.21	0.347	0.206
30	0.272	0.383	0.398	0.556	0.394
40	0.385	0.508	0.532	0.671	0.533
50	0.54	0.644	0.663	0.786	0.653
60	0.624	0.722	0.733	0.838	0.726
70	0.674	0.763	0.767	0.863	0.765
80	0.771	0.833	0.839	0.922	0.835
90	0.797	0.863	0.878	0.932	0.868
100	0.838	0.901	0.903	0.954	0.903
120	0.928	0.953	0.958	0.983	0.954
140	0.952	0.974	0.975	0.995	0.975
160	0.96	0.979	0.982	0.997	0.98
180	0.977	0.984	0.984	0.994	0.984
200	0.981	0.99	0.99	0.99	0.991
250	0.996	0.999	0.999	1	0.999
300	0.999	0.999	0.999	1	0.999
350	1	1	1	1	1
400	1	1	1	1	1
450	1	1	1	1	1
500	1	1	1	1	1

Figure 3.5: A plot of the power for different Normality tests vs the sample size when the data is simulated from Bin (5,0.5).

3.6 Comparison of simulated power for different Normality tests when the data is simulated from Poisson (6)

From table (3.6) and figure (3.6), it is clear that the simulated power at α = 0.05 is an increasing function of the sample size when the data for error term is simulated from Poisson (6).

Detecting the non-normality of the error term by using (PC), the sample size needs to be at least 100, by using (AD) test, (KS) test, and (SW) test the sample size (n) required needs to be at least 140. While using (CV) test (n) needs to be at least 120.

Thus, according to the simulation study we concluded that the best test in order are (PC), (CV), (SW), (AD), and (KS).

Table 3.6: The Power of different Normality Tests when the data is simulated from Poisson (6).

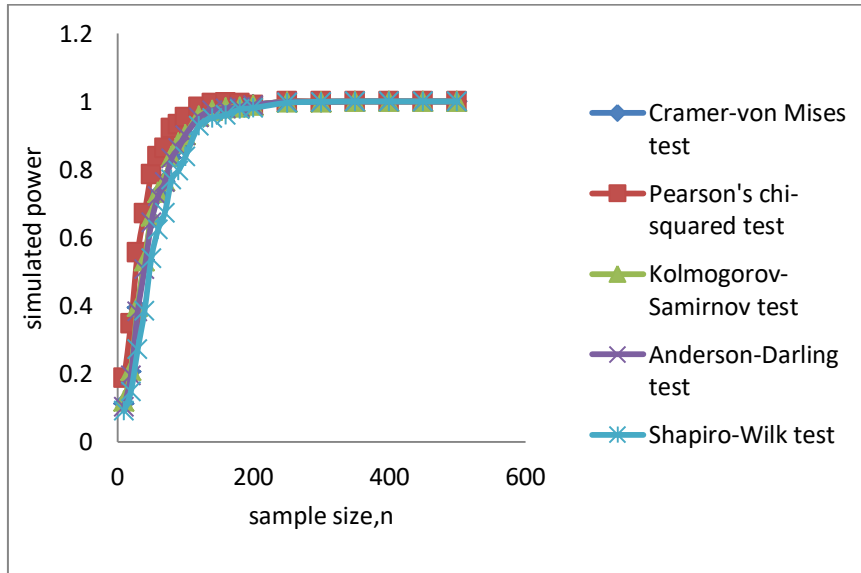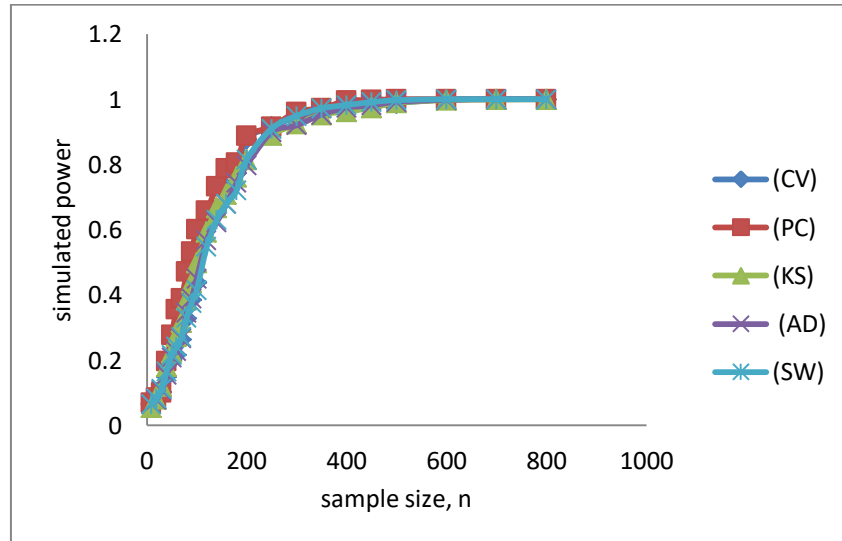| Sample size n	The simulated Power α = 0.05				
	(SW)	**(AD)**	**(KS)**	**(PC)**	**(CV)**
10	0.066	0.065	0.056	0.07	0.065
20	0.082	0.079	0.08	0.085	0.08
30	0.112	0.109	0.12	0.101	0.102
40	0.166	0.155	0.181	0.196	0.15
50	0.216	0.209	0.224	0.277	0.201
60	0.242	0.228	0.274	0.356	0.217
70	0.271	0.267	0.316	0.389	0.263
80	0.33	0.345	0.386	0.471	0.328
90	0.376	0.389	0.438	0.532	0.386
100	0.415	0.45	0.499	0.601	0.439
120	0.547	0.568	0.593	0.657	0.604
140	0.63	0.623	0.667	0.733	0.659
160	0.68	0.68	0.708	0.787	0.729
180	0.721	0.744	0.761	0.805	0.773
200	0.815	0.798	0.814	0.887	0.878
250	0.91	0.899	0.889	0.915	0.915
300	0.949	0.92	0.924	0.961	0.946
350	0.972	0.953	0.953	0.972	0.964
400	0.982	0.974	0.962	0.995	0.977
450	0.991	0.981	0.974	0.997	0.977
500	0.997	0.992	0.989	1	0.988
600	1	0.998	0.997	1	0.999
700	1	1	0.999	1	1
800	1	1	1	1	1

Figure 3.6: A plot of the power for different Normality tests vs the sample size when the data is simulated from Poisson (6).

4. Conclusion

In general, it can be concluded that among the five tests considered, Shapiro-Wilk test is the most powerful test for all types of continuous distributions and sample sizes, whereas Pearson Chi square and Kolmogorov-Samirnov tests are the least powerful tests. However, the powerful Shapiro-Wilk test is still low for small sample size. Anderson- Darling and Cramer Von tests are quite comparable with Shapiro-Wilk test, and Kolmogorov-Samirnov out performs Pearson Chi square test. But Pearson Chi square test is the most powerful test for all types of discrete distributions and sample sizes whereas the other tests are the least powerful tests. In general, the simulated power for all tests increased as the sample size increased. As a concluding remark, practitioners should not depend solely on graphical techniques such as histogram to conclude about the distribution of the data. It is

recommended that the graphical techniques be combined with formal normality test and inspection of shape parameters such as skewness and kurtosis coefficients. It is important to remember that skewness and kurtosis measures are also affected by sample size. Practitioners also need to be aware that these five normality tests do not perform well for small sample size (30 and below).

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Designing and Implementing a Predictive System for Alzheimer's Disease Using Logistic Regression Algorithms

4

Designing and Implementing a Predictive System for Alzheimer's Disease Using Logistic Regression Algorithms

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Abstract

Alzheimer's disease (AD) is a chronic brain disorder and the leading cause of dementia, commonly affecting older adults. It imposes a significant financial burden in terms of treatment and is a major cause of death among senior citizens. Early detection of Alzheimer's disease plays a crucial role in prevention and control of its progression. Machine learning, a branch of artificial intelligence, utilizes a set of probabilistic and optimization techniques that allow computers to analyze large and complex datasets. Therefore, researchers frequently focus on using machine learning to diagnose the early stages of Alzheimer's disease. In this paper, we focused on machine learning algorithms for prediction, including Logistic Regression (LR), Random Forest (RF), Multilayer Perceptron (MLP), and Support Vector Machine (SVM). Samples were taken from the Kaggle

organization, consisting of 629 diagnosed cases aged 55 to 90. Data analysis was conducted based on influencing factors, including age, Mini-Mental State Examination (MMSE) test, and years of education. The algorithms' performance was evaluated, with Logistic Regression (LR) showing the best prediction accuracy at 74.60%, with a 25.40% error rate. The type of error was determined to be partial rather than total. Additionally, a user-friendly interface for the system was designed to facilitate nonspecialist use.

Keywords: Alzheimer's disease - Machine Learning (ML) - Logistic Regression (LR) - Random Forest (RF)- K-Nearest Neighbors (K-NN) - Multilayer Perceptron (MLP) - Support Vector Machine (SVM).

1. INTRODUCTION

Alzheimer's Disease (AD) is one of the most common causes of dementia among the growing elderly population. Despite numerous studies, both preliminary and clinical, the exact etiology and mechanisms of AD are not clear enough to allow for early prevention based on rational grounds for detection and effective treatment in the early stages [1]. There have been attempts to use modern techniques based on artificial intelligence in the early diagnosis and prediction of the disease. As technology is the backbone of the current world's development, and since computers are the least expensive and most straightforward means of designing software and applications that help improve our practical lives, they represent the mainstay of the current information revolution. This has led to the development of computer programming that simulates human intelligence, allowing it to make inferential operations about facts and laws represented in the computer's memory. Artificial intelligence (AI) is a branch of computer science aimed at developing computers or machines that can think similarly to the human brain. AI can be defined as the ability of a machine to learn from the external environment by acquiring and

analyzing data based on logic to reach conclusions and ultimately correct its behavior on its own [2].

Machine Learning (ML) is a type of artificial intelligence that allows software applications to become more accurate in predicting outcomes without the need for explicit programming to do so [3].

2. RESEARCH PROBLEM

The main problem we aim to address is exploring the crucial role of artificial intelligence in early detection and prediction of Alzheimer's disease and dementia cases. With the aging population worldwide, some individuals suffer from cognitive impairment such as Alzheimer's disease and associated dementia. Alzheimer's disease, dementia, and other cognitive impairments are severe enough to interfere with an individual's ability to perform their daily tasks effectively. It is expected that the number of individuals affected by Alzheimer's disease will increase tenfold by the year 2050 [1].

3. PREVIOUS STUDIES

Previous studies help clarify the theoretical and practical foundations of the scientific research topic intended to be conducted by the researcher.

- Selim Buyrukoğlu's study (2021) "Early Detection of Alzheimer's Disease Using Data Mining: Comparison of Ensemble Feature Selection Approaches" conducted at Çankırı Karatekin University focused on the application of individual feature selection methods as well as ensemble feature selection approaches in the early detection of Alzheimer's disease. The study aimed to build a predictive model for early diagnosis of Alzheimer's disease using ensemble feature selection methods. The study indicated that better performance results were achieved by applying the Random Forest (RF) algorithm with

a subset of features obtained using the non-homogeneous feature selection approach (91%) [4].

- Roobaea Alroobaea's study (2021) "Alzheimer's Disease Early Detection Using Machine Learning Techniques" conducted at PSN College of Engineering and Technology, University of Jeddah, aimed to develop a computer-aided diagnostic system for Alzheimer's disease detection using machine learning techniques. Common supervised machine learning techniques such as logistic regression, support vector machine, random forest, and linear discriminant analysis were applied. The study reported the highest accuracy values of (99.43%) and (99.10%) achieved by logistic regression and support vector machine classifiers, respectively. The study recommended the integration of multiple algorithms for better performance [5].

- Kolla Bhanu Prakash's study (2020) "Analysis, Prediction and Evaluation of COVID-19 Datasets using Machine Learning Algorithm" published in the International Journal of Emerging Trends in Engineering Research involved the creation of various prediction models using machine learning algorithms for COVID-19 datasets and their performance calculation and evaluation. Random forest outperformed machine learning models such as support vector machine, k-nearest neighbors, and logistic regression [6].

- Keerthana Rajendran's study (2019) "Predicting breast cancer using supervised machine learning techniques" published in the International Journal of Innovative Technology and Exploring Engineering provided an overview of the evolution of machine learning techniques in cancer research, focusing on breast cancer. Algorithms such as linear regression, random forest, multilayer perceptron, and decision trees were applied, with multilayer perceptron showing better performance compared to other techniques [7].

- Hyung-Chul Lee's study (2018) "Derivation and Validation of Machine Learning Approaches to Predict Acute Kidney Injury after Cardiac Surgery" conducted at Seoul National University College of Medicine focused on developing machine learning approaches for better predictive capability compared to statistical analysis for post-surgical outcomes. Various machine learning techniques including decision tree, random forest, gradient boosting, support vector machine, neural network classifier, and deep learning were applied. The performance of these techniques was compared to logistic regression analysis, with decision tree, random forest, and support vector machine showing similar performance to logistic regression at (69%), while gradient boosting showed better performance with an error rate of (78%) [8].

4. RESEARCH IMPORTANCE

The importance of this research lies in understanding how to utilize one of the important fields of artificial intelligence, machine learning, and how to train it on a dataset of Alzheimer's patients to test its efficiency and predict the disease. This is crucial for diagnosing it for utilization in various settings.

5. RESEARCH SOURCES AND LIMITS

1. We obtained 629 samples from individuals aged 55 to 90 from the Kaggle organization, which is an online platform for data scientists and machine learning engineers.
2. Spatial Limitations: Kaggle organization.
3. Temporal Limitations: From the year 2014 to the year 2022.

6. RESEARCH METHODOLOGY

This section describes the method used for predicting Alzheimer's disease using machine learning (ML), encompassing a variety of algorithms used in artificial intelligence. Numerous systems have been developed for detecting and predicting Alzheimer's disease. Unfortunately, disease recognition still relies on medical expertise, particularly in Libya. We propose an Alzheimer's prediction system that can be used by both experienced and inexperienced doctors. The system's architecture is summarized in Figure (1), where each block represents a stage in the system.

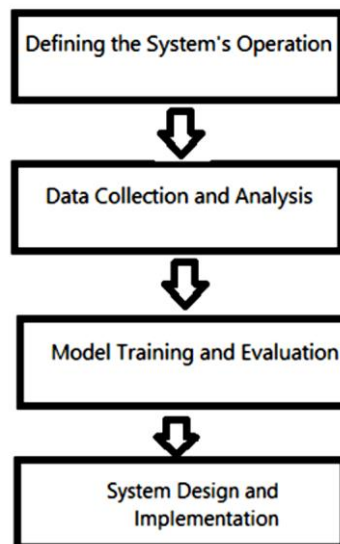**Figure 1: The general structure of the system**

1. Stage One: In this stage, the system's function was identified and specialized for the medical field, along with conducting a comprehensive study on machine learning to elucidate the system's potential success in diagnosing Alzheimer's disease.
2. Stage Two: Data was collected by downloading a dataset specific to Alzheimer's disease, and the Python programming

language was chosen to implement the system, along with importing necessary libraries to facilitate execution. Data was read and processed by cleaning it from empty values and uninformative columns, dividing the data, converting categorical values to numerical ones, and normalizing numerical data. The data was graphically represented, and its statistics were presented.

3. Stage Three: In this stage, the data was divided into training and testing datasets to train and evaluate the model. Then, the Random Forest (RF) classifier was selected to display the important features affecting model training, and the Logistic Regression (LR) model was used. The model was trained and evaluated on training and testing datasets. Error accuracy was calculated by identifying the type of errors.

4. Stage Four: In this stage, the user interface and its contents were designed, including buttons, data inputs, and symptoms of the condition. The system was implemented to predict Alzheimer's disease.

7. DESIGN AND IMPLEMENTATION

In this section, the theoretical design of the system was studied using machine learning stages to facilitate the practical system design. These diagrams are practically translated to succeed in machine learning in the medical field:

1. Stage One - System Scope Definition: The system's scope was defined to be in the medical field, accompanied by an extensive study on machine learning to elucidate the system's potential success in diagnosing Alzheimer's disease.

2. Stage Two - Data Collection: In this phase, data was collected by downloading a dataset for Alzheimer's patients in CSV format. The Alzheimer's dataset comprises three target categories: Cognitively Normal (CN), Late Mild Cognitive

Impairment (LMCI), and Alzheimer's Disease (AD), As shown in Figure 2.

Dx Codes for Submission	Genotype	Imputed_genotype	MMSE	APOE4	PTEDUCAT	PTGENDER	AGE	EXAMDATE	DX.bl	Acq Date	Visit	Modality	Image.Data.ID	RID	Subject
CN	33	FALSE	29	0	12	Female	78.5	11/4/05	CN	9/29/05	1	MRI	59375	14	022_S_0014	7
CN	34	TRUE	29	1	18	Male	80.8	10/18/05	CN	9/26/05	1	MRI	33066	15	100_S_0015	8
CN	34	FALSE	28	1	9	Male	65.4	10/13/05	CN	9/27/05	1	MRI	32306	16	011_S_0016	9
CN	23	TRUE	29	0	18	Female	73.1	11/23/05	CN	10/12/05	1	MRI	45228	19	067_S_0019	10
CN	23	FALSE	30	0	18	Female	72.6	10/24/05	CN	10/10/05	1	MRI	32332	21	011_S_0021	11
CN	34	FALSE	29	1	17	Male	63.2	10/19/05	CN	10/10/05	1	MRI	32389	22	011_S_0022	12
CN	33	FALSE	26	0	14	Male	71.7	11/8/05	CN	10/31/05	1	MRI	32409	23	011_S_0023	13
AD	34	TRUE	21	1	18	Male	64.1	10/31/05	AD	10/14/05	1	MRI	38717	29	067_S_0029	14
MCI	33	TRUE	29	0	19	Female	80	10/20/05	LMCI	10/10/05	1	MRI	31631	30	023_S_0030	15
CN	33	TRUE	30	0	18	Female	77.7	10/24/05	CN	10/12/05	1	MRI	69612	31	023_S_0031	16
MCI	23	TRUE	29	0	20	Male	83.3	12/9/05	LMCI	11/22/05	1	MRI	45166	33	035_S_0033	17
CN	33	TRUE	30	0	18	Male	76.9	11/8/05	CN	10/20/05	1	MRI	33074	35	100_S_0035	18
MCI	33	TRUE	25	0	12	Male	76.8	12/15/05	LMCI	11/10/05	1	MRI	35875	38	067_S_0038	19
CN	33	FALSE	29	0	18	Male	73.2	12/14/05	CN	10/24/05	1	MRI	34607	40	099_S_0040	20
MCI	44	TRUE	25	2	14	Female	70.9	11/14/05	LMCI	10/21/05	1	MRI	35734	41	007_S_0041	21
MCI	33	TRUE	30	0	18	Male	72.8	11/10/05	LMCI	10/31/05	1	MRI	31084	42	023_S_0042	22
CN	23	TRUE	29	0	16	Male	76.2	2/3/06	CN	12/8/05	1	MRI	36485	43	018_S_0043	23
CN	23	TRUE	30	0	20	Male	84.7	12/15/05	CN	11/17/05	1	MRI	33086	47	100_S_0047	24
CN	44	FALSE	29	2	14	Male	78.3	12/19/05	CN	11/22/05	1	MRI	45183	48	035_S_0048	25

Figure 2: Samples from Alzheimer's patients.

3. Stage Three - Language Selection: Python language was chosen for its portability, dynamism, free availability, object-oriented programming support, and extensive libraries.

4. Stage Four - Library Import: Libraries such as NumPy, Pandas, Matplotlib, Scikit-Learn, and Tkinter were imported to facilitate system implementation.

5. Stage Five - Data Reading: Data was read in CSV format using the `read_csv()` function from the Pandas library.

6. Stage Six - Data Processing and Preparation: Data was processed by cleaning it, splitting features into input and output sections, removing irrelevant features, converting categorical values to numerical using one-hot encoding, and normalizing numerical values.

7. Stage Seven - Data Representation: Data was graphically represented using Matplotlib's `pyplot` class, showing

distributions of numerical features and output labels and presenting statistical summaries. As shown in Figure 3.
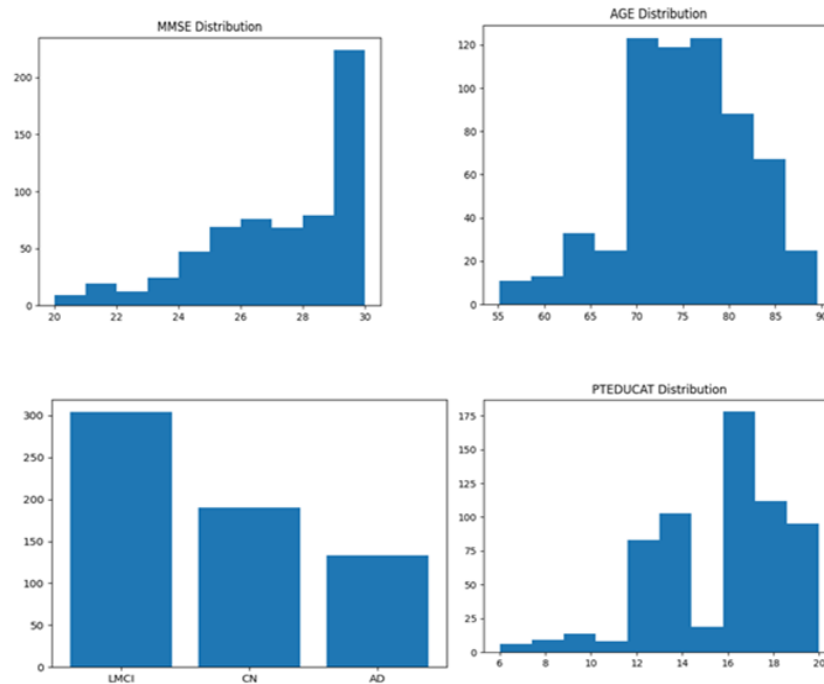

Figure 3: Data representation.

8. Stage Eight - Data Splitting: Data was split into training and testing sets using Scikit-Learn's `train_test_split` method to enable model training and evaluation.

9. Stage Nine - Model Selection, Training, and Evaluation: Various classification models from Scikit-Learn were imported, trained, and evaluated on the training and testing data. Logistic Regression (LR) was selected as the best-performing model for predicting new values. As shown in Figure 4.

```
Validation Accuracy LogisticRegression =  68.27%
Testing Accuracy LogisticRegression =  74.60317460317461 %
Validation Accuracy RandomForestClassifier =  65.67%
Testing Accuracy RandomForestClassifier =  0.6349206349206349
Validation Accuracy KNeighborsClassifier=  65.67%
Testing Accuracy KNeighborsClassifier =  0.6587301587301587
Validation Accuracy MLPClassifier =  52.07%
Testing Accuracy MLPClassifier =  0.6507936507936508
Validation Accuracy SVC =  43.86%
Testing Accuracy SVC =  0.5793650793650794
```

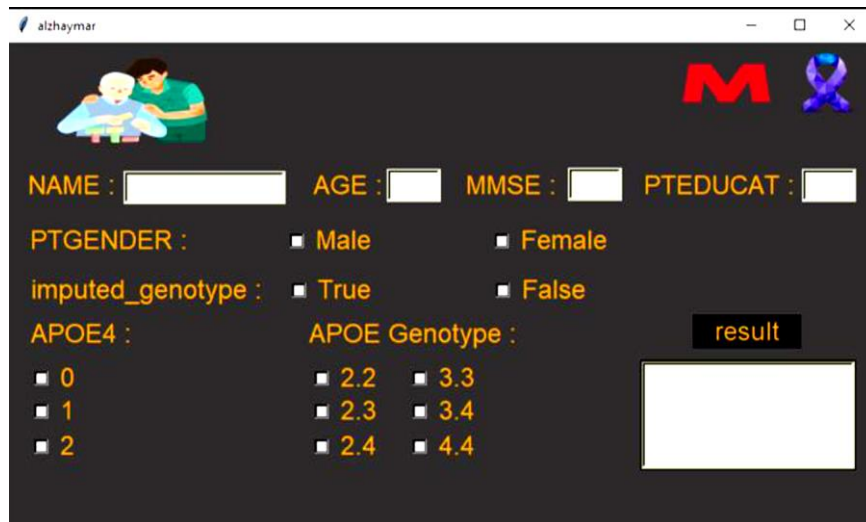**Figure 4: The evaluation ratio for each model.**

10. Stage Ten - Error Accuracy Calculation: Error accuracy was computed using Sklearn's `hamming_loss` class to determine the type of error (total miss, underestimate, or over-estimate). As shown in Figure 5.

```
from sklearn.metrics import hamming_loss
m=hamming_loss(log_clf_preds,y_test)
print("error = ",m*100,"%")

error =  0.25396825396825395
```

Figure 5: Calculating error accuracy.

11. Stage Eleven - System Interface Design: The system's general structure and contents were planned by defining the system screen and its components, facilitating practical system design using the Tkinter library. As shown in Figure 6.

Figure 6: Designing the main screen.

8. CONCLUSIONS

At the end of this paper, we have developed a predictive system for Alzheimer's disease using machine learning
algorithms. The following algorithms were utilized:

- SVM algorithm with a test accuracy of 57.93%.
- MLP algorithm with a test accuracy of 65.07%.
- K-NN algorithm with a test accuracy of 65.87%.
- RF algorithm with a test accuracy of 63.49%.
- LR algorithm with a test accuracy of 74.60%.

Based on the comparison with the previous algorithms, it can be concluded that the LR algorithm performed the best in terms of test accuracy, with an error rate of 25.40%. For feature selection, the RF algorithm was adopted, and it was integrated with the LR algorithm to achieve better results.

9. RECOMMENDATIONS

There are some future recommendations that should be considered:

1. Increase the number of cases (samples) as much as possible to obtain better results in system prediction.
2. Increase the number of features to improve prediction accuracy.
3. Incorporate MRI images into the Alzheimer's disease dataset and compare them using image processing techniques.
4. Utilize deep learning (DL) algorithms for prediction.

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Key Management in Distributed Database Security: A Case Study of Google's Security Strategy

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Key Management in Distributed Database Security: A Case Study of Google's Security Strategy

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Abstract

This research investigates Google's encryption and key management protocols within its distributed databases to understand how the company secures sensitive data and guide similar organizations in enhancing their security postures. Employing a comprehensive review of scholarly articles, technical documentation, and Google's public security disclosures, the study reveals Google's adoption of a multi-layered encryption strategy, combining symmetric and asymmetric techniques, alongside a distributed key management system that restricts access to authorized personnel. It further highlights the use of hardware security modules (HSMs) and stringent access controls to safeguard encryption keys. The findings suggest that Google's approach provides a robust security framework for distributed databases, recommending that organizations with similar security needs consider adopting layered encryption practices, decentralized key management, and reliable security mechanisms to protect their encryption keys. This study contributes to the broader understanding of effective data protection strategies in distributed computing environments.

Keywords: Distributed databases, security, encryption, key management, access control, auditing, monitoring, data collection, data analysis, limitations, constraints.

1. Introduction

The proliferation of distributed databases, fueled by cloud computing advancements, addresses the growing demand for scalable, available, and fault-tolerant data management systems. These databases, essential for handling extensive data across distributed networks, are classified into homogeneous (uniform DBMS and OS) and heterogeneous (varied systems) types, each presenting distinct security challenges. Homogeneous databases are further divided into autonomous and non-autonomous systems, while heterogeneous ones are categorized as federated or un-federated, complicating transaction and query processing. The benefits of distributed databases include improved scalability, fault tolerance, and performance, making them ideal for data-heavy applications like e-commerce and social media. Nonetheless, the complexity of securing data across various nodes necessitates sophisticated encryption and key management strategies. Google exemplifies the implementation of a multi-layered encryption approach and a distributed key management system to safeguard its distributed databases [1]. This study aims to dissect Google's security framework to offer valuable insights into securing distributed databases against inherent risks and challenges.

Securing these databases involves overcoming obstacles such as managing security across multiple nodes, ensuring data confidentiality, integrity, availability during transit, and implementing effective access control and encryption/key management strategies. Challenges also include mitigating risks of data loss or corruption and insider threats. Addressing these issues requires a comprehensive security strategy encompassing network security, robust access

controls, diligent encryption and key management practices, data redundancy plans, and thorough employee training to prevent data breaches and ensure data integrity across distributed environments [2].

1.1 Problem Statement

The security of distributed databases, essential for managing vast amounts of sensitive data across multiple nodes, is challenged by the complexity of encryption, key management, and the mitigation of risks such as data loss and insider threats. This paper is looking to explore Google's effective strategies in these areas to provide a blueprint for similar organizations seeking to enhance their security frameworks.

1.2 Purpose of The Study

This study aims to dissect the complex security challenges of distributed databases, focusing on encryption and key management to develop strategies for effective risk mitigation. It seeks to illuminate the intricacies of protecting data across multiple nodes and establish robust security measures for safeguarding sensitive information within these systems.

1.2.1 Objectives of The Study

The objectives include investigating the security hurdles of multi-node systems, assessing vulnerabilities in network communications, identifying effective access control mechanisms, and exploring encryption and key management practices. Additionally, the study focuses on evaluating data backup and redundancy solutions to prevent data loss or corruption, and scrutinizing employee training and monitoring to mitigate insider threats. Through this comprehensive analysis, the study intends to provide actionable insights for enhancing the security of distributed databases.

1.3 The Roles

Securing distributed databases is pivotal due to the sensitive data they handle across multiple nodes. Key security components include encryption, key management, access control, auditing, and monitoring. Encryption safeguards data, making it unreadable without the correct key, crucial for protecting data both in transit and at rest [3]. Key management ensures the secure creation, storage, and distribution of encryption keys, central to maintaining data security [4]. Access control restricts data access to authorized personnel, reducing insider threat risks [5]. Auditing and monitoring are vital for detecting security breaches and ensuring compliance [6]. Implementing robust encryption and key management, alongside strict access control, comprehensive auditing, and real-time monitoring, forms the cornerstone of effective security strategies for distributed databases, ensuring the confidentiality, integrity, and availability of data [7].

2 .Methodology

This section details the systematic approach and analytical techniques used to collect and analyze data on distributed database security. It emphasizes transparency to enable assessment of the study's reliability and addresses encountered limitations. The goal is to enhance the credibility and accuracy of the research findings.

2.1 Description of the methodology used for the project, including
data collection and analysis methods

For this paper, the methodology used was a combination of literature review and expert interviews. The literature review involved conducting a thorough search of academic journals, conference proceedings, and industry reports to gather relevant information on

distributed database security. The search terms used included "distributed database security," "encryption," "key management," "access control," "auditing," and "monitoring," among others. The information gathered from the literature review was then analyzed to identify key themes and concepts related to distributed database security. The data collected from both the literature review and security studying was then synthesized and analyzed to develop a comprehensive understanding of the key components of distributed database security, with a focus on encryption and key management.

2.2 Literature Review

The increasing adoption of distributed databases has spotlighted the critical need for robust security measures, particularly encryption and key management, due to their inherent security vulnerabilities compared to centralized systems [8]. Research in this domain has flourished, focusing on innovative solutions to s safeguard sensitive data across distributed networks.

Wang et al. (2018) delve into the security hurdles of distributed databases, proposing a novel framework aimed at secure data sharing within cloud-based systems, underscoring encryption and access control as fundamental for protecting data in shared environments [9]. Zhang et al. (2019) investigate the application of homomorphic encryption, which allows data processing without decryption, highlighting its promise and the associated computational burdens [10]. Li et al. (2019) scrutinizes current security practices, pointing out that traditional access control might not suffice for the complexities of modern distributed settings [11].

Moreover, Cheng et al. (2020) explore blockchain as a means to enhance security through decentralized access control and key management, albeit noting scalability and interoperability as ongoing challenges [12]. Collectively, these studies affirm the pivotal role of

encryption and the continuous search for more sophisticated security approaches, despite potential limitations like computational demands and scalability concerns.

Moreover, Cheng et al. (2020) explore blockchain as a means to enhance security through decentralized access control and key management, albeit noting scalability and interoperability as ongoing challenges [12]. Collectively, these studies affirm the pivotal role of encryption and the continuous search for more sophisticated security approaches, despite potential limitations like computational demands and scalability concerns.

2.3 Countermeasures

To safeguard distributed databases against external threats, strategies such as deploying firewalls, intrusion detection systems, and antivirus software are crucial, along with regular updates and security patches [13]. For internal threats, enforcing stringent access control policies, particularly role-based access control, limits data access to authorized users [14].

To prevent data corruption stemming from hardware or software failures, organizations must establish comprehensive backup and redundancy measures, ensuring data can be recovered promptly in the event of system breakdowns or other unexpected issues [15].

2.4 Limitations

Challenges in this study included finding current, relevant research on distributed database security, overcome by a selective review process to ensure the analysis focused on the most pertinent information. Additionally, time constraints necessitated prioritizing essential project elements, concentrating efforts on collecting and analyzing the most critical data within the limited available timeframe.

3. Case Study: Google's Security Strategy

Google has established a comprehensive security strategy for its distributed databases, prioritizing the confidentiality, integrity, and availability of data. Central to this strategy is the use of both symmetric and asymmetric encryption to safeguard data in transit and at rest [16]. Google's Key Management Service (KMS) ensures secure key storage and management, supplemented by Hardware Security Modules (HSMs) for physical key security [17]. Additionally, Google implements rigorous access control, utilizing a role-based system, and auditing processes to monitor data access [18]. The strategy is designed for scalability and resilience, with a distributed architecture that enhances redundancy and data recovery capabilities [19]. Google's approach exemplifies a holistic security framework

combining encryption, key management, access control, and auditing to protect user data effectively.

4 .Google's Strategy

Google's security strategy is comprehensive, designed to protect its extensive infrastructure and sensitive data, while ensuring adherence to GDPR and other data protection laws. It employs a layered approach to security, including access control, auditing, encryption, and advanced threat detection mechanisms like machine learning and anomaly detection [20]. To address specific threats, Google has developed measures such as DDoS protection and insider threat mitigation, including background checks and monitoring [21]. Its GDPR compliance is supported by data processing agreements, Data Protection Impact Assessments (DPIAs), specific security controls, and EU data center regions for data storage [22]. Google also emphasizes transparency and accountability, publishing reports on government data requests and content removal.[23]

This strategic blend of security, compliance, and transparency establishes Google as a model of data protection and user trust.

4.1 Analyzing Google's Comprehensive Security Strategy: Strengths and Weaknesses

Google's security strategy is marked by a blend of advanced measures and compliance controls, designed to protect its complex infrastructure and sensitive data. Strengths include sophisticated security technologies like machine learning for threat detection, a risk-based compliance framework ensuring adherence to laws, scalable infrastructure supporting data growth, and centralized management for consistency across its systems. However, weaknesses emerge from its centralized control system, making it a prime target for cyberattacks, reliance on third-party services introducing external vulnerabilities, and the inherent complexity of its infrastructure, which could hinder threat detection and response. Despite these challenges, Google's approach remains a strong defense, albeit one that requires continuous vigilance and adaptation to evolving threats and technologies.

4.2 Comparing Google's Distributed Database Security Strategy with AWS and Azure

Comparing the distributed database security strategies of Google, AWS, and Azure reveals distinct approaches within a shared commitment to safeguarding data. Google emphasizes a risk-based compliance framework, advanced security technologies, and the scalability and manageability of its services, notably through Cloud Spanner with its encryption and access controls. AWS focuses on comprehensive access management, encryption, and auditing tools, supported by services like Amazon RDS and DynamoDB, enhanced by VPCs, IAM, and KMS for security and compliance. Azure, through offerings like Azure SQL Database and Cosmos DB, prioritizes access management, encryption, and a strong compliance

posture, integrating Azure Active Directory and encryption standards, supplemented with monitoring tools like Azure Monitor. Each platform tailors its security measures to provide robust data protection, demonstrating unique strengths in managing distributed database security.

4.2.1 Commonalities

Google, AWS, and Azure exhibit key similarities in their distributed database security strategies, including a strong emphasis on encryption for data both at rest and in transit, ensuring robust protection against unauthorized access. Access management is another critical focus, with each utilizing advanced tools like IAM and RBAC to control data access precisely. Compliance with regulatory standards such as HIPAA, PCI DSS, and SOC 2 is uniformly prioritized, reflecting their commitment to meeting stringent industry requirements. Furthermore, all three companies offer comprehensive auditing and monitoring capabilities, enabling effective oversight of database activity, anomaly detection, and incident response. Scalability remains a cornerstone, with each platform providing scalable solutions to support the evolving demands of businesses, showcasing their dedication to delivering secure, compliant, and adaptable distributed database services.

5 .Motivation Problems and Solutions

Challenges in implementing distributed database security include performance impacts from security measures, the complexity of key management, adherence to regulations, difficulties in key distribution and revocation, and potential usability issues affecting user adoption. Solutions involve adopting a risk-based security approach, optimizing performance, employing strong key management practices, ensuring regulatory compliance, automating key distribution, and prioritizing

user experience. Google's strategy on the Google Cloud Platform (GCP) addresses these challenges through: Performance Optimization: Leveraging hardware-based encryption and distributed access control systems like Spanner to minimize performance impacts. Key Management Simplification: Offering Cloud KMS for easy key distribution, revocation, and access control, supporting key rotation and versioning. Regulatory Compliance: Ensuring GCP services comply with standards like GDPR, HIPAA, providing documentation and certifications to help organizations demonstrate compliance.

Automated Key Distribution/Revocation: Integrating Cloud KMS with IAM for fine-grained access control, automating key management processes.

Google's approach tackles the motivation problems by balancing security needs with performance, compliance, usability, and effective key management, facilitating secure and efficient distributed database operations.

6. Exploring Emerging Technologies: Blockchain and Homomorphic Encryption for Distributed Database Security

The field of distributed database security is rapidly evolving, with blockchain and homomorphic encryption emerging as promising technologies to address current security challenges. Blockchain offers a decentralized, tamper-proof ledger system, enhancing data integrity and confidentiality across distributed databases. It facilitates immutable transaction records, secure data sharing, and digital identity management, marking a significant step forward in secure data management and collaboration. Homomorphic encryption represents a breakthrough by allowing computations on encrypted data without needing decryption, thereby maintaining data security

during processing. This technology enables secure data processing, computation outsourcing, and sharing, presenting a solution to the vulnerability exposed during data decryption .

While both technologies are in early development stages and face challenges like performance and complexity, their potential to revolutionize distributed database security is immense.

As cyber threats grow more sophisticated, the adoption and integration of these emerging technologies will be crucial for organizations seeking to bolster their data security measures. Keeping abreast of these advancements is essential for ensuring the long-term protection and integrity of distributed databases.

6.1 Implications of Emerging Technologies on Google's Security Strategy

Emerging technology like blockchain and homomorphic encryption hold significant implications for Google's distributed database security strategy. Blockchain's decentralized, tamper-proof ledger could vastly improve data integrity and confidentiality, offering a robust defense against unauthorized access and data tampering. This technology enables secure data sharing and collaboration, aligning with Google's commitment to data privacy and security.

Homomorphic encryption allows for the processing of encrypted data without decryption, reducing the risk of breaches during data processing. Its integration could enhance Google's ability to securely manage data processing, sharing, and outsourcing computations within its distributed databases. As these technologies evolve, Google must continuously evaluate their fit within its security framework, ensuring agility in its security strategy to incorporate advancements effectively. Adapting to these emerging technologies is crucial for maintaining the security, confidentiality, and integrity of Google's

data against the backdrop of evolving threats in distributed database environments.

7. The Significance of Encryption and Key Management in Bolstering Distributed Database Security

For organizations utilizing distributed database systems, encryption and key management are pivotal in forming a robust security foundation against the evolving threat landscape. Key recommendations include:

Prioritize Encryption: Encrypt data at rest and in transit using strong algorithms and keys to prevent unauthorized access and data theft.

Robust Key Management: Develop a secure framework for generating, storing, and managing cryptographic keys, incorporating automated key rotation and strict access controls.

Regular Security Assessments: Conduct routine vulnerability scans and penetration testing to identify and mitigate risks.

Granular Access Controls: Implement role-based access control (RBAC) and multi-factor authentication (MFA) to restrict data access to authorized personnel.

Consistent Updates and Patches: Maintain a patch management process to apply security updates promptly.

Employee Security Training: Educate employees on security best practices, including password security and recognizing social engineering attacks.

Adhering to these guidelines strengthens the security posture of distributed databases by ensuring data confidentiality, integrity, and availability. Organizations must stay informed about the latest security

trends and technologies to effectively protect their data against emerging threats.

8. Conclusion: Safeguarding Distributed Database Security

In today's data-driven world, the security of distributed databases is paramount as data volumes continue to surge. This project has examined the challenges and threats in this domain and explored emerging technologies and best practices to mitigate these risks.

I. Key Findings and Contributions

1. Encryption and Key Management: Encryption and key management are pivotal. Encryption protects data, even if it falls into unauthorized hands, while key management ensures exclusive access by authorized parties.
2. Staying Up-to-Date: Organizations must keep abreast of the latest security trends and technologies, including blockchain, homomorphic encryption, and multi-factor authentication, to counter emerging threats.
3. Secure Coding Practices: Implementing secure coding practices, regularly patching vulnerabilities, and conducting security audits are fundamental for robust distributed database security.

II. Implications for Future Research and Practice

1. Ongoing Research and Innovation: Continuous research and innovation are essential. Collaboration among researchers, practitioners, and industry leaders is crucial for effective and practical security solutions.

2. Interdisciplinary Approach: Due to the complexity of distributed database security, an interdisciplinary approach drawing from various fields is indispensable.

III. Recommendations for Organizations

1. Prioritize Encryption and Key Management: Make encryption and key management fundamental components of the security strategy to ensure data protection.
2. Stay Current: Vigilantly monitor the latest trends and technologies in distributed database security to effectively confront emerging threats.
3. Implement Secure Coding Practices: Embrace secure coding practices, regular vulnerability patching, and security audits to identify and rectify potential vulnerabilities. As data volumes continue to grow, it is imperative for organizations to prioritize and invest in distributed database security to safeguard their data against evolving threats.

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THE ROLE OF PROJECT MANAGEMENT FOR INCREASING THE PRODUCTIVITY OF PRODUCT

6

THE ROLE OF PROJECT MANAGEMENT FOR INCREASING THE PRODUCTIVITY OF PRODUCT

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ABSTRACT

This review paper describes the relationship between the using of the tool for project management and the productivity of product. To be more precisely it explains the important role project management play to improve the productivity of the product in industry. It shows in brief the most recent study about this topic and the more effective way to do project management to reach the organization target related to the product. Then it suggests the general project management block diagram to apply for any type of industry to increase the productivity of the product.

Keywords: Project Management, Quality, productivity, the product.

1. INTRODUCTION

Project management history is said to be known for ages. It`s said through Craig B. Smith in his book "How the Great Pyramid became constructed" that the first-rate pyramid of Giza could now no longer had been constructed without a few shapes of assignment management. Even to the extent that a WBS more likely was used [10]. Project management has emerged as an essential tool to improve the management effectively for all types of organizations, manage successful projects providing a vision and techniques which can be improved and workflow redesign to make it more efficient and adaptable to the needs of customers. Project management is a structured methodology that can be used in all industries regardless of service or product it's designed to deliver. Project management has a remarkable value beyond its basic application across industries. When project management is implemented effectively, it increases the success of the intended delivered product or service.

The most important thing of the product is that product contact with customer satisfaction directly. This reason makes the increasing of the productivity of product very sensitive. Usually, the producing enterprise drew advantages from validated manufacturing control techniques so they invest a lot of money in this field research. Improvement productivity needs from us to know the factors that influence productivity and looking for proper ways and techniques for each firm. These techniques and elements can be divided to industry-level, company-level, and challenge level. In our review, it will show and focuses on the company level and project management level. For example, In Canada exactly in 1994 there was a study shows, planning and scheduling consider it as the first factor that drive the productivity in the waste water treatment plant field [4].

The Methodology of this study mainly depends on secondary data collection sources.

The prime objective of this paper is to review literature and case studies related to the relationship between the project management and productivity of the product. This study will help us to explore the techniques in the project management that affect the productivity of product at industry.

2. Materials and Method

Most of the studies in this field depend on the quantitative method for collecting data and analyzed it. Some of these studies were used a computer program to get the results such SPSS program (Statistical Package for the Social Sciences). Some of them were used time series to show the effect of the factor within two different period of time. The comparison between project management models was applied. Whatever the way was used in these studies; we are focusing on the results from these methods which are giving us the clear picture about the relationship between project management tools and productivity of the product.

3. Literature Review
3.1 Techniques and factors to increase the productivity of the product

Since the industry revolution, increasing the productivity considered as main element which can play an important part to the countries' economy. There are very important factors to improve industrial competitiveness and productivity of product such as to broaden techniques round product design, making use of the idea of excellence in all its degrees and focusing in innovation field.

There is study regard to this issue published in 2013. This study aims to show process of product design is an important part to put the criteria of the excellence of product to meet the demands of customers in the global competitive markets. The methodology of this study is

comparison study between European regulatory paradigms on the design of products, standard BS 7000-2: 2008 with models predictive of project management, mainly international PMBOK (Project Management Body of knowledge) guide and the model developed in Europe, PRINCE2. This comparison will create integrated vision for all level of process in project management. The main contribution of this study is taken the benefit of each model it will enhance the product design. From this study it was found that the PMBOK manual describes uniquely venture control approaches that make sure that the venture progresses successfully for the duration of its existence, which includes those approaches, the gear and strategies worried with inside the utility of abilities and skills which might be defined with inside the regions of knowledge. The British Standard BS 7000-2: 2008 offers a predictive technique for venture control with an excessive diploma of similarity to the PMBOK manual, with reference to the outline of the venture control approaches, figuring out each the approaches which have been identified as top exercise for almost all of projects. This does now no longer imply that the defined approaches have to usually be implemented uniformly on all projects, the venture supervisor and his crew may be answerable for figuring out what approaches are appropriate and what diploma of accuracy suitable for every process. However, the PRINCE2 version enables a sequence of approaches that designate what have to manifest and while with inside the venture in order that any venture guided via way of means of this approach ought to contain those approaches in a way, however greater importantly, is to regulate the version approaches to the necessities of that unique venture you're working.

A PRINCE2 project is planned, monitored and controlled phase to phase, is focused on the definition and delivery of products, in particular its quality requirements, processes diverge widely. Moreover, from this study it can be concluded that the utility of undertaking control procedures will increase the possibilities of fulfillment of a huge form of projects. It is recommended to make a

comparative evaluation of undertaking-stage control of a number of the predictive fashions used for undertaking control, with European guidelines for dealing with the layout of synthetic products. In technologically extra superior countries, technical productiveness improvements which mark the variations among organizations belonging to numerous monetary sectors presently are associated with enterprise of work. In this regard, continuous process improvement has evolved into a new integrated management approach. Total management system by processes as illustrated in Figure 1 shows the main difference between PMBOK process and PRINCE2 phase process. The main income knowledge was taken from this study how to take the benefit of different standardized model to increase the productivity of product [9].
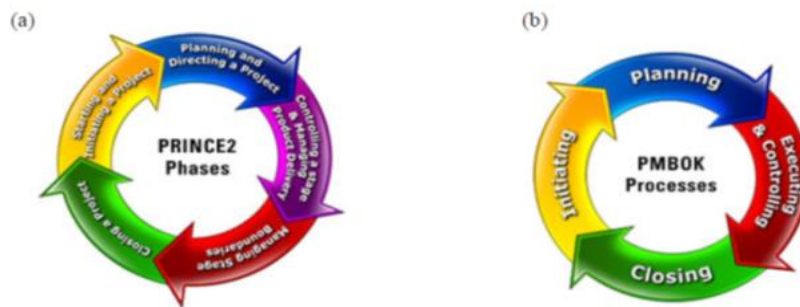

Figure 1. Compare between (a) PRINCE2 (The Project in controlled Environments); and (b) PMBOK (Project Management Body of knowledge) [9].

According to a study published in 2020, The primary objective of any manufacturing entity is the attainment of customer satisfaction, which can be realized through the provision of high-quality products,

delivered punctually, and offered at a competitive price point. Any organization, whether engaged in manufacturing or providing services, will thrive and maintain its competitive edge if it possesses the requisite flexibility to adaptively and systematically respond to customer demands, thereby enhancing the value of its offerings. The costs associated with equipment, materials, and labor are subject to inflationary pressures, which serve as critical factors influencing the pricing of products. Inefficient use of equipment, materials, and labor results in direct financial losses. Therefore, it is imperative to prioritize the optimal utilization of these key factors, followed by efforts to minimize waste in manufacturing processes. Lean manufacturing practices have become essential across various sectors, including automotive, electronics, plastics, textiles, food, dairy, foundry, stamping, and maintenance. The advantages noted following the adoption of individual or integrated lean manufacturing techniques include a decrease in cycle time, the removal of non-value-adding activities, and the establishment of a clean, organized, and sanitary work environment. Additionally, these techniques facilitate a seamless production flow, enhance productivity, lower production costs, promote employee engagement, ensure proper order documentation, decrease inventory levels, and improve both intra- and inter-departmental connectivity for expedited decision-making and rapid responses. This review examines various manufacturing sectors to assess the impact of implemented lean manufacturing techniques on process improvement and waste reduction [12].

Another study published in 2012 talks has the title "Significance of depth of inspection and inspection performance metrics for consistent defect management in the software industry". It talks about how the production of high-quality software can improve the productivity of products through an effective defect management system. This study focuses on how inspection and testing which are parts of the defect management system play an important role in increasing the quality of

the production line then it will increase the productivity of the product as well. This study provides a case study involving empirical analysis of projects from a leading product-based software industry. The study strongly indicates the need for awareness and use of quality measurement of processes and people in realizing effective defect management. Moreover, this study explains how to implement high-quality software by using process metrics, inspection performance metrics, and quality metrics for development more supplement the quality and productivity in the process line. This software will be able to reduce the expensive rework time, cost, and rebinding of resources. This study takes the silicon market as a case study for this implementation because it is considered highly competitive in modern days. This study suggests that software organizations can improve their quality within estimated cost and schedule with a good understanding of effort distribution of quality assurance activities such as reviews, process audits, and testing which lead to process improvement. In addition, this study shows the effect of the skill level or experience of the participants has to be one of the important project factors, that can influence the productivity of the product. Since effective defect management is one of the successful paths to producing high-quality software, the industry follows several defect management strategies to address defect-associated issues. They primarily include defect detection and defect prevention strategies. Defect detection and prevention aims to provide quality software that reduces the cost and time to fix a defect, increases productivity, and enables to achieve total customer satisfaction.

This study shows that high-quality a product is the only method for achieving customer satisfaction. Implementation of quality metrics therefore reflects continual process improvement of the company and enhances their productivity. The application of pair metrics as an effective defect management tactic is a potential hope for saving a billion dollars across the industries by annulling expensive defect-associated rework in the projects. This approach provides an

opportunity for the business houses who outsource work to software factories, to have a firm grip on the quality of the inspection process and save inadvertent cost escalation, usually arising out of test forecast failure, and increase productivity as well [5].

There is a study published in 2009 that highlights unit cost considerations. This study is entitled "On Productivity in project organizations". The methodology in this research is based on extending the old method which was developed by Gold to cover multi-project organizations. Moreover, the adaptation of the productivity network is verified using a hypothetical case. This paper "generally" talks about the productivity in an organization is found not to be dictated by a single input, but by the multiplicative outcome of each together. Specifically, yearly the number of projects handled appears to be of strategic importance in productivity. The limitation of this paper is that this paper is conceptual, so applicability depends upon the nature of the particular organization to which it is applied. The main contribution of this study, it provides quantitatively treated productivity in multi-project organizations. The approach can be used to understand the productivity as well as some elements of effectiveness of multi-project organizations. It was found By using an index stream for each of the inputs which is the new method implemented by this study, productivity could be associated with modifications in material inputs, changes in the design of the operating process, improvements in control systems, and alterations in the design of products. This study shows if the firm was working close to capacity, increases in the number of projects would be expected to decrease productivity. Although there are problems that might be anticipated in using the methodology, it is asserted that managers of multi-project firms would be better at trying it. At the very least, it reflects on the productivity of major inputs and the project mix of the firm [2].

There is an important study published in 2007 highlights the benefit of self-management and its effects on increasing productivity. The idea of self-management is to create self-controlled painting groups and the way to combine those groups into undertaking management. This study is based on a range of works, which provide a description and practical advice about self-managed work teams by reviewing other work. The main results of this study provide a full view of self-managed work teams in today's workplace. It was found from this study that implementing self-managed work teams is considered a useful way to increase the productivity of product and employee morale. It mentions other benefits of a self-managed work team such as increasing the quality of work these teams produce, shifting the company's focus from simple planning to a focus on the entire process of production and self-managed teams offer multi-functional definitions and solutions to problems that generate innovative products or services. It concluded that members have to become personally responsible for adequately representing and integrating their technical contributions into the final product [8].

3.2 Project management in the manufacturing field

When applying project management practices, tools, and techniques to the manufacturing process, it can ensure that the time to market is efficient and the quality standards are met. Project management techniques such as scheduling, planning, risk management, quality assurance, quality management, and quality control are essential to achieve these factors.

There are three phases of project management that are considered while managing projects which are planning, scheduling, and controlling. Below is a brief review of each element [7].

3.3 Project Planning

Project planning comes at the initial and early stages of manufacturing or software development. Project planning also includes planning, organizing, directing, and controlling project tasks and activities. There are many signs of unplanned projects. Two of these indicators are financial loss and project delay [1].

3.4 Project Scheduling

Project scheduling is an important element of project execution success as it's vital to accomplishing the project's goals and objectives. Keizer and Render in Element in Project Management mentioned that projects with appropriate scheduled tasks are more likely to produce far better-quality work products, cost savings, and shorten the project timelines [7].

The engineers, project managers, team players, and software developers all play an important role adhere the project schedule and meeting the obligation of completing the product according to the designated timelines. The project might be delayed as a risk if not adhere to the schedule which would cause project completion interruption and financial loss. [1].

3.5 Project Controlling

Project controlling is a very important phase of project management to allocate resources, budget, equipment, and time into a time frame to achieve the project's objectives without compromising the performance and outcome [6]. Project controlling involves project objectives control, design control, budgeting, cost control, authority and approving control as well as financing control and control costs [11]. Hence, in short, no project can be successful without clearly

defined objectives, and proper allocations are made for the essential resources, and material or equipment.

There is a direct effect of the incident of result process administration and control of product quality from the outlook of the study sample at the Libyan Iron and Steel Company in Misurata, and mathematical reasoning habitual this friendship. This result reveals the consideration of the Libyan Iron and Steel Company - Misrata in the constant happening of administration of result processes during the whole of the Diversified stages of production, at the time of the discovery and scrutinizing of result processes, softening and calculating natural resources in the rods and skewers division of the brace plant, and last accompanying the test of definitive produce. All of these processes increase the value of the things produced.

A direct connection betwixt evolving result process administration and control of product quality at the Libyan Iron and Steel Company Misrata. On the contrary, the boredom in the unending growth of the administration of result movements for one administration of the Libyan Iron and Steel Company - Misurata will abandon to control the product's kind, happening in the guest's failure to spar concerning business and a downturn in allure retail share [13].

4. Results and Discussion

From this review, we can conclude that there is a clear relationship between the productivity of the product and the project management tools and techniques. That means if any organization prepares the best approach to scheduling, planning, controlling, and project management overall, it will reach better productivity. On the other hand, if the organization enhances the productivity of a specific company or field restricted by the quality of the manufacturing process it will increase the whole system productivity which is the requirement for any organization or plant. After this literature review, we end with a general project management (techniques and factors)

framework that can be applied to any industry to increase productivity. The relationship between project management and the productivity of a product with consideration of time value can be summarized by the block diagram below:
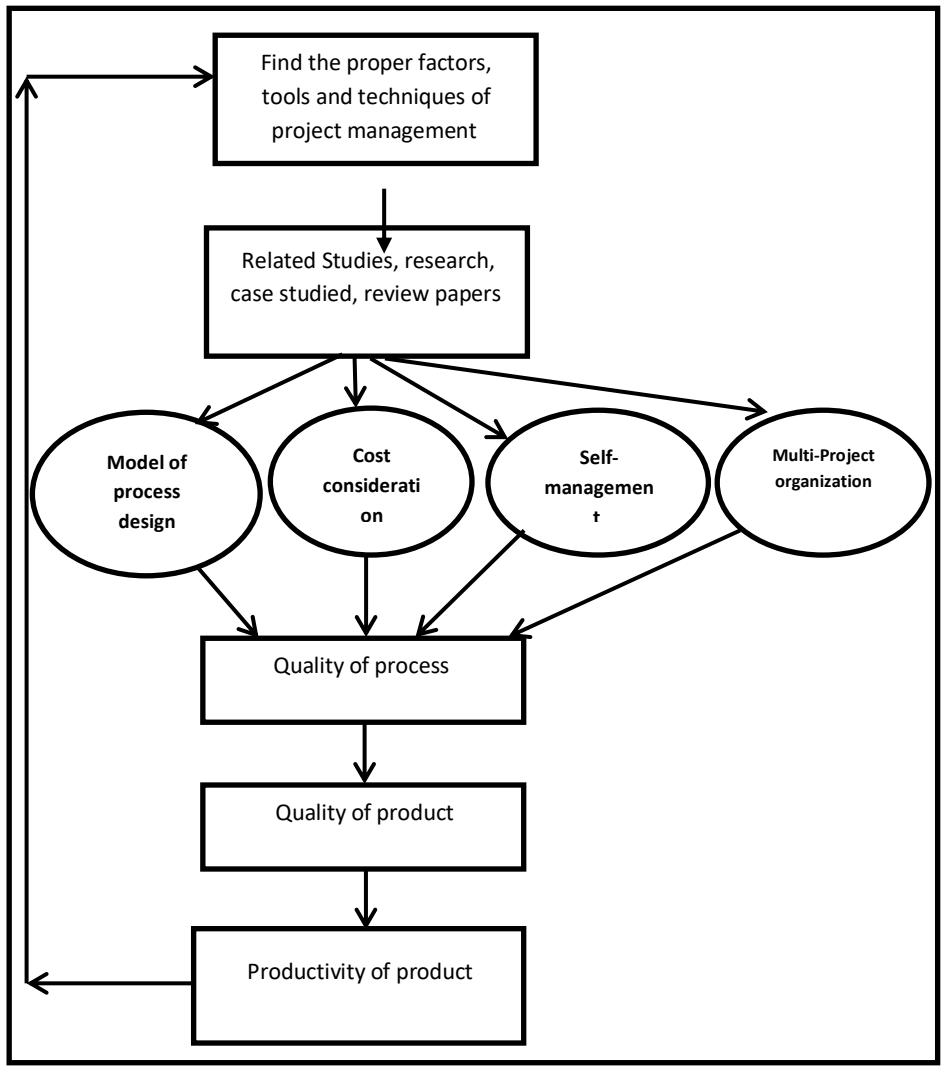

Figure 2. The relationship between project management and productivity of product

5. Conclusion

This review paper shows the strong relationship between the project management tool and the productivity of the product. The result block diagram from this review paper shows increasing productivity must have some steps, tools, techniques, and considerations from each organization. Therefore, increase productivity any firm needs to look at recent techniques and considerations such as cost consideration, self-management technique, and a model of processing design and make the organization work as a multi-project organization.

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THE IMPACT OF SOCIAL MEDIA PLATFORMS ON LEARNING ENGLISH LANGUAGE IN CAPE TOWN CITY: CASE STUDY

7

THE IMPACT OF SOCIAL MEDIA PLATFORMS ON LEARNING ENGLISH LANGUAGE IN CAPE TOWN CITY: CASE STUDY

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ABSTRACT

Social media platforms consist of several different websites and applications, which help individuals communicate with each other. They can also follow current events and exchange information, and these means have also become a platform for learning. This research aims to determine the extent of the impact of these methods on students learning the English language in terms of reading and writing in Cape Town. The method used in this research is using mixed research and data were collected through questionnaires intended for students as well as from interviews with English language teachers. The results obtained from this research are that social media actually have a negative impact on students' teaching of the English language, writing and reading. This is due to the fact that the language used in these platforms is colloquial English, and what made matters worse

was their reliance on spelling, writing and reading correction programs**.**

Key words: social media, English language, colloquial, writing, reading, spelling.

1. INTRODUCTION

Social media consists of several electronic channels such as different websites, microblogging, social networks, and many forums [1]. These means were designed for the purpose of communication between people to share content between them in an easier [2]. Social media provides many services that family and friends need, such as following current events, news, and exchanging information [3]. These tools are also used to provide entertainment content, such as tracking historical activities, and to exchange opinions on various topics over the Internet [3]. Not only that, but many of these methods have also contributed to improving the provision of services provided by companies and advertising various products [4]. These channels have made it easier to buy and sell many different goods such as buying academic articles and commercial video lessons online [5]. It is not necessary for the users of these means to be in a specific region, or of specific races, or to differ in educational, economic, or social levels [5]. Since the use of these methods is widespread in the world and is used in many fields, from owners of large companies to the general public, this means that students will also use them in their academic achievement [6]. Despite the presence of this advantage,

there are some challenges that students face when using the English language and applying it correctly. This is due to the student not adhering to the correct grammatical and spelling rules, symbols and punctuation marks of the language [7]. Therefore, despite the positives offered by social media platforms, their use has negative consequences [8]. Students use Facebook, Twitter and WhatsApp to communicate with each other. These digital tools are beneficial to students but have undesirable effects on their writing skill [9]. This is because students use abbreviations in their writing, which makes them write faster without paying attention to correct grammar [10]. Students have started using colloquial language in preparing essays, assignments and exams instead of the correct formal language [11].

2. METHODOLOGY

Research is conducted for many purposes such as interpreting, explaining and developing a specific idea to provide knowledge [12]. There are three types of research methods: quantitative research, qualitative research, and mixed research [13]. This research will use the third type, which is mixed research. Quantitative research relies on collecting numerical data to be analyzed using statistical methods [14]. This type of research is concerned with understanding the causal relationships between variables [15]. Quantitative research is divided into two parts: research that studies events and studies to find out the influential and causal relationships [16]. For qualitative research aims to understand social and human activities [17]. Data in this type of

research is collected in a detailed inductive manner through which the researcher understands and infers meaning from this data [18]. Mixed research means that both quantitative and qualitative research were used. This study focused on sampling data from English language schools in Cape Town and also on teachers working in these schools. Non-probability samples were used in this research for the purpose of conducting a broad social survey. Therefore, it is difficult to use probability samples, which means obtaining a list containing all members of the community to be researched. Specifically, the purposive sampling technique was used, which is a technique for taking non-probability samples [19]. Through this type of sample, we can obtain more accurate results because a specific number of individuals were selected from the research area. The research method in this study depends on collecting data from two categories. The first category represents students studying in English language schools in the Cape Town area, which is not their mother tongue. The youngest age among them was seventeen (17) years and they are (66) students. These students are users of various social media. These samples were taken to know the extent of the impact of these media on their writing and reading skills. The second category represents a group of English language teachers in the same region. There are 12 units. This is to know the teachers' points of view on the impact of social media on students' tendency to learn English.

3. DATA COLLECTION

This section will explain what data collection tools are in this research:

3.1 Individual Interview

This method provides freedom for the speaker, i.e. without restrictions from the researcher. Nine (9) open questions were prepared, the interview duration did not exceed 20 minutes, and the interview was recorded in full via mobile phone.

3.2 Questionnaires

Questionnaires are a method of collecting data and usually contain written questions. These questions may be open-ended or closed-ended [20]. The data collected from interviews and questionnaires were analyzed using special methods to extract and extract the desired information. The data collected from the questionnaires were analyzed using descriptive statistics, i.e. to be analyzed quantitatively and then represented in figures and graphs. The data collected from the audio recordings were analyzed through thematic analysis to obtain meaningful words and present them as a relevant topic.

4. RESULTS

In this section, samples of the results of both questionnaires and face-to-face interviews will be presented in the form of graphs or tables.

The questionnaire was analyzed quantitatively using descriptive analysis with tables and graphs to show the student respondents. Interviews were recorded

Audio recording by the researcher with permission from the respondents. It was then copied to a Microsoft Word document in a spreadsheet as shown below (Table 3).

4.1 Samples of Results of Questionnaire

Question 1: Do you use social messaging applications instant Messaging like WhatsApp and Facebook messenger?

Tabel 1: Students' Answers to Question No.1

	Options	Frequency	Percentage
1	Yes	66	100%
2	No	0	0%

Question 4: Do you use cyber slang or abbreviations in your communications on social media?
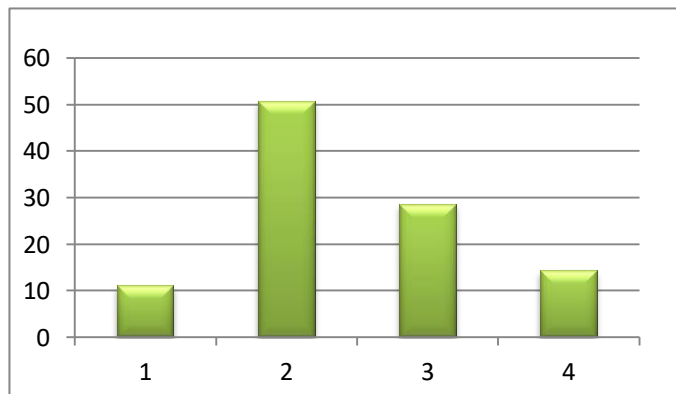

Fig. A Graph Showing Students' Answers to Question No. 4.

Question 7: Which of the following skills do you believe the use of social media improves?

Tabel 2: Students' Answers to Question No.7.

	Options	Frequency	Percentage
1	Reading skills	22	34.9%
2	Writing and spelling skills	19	30.2%
3	Creative thinking and writing skills.	27	42.9%
4	Language skills.	27	42.9%
5	None of the above.	9	14.%

4.2 Samples of Results of Interviews

Tabel 3: Some Questions and answers of Interviews.

Question 1: What is your understanding of the term colloquialism	
Interview 1	Colloquialisms refer to terms that are almost like slang and specific to counties or cities and differ throughout the world.
Interview 3	Colloquialism refers to informal speech, language that is used on the street and informal language.
Interview 9	Colloquialism refers to the everyday language, it's the everyday terminologies.
Interview 11	Colloquialism refers to the speech we use everyday
Question 5: Do you think social media communication offers students any benefit in terms of students' education? If so why, if not why?	

Interview 2	Social media communication offers students benefits in terms of students' education. Social media may be used for teaching. Teachers should use social media communication as part of student's learning.
Interview 4	Social media has a positive effect and can improve connectivity through the creation of a Facebook page or a What's App group
Interview 8	Social media communication has a lot of benefits for student education. Not all social media consists of short cuts Blogs Facebook, Twitter and Grammarly
Interview 10	They provide students with a great platform to practice their English. Social media platforms that allow for comments such as Facebook and the internet, improve the fluency of students. Social media communications allow students to express their opinions in English. Social media communications have benefits for students.
Question 6: Can you describe ways in which students can be educated on the use of social media to improve their reading and writing skills?"	
Interview 1	Students should learn how to write the structure correctly then feel free to change it to the slang variety. Students should be urged to write properly.
Interview 2	Students can be educated on the use of social media like WhatsApp and Facebook to improve their reading and communication skills.
Interview 6	Teachers should intrigue students with topics that interest them. cyber slang has negatively impacted on the reading

	and writing skills of students.
Interview 12	Students should be encouraged to write on social media platforms such as Twitter posts or Facebook posts in order to improve writing skills. Writing on social media platforms might not lead to an improvement in academic writing.

Through the results obtained from questionnaires and interviews with teachers, it became clear that:

1- Colloquial language is a language that is recognized as not being an official language and cannot be used in academic research and in formal environments

2- Most of the teachers who participated in the interviews agreed that this language is widely spread among students to the point that students use it in this classroom, which makes it difficult to eliminate or even reduce it. Consequently, this language negatively affects the teaching of the correct language, such as their inability to spell correctly and write correct sentences, as well as the absence of punctuation marks, etc. Some also say that this language has some positives, as it encourages students to communicate and talk, and that applications designed for spelling and grammar checking are capable of correcting errors and contribute to proper understanding.

3- Some participants believe that electronic colloquial language does not necessarily affect students' intellectual abilities, but rather affects their writing and information gathering skills. On the other hand, some believe that it contributes to the decline of students' thinking. However, they all agreed that students should be taught to

distinguish between the use of formal and informal language in different environments.

4- Some teachers believe that electronic slang weakens society and culture because it affects students' cognitive abilities, and they become dependent on auto-correction. Therefore, students must be taught what is acceptable to use in this language.

5- Some participants believe that social media platforms are a good tool for learning among students, as they contribute to encouraging students to discuss and communicate, and enhancing reading skills by sharing links between them, as well as enhancing listening skills through clips on YouTube.

5. Discussion

Through the results obtained from this study, it is clear that more than ten students confirmed that they use colloquial language and electronic abbreviations using instant messages. This result is similar to the results of a previous study [21]. Which confirms that social media platforms are being used addictively by young people and students. Most students (88.9%) who use instant messaging admitted that colloquial language affected their spelling, reading and writing skills. This result is consistent with the study by Vance et al [22]. This study confirmed that because students use colloquial language in their official duties, they are exposed to many grammatical and spelling errors. More than half of students (50.8%) use abbreviations sometimes. It affects their writing skills the most (54%), while another third (36%) indicated that it mainly affects their ability to spell.

6. Conclusion

Technological development in this world is increasing rapidly, so students must keep pace with this development so that they can practice the techniques that help them in their education and strengthen the relationships between them and their teachers, which contribute to encouraging them to write and express continuously. Social media has made this world a global village in which there are various hobbies, cultures, and especially languages. Language has contributed very significantly to integrating these things, specifically the English language as it is a global language at the present time. Students who aspire to learn the English language flock to countries that speak this language, such as Britain, Africa, and Canada. Recently, South Africa has become a well-known destination for teaching the English language. This research was concerned with an in-depth study of the different viewpoints of both students of the English language and teachers of this language in the city of Cape Town, and the extent of the impact of social media on their learning of the English language, and precisely the use of colloquial language in social media and its impact on them while learning the language English The results reached by this study through questionnaires for students and face-to-face interviews with English language teachers confirmed that students are indeed clearly influenced by the colloquial language used on social media platforms via smartphones, computers, tablets, and the like. With the presence of automatic correction programs, the situation is exacerbated because students depend on

these programs to correct their writing, and therefore they cannot spell and write correctly. Despite this, most of the teachers interviewed confirmed that the colloquial language used on social media platforms has many advantages with regard to learning and practicing the language. That is, social media platforms can be used to enhance language skills such as speaking and even writing.

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Comparison of For and Foreach Loops in VB.NET Language

8

Comparison of For and Foreach Loops in VB.NET Language

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Abstract

Most of programming languages use loops as a tool to solve many problems. The base of loops and how do they work are the same in all languages with the difference in the general form of loops' body. In this paper the author compares the two types loops of VB.NET For and Foreach loops according to Run Time of some examples to increase the performance and efficiency of the programs. Many examples with different types of data were used. Array and Array list were used to store data. It is found that For loop is more efficient when using array, and ForEach is more efficient when using Array List.

Keywords: Loop - For - Foreach – Run time – Compile time.

1. Introduction

There are three types of code the programmer can use while solving his problem, Sequential code, Selective code and Repetitive code. The programmer can use one of them or all of them in one code depend on the problem that he wants to solve [1]. However, most of software changes are repetitive in general [2]. In Repetitive code, the program executes some statements many times according to the programmer demand.

The selective code and repetitive code are most common structures codes used in all modern programming languages. In Selective code the program executes specific statements depending on the value of logical expression. In Repetitive code, the program executes some statements many times according to the programmer demand.

Loops are the most powerful tool that used in programming languages. In computer sciences loops are controlled by counter (control variable) or by logical expression. Control variable has three values, initial value, limit value and step size. The iterations of some statements continue till the limit value is reached and then the loop stops [3].

Runtime and compile time are two parameters that effect the efficiency of computer program. Runtime is the period of time when a code is running. The point at which a program is converted from source code to machine code is called compile time. This paper makes comparison between For and Foreach loops in VB.NET language to design good and efficient code according to RunTime.

2. For Next Loop

It is used to repeatedly execute a sequence of code or a block of code until a given condition is satisfied. A For loop is useful in such a case

when we know how many times a block of code has to be executed. In VB.NET, the For loop is also known as For Next Loop. The general form of For loop is:

For variable_name = start to end [Step size]

 [Statements to be executed]

Next

- **For** is the keyword (reserved word).
- **Variable_name:** it is a variable name and its value should only be numeric. The value of this variable determines when to exit the For loop.
- The **start** and **end** are the two important parameters representing the initial and final values of the **variable_name**. These parameters are helpful while the execution begins, the initial value of the variable is set by the start. Before the completion of each repetition, the variable's current value is compared with the end value. And if the value of the variable is less than the end value, the execution continues until the variable's current value is greater than the end value. And if the value is exceeded, the loop is terminated.
- **Step**: A step parameter is used to determine by which the **counter** value of a variable is increased or decreased after each iteration in a program. If the counter value is not specified; It uses 1 as the default value.
- **Statements**: A statement can be a single statement or group of statements that execute during the completion of each iteration in a loop.

- **Next**: In VB.NET a **Next** is a keyword that represents the end of the **For loop's** [4].
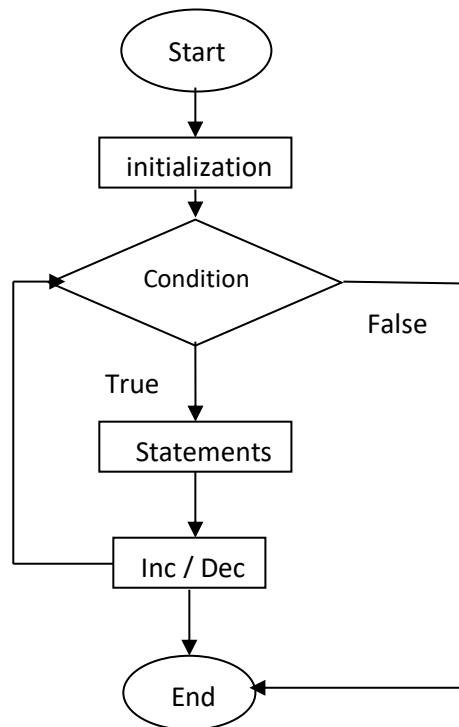

Figure 1: For loop flowchart

3. ForEach Loop

In VB.NET, For Each loop is useful to loop through items in an array or collection object to repeatedly execute the block of statements. The general form of ForEach loop is:

> For Each var_name As [Data_Type] In Collection_Object
>
> Statements to Execute
>
> Next

- The **var_name** is the variable that will be used to iterate over all items of the collection.
- The **data_type** is the data type of the element. It is required if the item had not been declared.
- The **collection_object** is the collection over which statements are to be repeated. It is required.
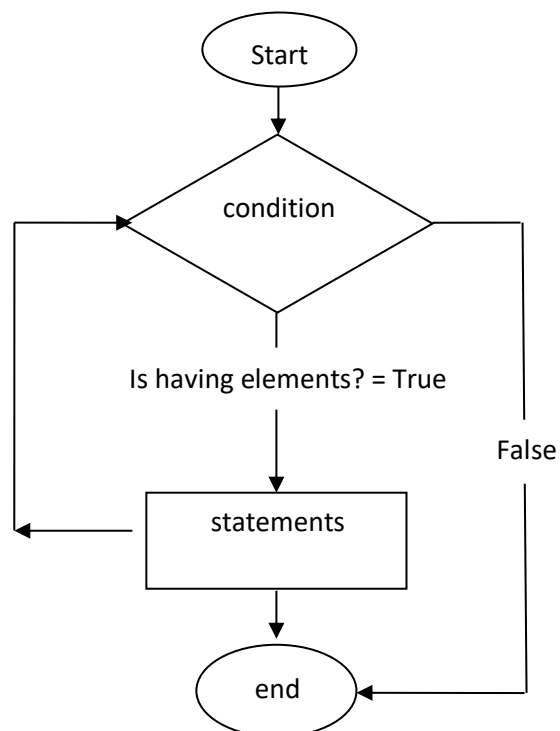- The **Next** marks the end of the For Each loop, which is required [5].

Figure 2: ForEach loop flowchart

4. Results and Discussions

After doing many experiments using different kind of data, we recorded run time of counting many characters and integers using For

loop and ForEach loop. Our data were stored in array and array list, the following tables and figures show the results that we have obtained.

4.1.   Using String Array

Table-1: Comparison of Run Time of For Loop and ForEach

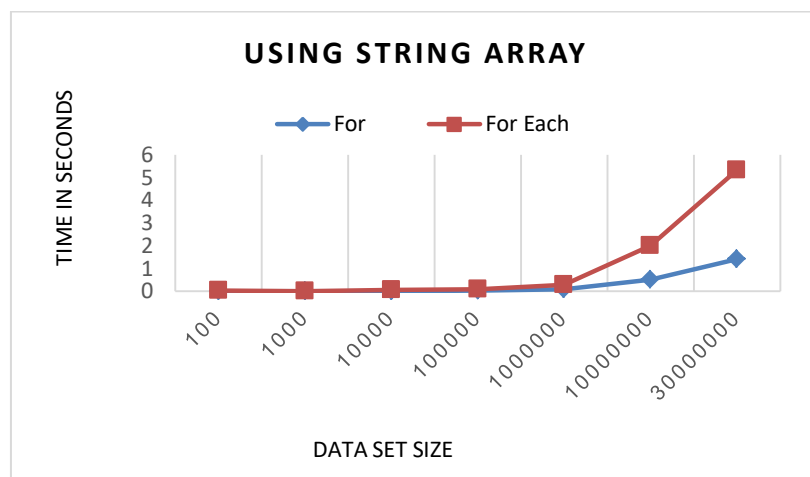| Array type	Number of elements	Run time (sec)	
		For Loop	**ForEach Loop**
String Array	100	0.0018748	0.0046489
	1000	0.00103	0.0030994
	10000	0.0024398	0.0338762
	100000	0.0042455	0.0596996
	1000000	0.0635392	0.2769736
	10000000	0.4905563	2.0033671
	30000000	1.4019932	5.3254707

Figure 3: Run time by using string array

4.2.   Using String Array List

Table-2: Comparison of Run Time of For Loop and ForEach

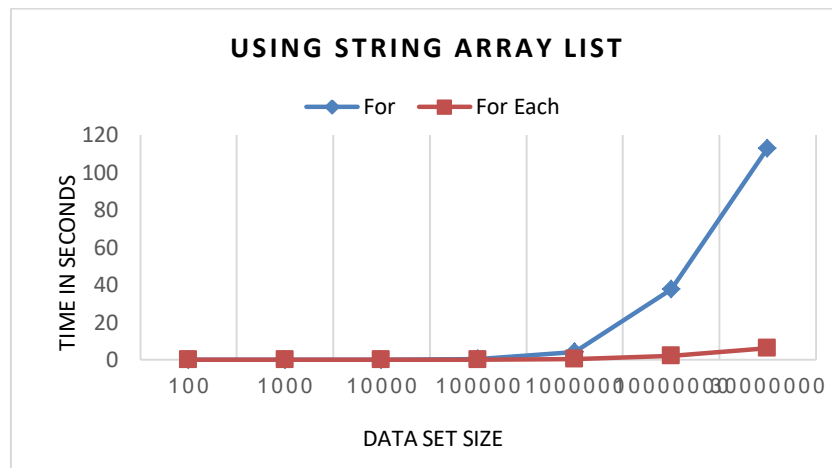| Array type	Number of elements	Run time (sec)	
		For Loop	ForEach Loop
String Array List	100	0.004554	0.0059705
	1000	0.0199857	0.0040583
	10000	0.039974	0.0407129
	100000	0.380405	0.0509242
	1000000	3.8695382	0.2206301
	10000000	37.5453351	1.9789709
	30000000	112.6238054	6.127318

Figure 4: Run time by using string array list

4.3.   Using Long Array

Table-3: Comparison of Run Time of For Loop and ForEach

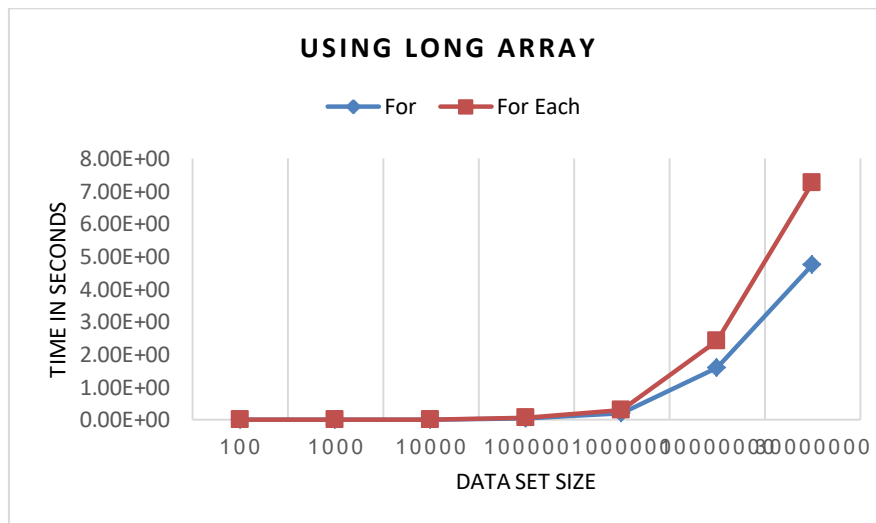| Array type	Number of elements	Run time (sec)	
		For Loop	**ForEach Loop**
Long Array	100	1.99E-05	3.92E-05
	1000	0.0001538	0.0002969
	10000	0.0038115	0.0042006
	100000	0.0352256	0.0553906
	1000000	0.1901469	0.3005881
	10000000	1.5946	2.4174485
	30000000	4.741296	7.2621135

Figure 5: Run time by using long array

4.4.   Using Long Array List

Table-4: Comparison of Run Time of For Loop and ForEach

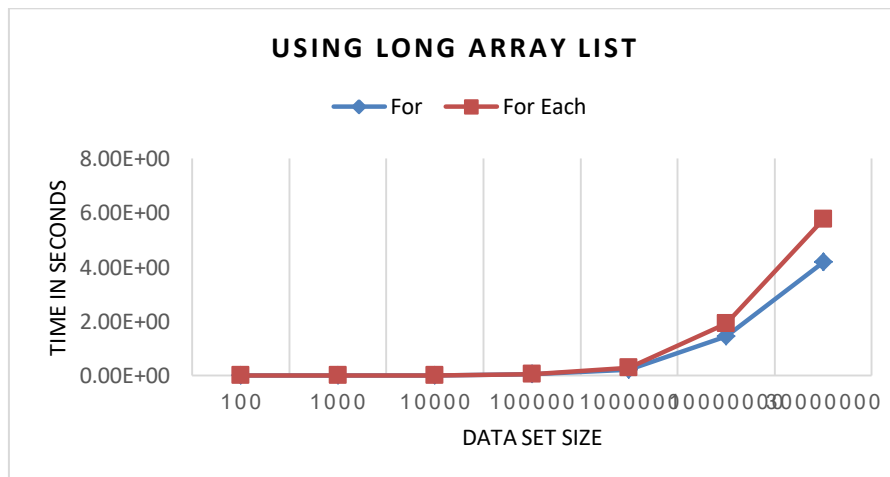| Array type	Number of elements	Run time (sec)	
		For Loop	**ForEach Loop**
Long ArrayList	100	3.38E-05	5.89E-05
	1000	0.0003144	0.0002291
	10000	0.0022952	0.0060373
	100000	0.0511596	0.0581539
	1000000	0.2288627	0.2864522
	10000000	1.4530462	1.9257318
	30000000	4.186264	5.7529089

Figure 6: Run time by using long array list

4.5. Using Big Integer Array

Table-5: Comparison of Run Time of For Loop and ForEach

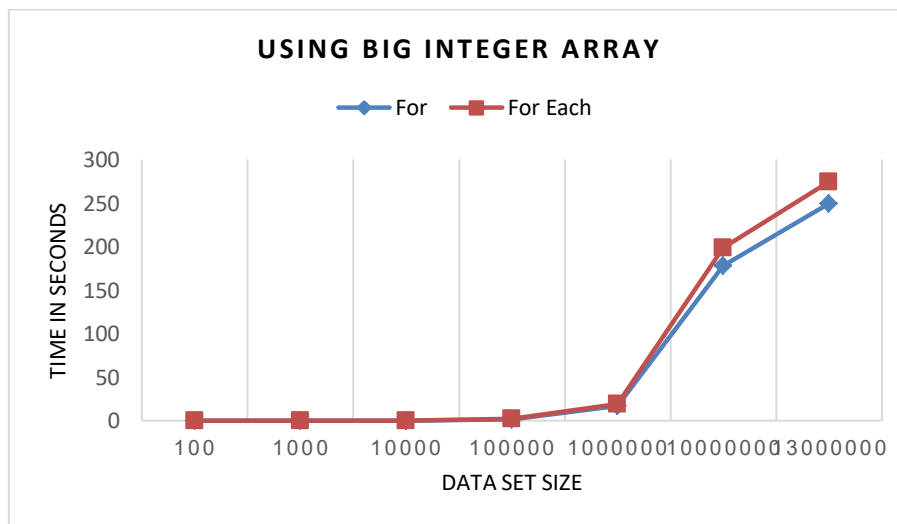| Array type	Number of elements	Run time (sec)	
		For Loop	**ForEach Loop**
BigInteger Array	100	0.0294712	0.0018658
	1000	0.0235443	0.0235759
	10000	0.2352708	0.2317653
	100000	1.8330005	2.03944
	1000000	17.154022	19.3191118
	10000000	178.3924282	198.3599994
	13000000	249.5933781	274.5701366

Figure 7: Run time by using big integer array

4.6.   Using Big Integer Array List

Table-6: Comparison of Run Time of For Loop and ForEach

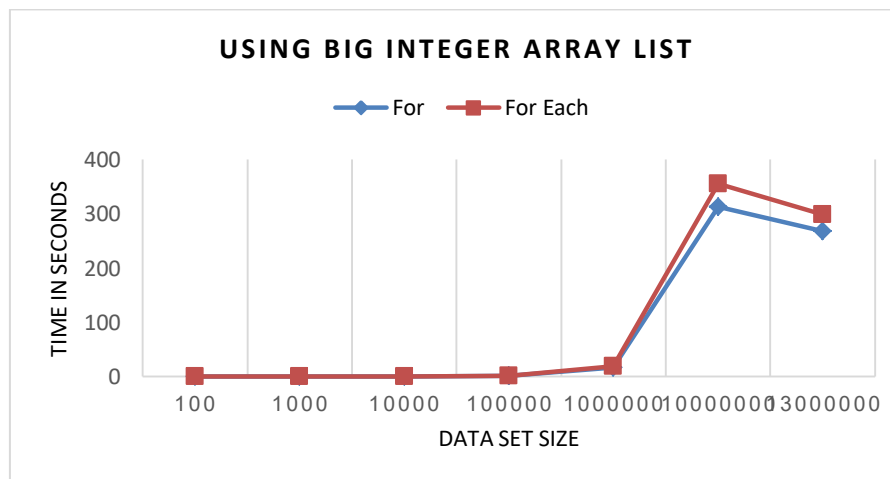| Array type	Number of elements	Run time (sec)	
		For Loop	**ForEach Loop**
BigInteger ArrayList	100	0.0023843	0.0041758
	1000	0.0206681	0.0231768
	10000	0.2060585	0.2019802
	100000	1.7161565	1.9042804
	1000000	17.1478867	19.0799392
	10000000	313.2975522	355.3117054
	13000000	268.3438386	298.6336655

Figure 8: Run time by using big integer array list

According to the results and figures, it is found that For loop is faster than ForEach Loop when we use Array, but when we use ArrayList, it is found that Foreach Loop is faster than For Loop.

5. Conclusion

For Loop and ForEach Loop are similar in that both are using for repeating many statements depending on the user desired. We notice that, when we deal with array to store long and big integers as a data type, For Loop is much easier and faster than Foreach Loop according to Run Time, in contrast, ForEach loop is much faster than For Loop when we use array List to store character string as a data type.

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