

## **CHAPTER 1**

### **The Problem and It's Background**

This chapter contains the following, introduction, background of the study, purpose and description, conceptual framework, statement of the problem, objective of the study, scope and delimitation, significance of the study and definition of terms.

### **1.1 INTRODUCTION**

According to McAfee 2019, on the period of Ancient Greece, Hephaestus was the God of Technology and he built human- shaped robots that could help on his workloads. The written myth conveys message that technology changes and advancements in today's society resulting in a simplified manner of carrying out certain activity. The continuous developments in technical aspect allow people to accomplish tasks easier without consuming much of their time. Technology changes, innovations always head the same way.

Nowadays, it has been proved that there is a rapid growth for Internet of Things (IOT) culture which causes for the automation of various tasks that people are facing nowadays. Automated machines are in demand for it makes numerous activities not only easier but also time efficient. These machines require minimal human intervention to accomplish its job. One of the



latest and most interesting themes in the IOT arena, that will soon begin to draw attention in the commercial marketplace is the automation of the cocktail mixing procedure.

## **1.2 BACKGROUND OF THE STUDY**

Technology nowadays is rapidly changing keeping pace with the demand in the bar industry is always a necessity. It has been proven that technology is truly has brought immense changes in our ways of living. As human tries to find ways of making things easier and time efficient, technology has its advancements. With this rapid and dramatic growth of technological innovation anything can now be automated. The actual history of the cocktail started in the United States of America around 1800. At that time, cocktails rarely consisted of pure spirits. "Quantity instead of quality" was the motto then, for people in America drank four times the amount of distilled alcohol as we do today. The term 'cocktail' was first mentioned in the Balance and Columbian Repository in 1806, the birth of the cocktail. As time passed, the quality of cocktails eventually increased, especially in the second half of the 19th century. Yet not every bar in America served those fine drinks we refer to as cocktails today, but sold cheap drinks, often mixed with drugs like opium. Saying the quantity mattered more in those days, the "cocktails" were simply spirits poured together, rarely complementing each other's' flavors.



Today, cocktails are deeply rooted in the society, new bartenders emerge, new concoctions, which are potent and delicious. Since cocktails found their way into the 'lower' strata of society, quality need not to be the measurement for cocktails today. Some drinks just have to be good-looking to be sold effectively.

Alcohol drinking is a big part of the Filipino merry-making activities. Beer is an essential part of fiestas, birthdays, and parties. Even when there is no special occasion, many Filipinos hang out together in the streets, in front of their houses and convenience stores drinking gin and tonic, which is a considerably cheaper alcoholic drink.

Typical bar scenario during happy hour involves people ordering drinks simultaneously every now and then thus, making the bartender the busiest person. Due to time pressure and demands from the costumers, bartenders are prone to make mistakes during the actual cocktail making process. Because of the inaccuracy of the bartender, the quality of drinks produced may be at stake and worst it may cause hazard for the costumer's health.

This project aims to solve those irregularities to avoid jeopardy by eradicating such issues relating to the poor-quality control and put some time consumption which a typical bartender usually deals with.



### **1.3 PURPOSE AND DESCRIPTION**

The main purpose of Smartender is to provide events, occasions and celebrations a machine that will precisely dispense mixed liquor while reducing the requirements of human labor to perform it.

The Smartender is user-friendly making it very simple to operate. The Smartender has a menu in mobile application that can control remotely using mobile phones. So, if you select a one type of liquor, it will automatically flow the liquor that you selected. There are six pumps connected in a relay and controlled by the Raspberry pi that are responsible for dispensing the drinks out from the Silicon hose to the glass. It has a button which are the selection button.

#### **The device has the following features:**

Button – the button indicates six types of liquor with juice and will dispense in the glass.

Water pump – It will sip the liquor in the container transfer to the glass.

Relay switch – provides the power to the water pump turn on/off when presses the button.

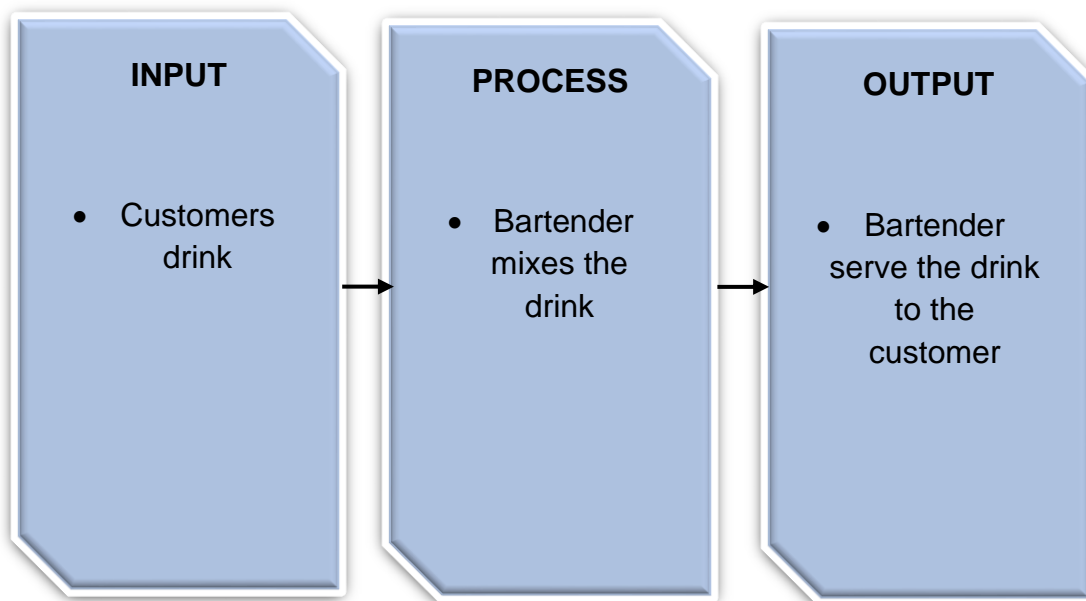
Exit Button – indicates he/she is going to leave the application.



## **1.4 CONCEPTUAL FRAMEWORK**

This framework aims to show and explain the Existing Process in the figure 1.4.1.1, Knowledge Process in figure 1.4.2.1 and Proposed Process shown in figure 1.4.3.1.

### **1.4.1 EXISTING PROCESS**

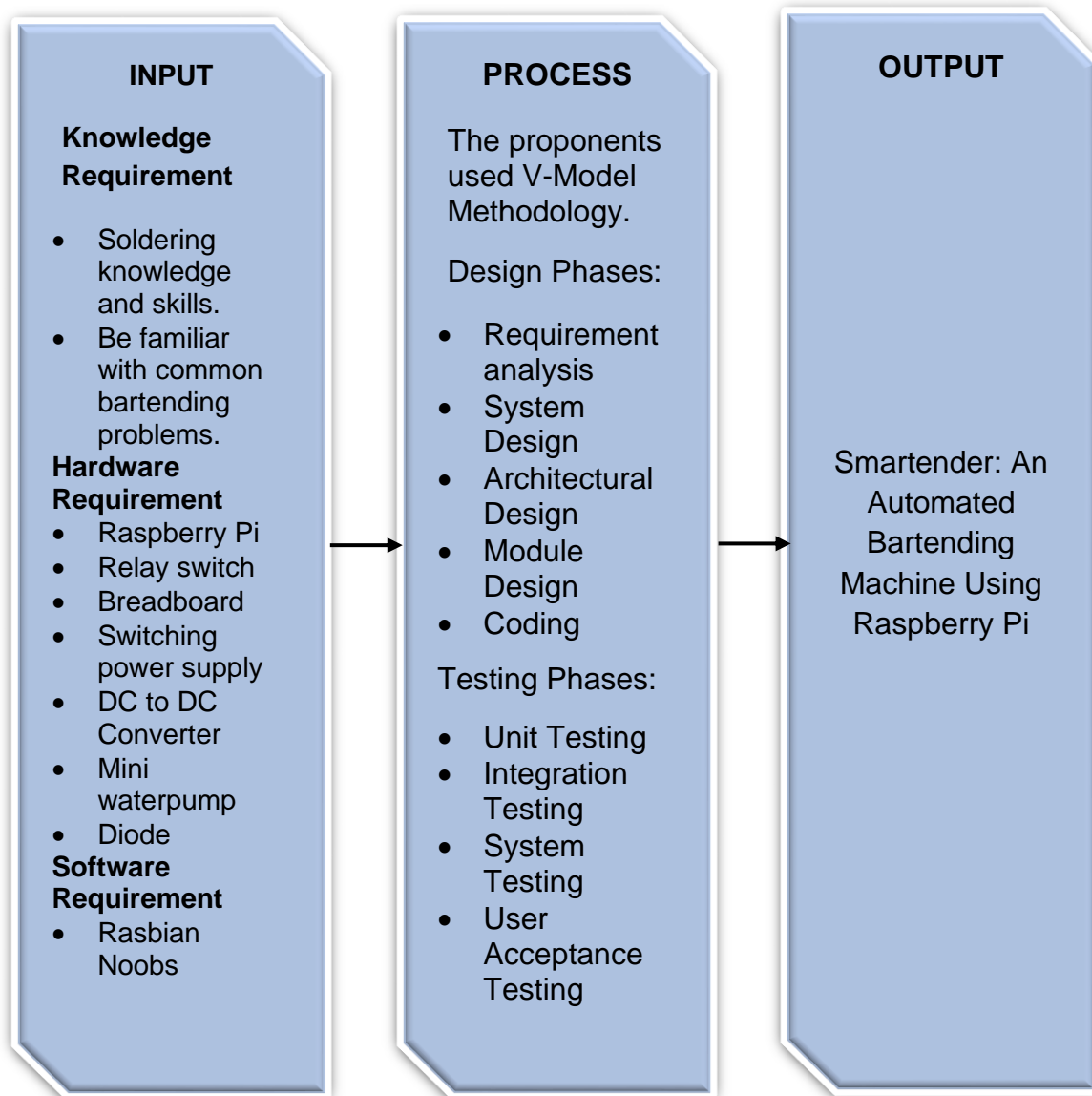


**Figure 1.4.1.1 Existing Process**

In Figure 1.4.1.1 shows the Conceptual Framework on how the existing process works and how it is used manually. In the input, the bartender will take the customer's order or give to them the menu. Process, the bartender will prepare drinks by using proper liquor and manually mixes it. Output, the bartender will serve the order in customer.



### 1.4.2 KNOWLEDGE PROCESS



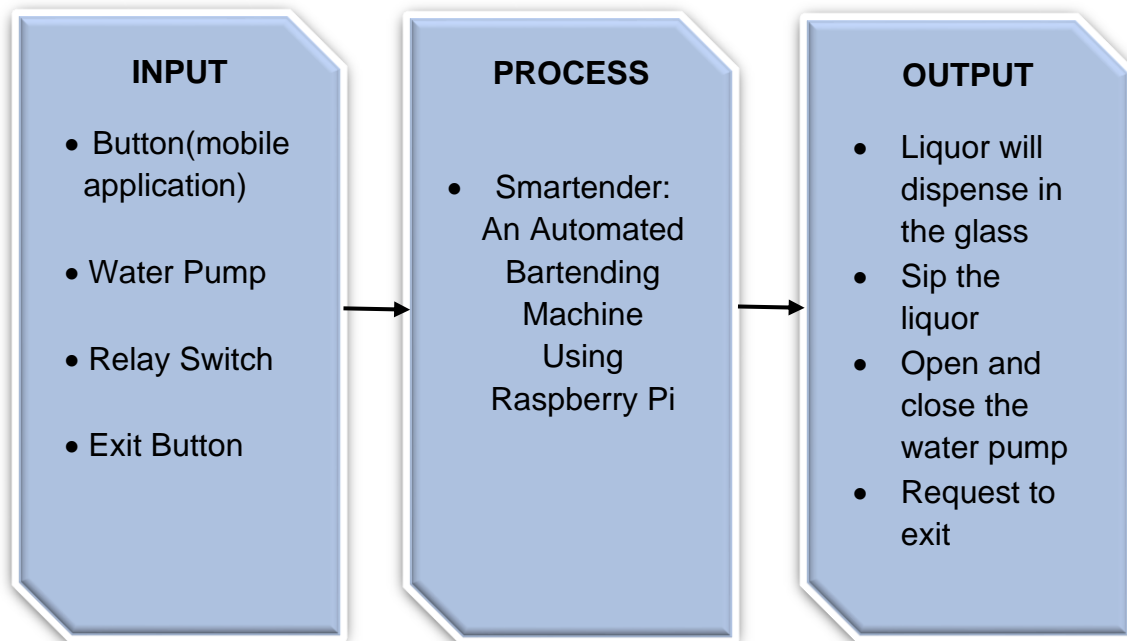
**Figure 1.4.2.1 Knowledge Process**

In Figure 1.4.2.1, the knowledge process for the proposed project entitled “*Smartender: An Automated Bartending Machine Using Raspberry Pi*”. The proponents need various skills and knowledge in order to achieve the output’s main functions. The proponents need to develop an automated machine



that can mix drinks and user friendly. The programming language used to develop this project is Python Raspberry Pi which is the microcontroller used for the project, and it has its own compiler. The proponents have to familiarize the following in order to avoid problems during the project development.

### 1.4.3 PROPOSED PROCESS



**Figure 1.4.3.1 Proposed Process**

In Figure 1.4.3.1 shows the Conceptual Framework of the proposed project entitled “*Smartender: An Automated Bartending Machine using Raspberry Pi*”. In the input, the button (mobile application) indicates six types of liquor with juice. Process, “*Smartender: An Automated Bartending Machine using Raspberry Pi*”. Output, automatically mix the liquor and transfer it to the glass.



## **1.5 STATEMENT OF THE PROBLEM**

In this part it shows the general problem and the specific problem that needs to be solved. A Problem Statement is the description of an issue currently existing which needs to be addressed.

### **1.5.1 GENERAL PROBLEM**

The main problem of the proposed project is how to make a device that is automated in order to lessen the time, effort and make work easier and faster for events, occasions and celebrations.

### **1.5.2 SPECIFIC PROBLEMS**

- How to create a device that can mix multiple drinks?
- How to create a device that can select drinks remotely?
- How to develop a device that is compact and easy to use?
- How to develop a device that can manage the customer's order?





## **1.6 OBJECTIVE OF THE STUDY**

This part stated the achievements of the study. General statements concern in overall goals, individual stages that the proponents must achieve in order to reach the goals.

### **1.6.1 GENERAL OBJECTIVE**

The main objective of this study is to provide a machine that can produce sets of drinks fast, accurate, consistent and efficient that can accommodate a big number of drinkers.

### **1.6.2 SPECIFIC OBJECTIVES**

- To develop a machine that can mix multiple drinks.
- To develop a machine that can select drinks in mobile application.
- To design a machine that is a user friendly, wherein the customer can operate the machine.
- To develop a machine that can manage the customer's order.



## **1.7 SCOPE AND DELIMITATION**

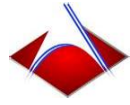
This part of the study identifies the coverage and boundaries of the proposed project entitled “*Smartender: An Automated Bartending Machine Using Raspberry Pi*”.

### **1.7.1 SCOPE OF THE STUDY**

- Can mix six types of drinks.
- Can serve 5ml liquor and 10ml of juice.
- Can serve drinks efficiently and accurately.
- Can control the device using mobile phone.
- Has a user-friendly interface.

### **1.7.2 DELIMITATION OF THE STUDY**

- The device won't work without internet connection.
- The device can't add or dispense ice automatically.
- Power Shortage.



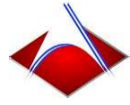
### **1.8 SIGNIFICANCE OF THE STUDY**

The proponents aim to provide a device that can mix liquor using Raspberry Pi. It also helps the bartender to make their work easy.

**To the users,** the study will help the user lessen the time and effort mixing drinks.

**To the Future Researchers,** this study would serve as a handy reference for the other researchers who would embark on a similar study in the future especially on certain aspect not derived into the present study.

**To the Proponents,** the proponents would also be the recipient of the study. It will help the proponents gain and improve their skills during the study.



## **1.9 DEFINITION OF TERMS**

This part of the study gives the meaning of the words to be used in the entire study conceptually and operationally for better comprehension of the users.

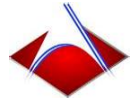
**Raspberry Pi.** The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

**Stepper Motor.** is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence.

**Stepper Drive.** is the driver circuit that controls how the stepper motor operates. Stepper drives work by sending current through various phases in pulses to the stepper motor.

**Automate.** The act of converting to an automatic operation (Nagayo, 2007). In this study, it is the process undertaken to eliminate manual intervention of user in a system.

**Cocktail.** Beverage that contains three or more ingredients if at least one of those ingredients is alcohol (Croswell, 1806). In this study, it is the output or the



final product which is being processed by the automated drink mixer, it is the output.

**Relay.** It is an electrical device such that current flowing through it in one circuit can switch on and off a current in a second circuit (Wai, 2005). In this study it is the components which bridges the pathway of the electrical signals.

**Pump.** It is a mechanical device that moves fluid or gas by pressure or suction (D.C Johnson, 2002). In this study, it is the component which act as the heart of the project for it pushes the liquids from its repository all throughout the rubber hoses to its final container.

**Dispenser.** It is a container so designed that the contents can be used in prescribed amounts (Fisher, 2002). In this study, it is the repository which holds the five basic ingredients in which the mixes will be rendered from.

**Prototype.** It is an original, full-scale, and usually working model of a new product or new version of an existing product (Maloney, 2003). In this study, it is the actual output of the research study which conveys the totality of all of its component weather software or hardware.

**V-Model.** the V-model is a type of SDLC model where process executes in a sequential manner in V-shape. It is also known as Verification and validation model. It is based on the association of a testing phase for each corresponding development stage. Development of each step directly associated with the testing phase.



## **CHAPTER 2**

### **REVIEW AND RELATED STUDIES**

In this chapter, the researchers gather references to compare and depend the originality and concepts of the proposed study. In this way the researchers can either adapt or innovate features on their proposed study.

#### **2.1 FOREIGN REVIEW RELATED LITERATURE**

**TITLE: HOW BARS ARE USING HIGH-TECH EQUIPMENT TO MAKE BETTER DRINKS**

**AUTHOR: CAMPER ENGLISH**

**DATE PUBLISHED: August 10, 2018**

Cocktails on tap have become a trend in recent years because customers want fancy, delicious cocktails with fresh, quality ingredients, but they don't want to wait 20 minutes for bartenders to add drops and dashes of 12 different things in every drink. By kegging cocktails, bartenders can make a large batch all at one time and serve them as fast as they could a beer. And though many bars are now offering one or two on tap, at Tavernita they have all sorts of beer and wine, plus ten cocktails on tap, and these include ingredients like



paprika-infused rye whiskey, wine-pear syrup, and BBQ bitters. The simplest way to serve a cocktail on tap is to use an inert gas like nitrogen and push it through the line as one would for wine on tap. But this only works for non-carbonated drinks like Negronis and Manhattans (and Sangria at Tavernita as well). Here they also offer some cocktails that are carbonated, like a Gin & Tonic with homemade tonic syrup, and a cachaca drink with grape soda. The kegs are all refrigerated and prepared by their 'batchologist' whose job is to be very exacting with preparations, measuring ingredients by weight rather than by volume. They even calculate the dilution in advance and add water to the keg depending on whether the drink will be served on ice or not.

**Reference:** <https://www.popsci.com/article/technology/how-bars-are-using-high-tech-equipment-make-better-drinks/>

*This study is related to the proposed project entitled "Smartender: An Automated Bartending Machine using Raspberry Pi". It has a multiple choice of drinks to serve to the customer. It provides a water to clean the cup.*



**TITLE: THE DRINKMOTIZER**

**AUTHOR: CABE ATWELL**

**DATE PUBLISHED: February 5, 2018**

This one doesn't break the bank. It's DIY, Open, expandable. Artistically speaking, it isn't just a nozzle that sprays alcohol at objects, it uses the actual bottle, and gravity. The concept is based on a CNC lathe I built. My goal was to make something a bit faster, slightly less precise, and upgradeable. Drinkmo is all that. In the video I show six bottle stations and one chaser spout. That particular setup, being four feet long, can have up to sixteen bottles and still have the chaser spot. Technically, I could build a Drinkmo that is twenty feet long having 80 bottles on it! I thought that would be cool to see at a bar somewhere.

**Reference:** [https://www.element14.com/community/community/raspberry-pi/raspberrypi\\_projects/blog/2014/01/17/raspberry-pi-drink-mixing-robot--aka-the-drinkmotizer](https://www.element14.com/community/community/raspberry-pi/raspberrypi_projects/blog/2014/01/17/raspberry-pi-drink-mixing-robot--aka-the-drinkmotizer)

*This study is related to the proposed project entitled "Smartender: An Automated Bartending Machine using Raspberry Pi" because the device has a three (3) types of chaser that can mix in the liquor.*





**TITLE: BEAUTIFUL PI-POWERED COCKTAIL MACHINE**

**AUTHOR: RICH HAWKES**

**DATE PUBLISHED: APRIL 9, 2018**

Instead of a sliding wall panel, [HighwingZ] has built a hexagonal container. Five of the six sides contain bottles to fill the drink with, the last panel contains the spigot and a spot for the glass. The machine works by weighing the liquid that gets poured into the glass using a load cell connected to a HX711 load cell amplifier. An aquarium pump is used to push air into whichever bottle has been selected via some magnetic valves which forces the liquid up its tube and into the glass. A simple touch screen UI is used so the user can select which drink and how much of it gets poured. All of this is connected to a Raspberry Pi to control it all.

**Reference:** <https://hackaday.com/tag/automatic-bartender/>

*This study is related to the proposed project entitled “Smartender: An Automated Bartending Machine using Raspberry Pi”. It has a water pump to flow the drinks to the cup to serve automatically to the customer(s).*



## **2.2 LOCAL REVIEW RELATED LITERATURE**

**TITLE: SMART BAR TECHNOLOGY TO ENHANCE OPERATIONS WINS SMARTECH AWARD**

**AUTHOR: GLIMPSE TEAM**

**DATE PUBLISHED: JAN 31, 2019**

For the past 50 or so years, our society has been racing towards a digital economy. Just about everyone has a smartphone now, and you would be hard-pressed to find anyone without an email address. Whether you like it or not, running a business nowadays must be up to date with the times to keep up with the trends of consumers. For example, consumers can look on their phones to see the wait times at local salons or restaurants. The advancement of technology has allowed consumers to expect much more from their products and services, convenience and ease of use have never before been demanded so highly. For restaurants and bars, this means providing the best possible experience; quickly and easily. There are some great ways to incorporate new bar technology into the operation of your bar or restaurant. Here are some of the top ways to leverage technology to increase proficiency and profitability.

**Reference:** [https://www.glimpsecorp.com/smart-bar-technology/?fbclid=IwAR0k3iJ\\_UxUvmTzUx1TEoaQFtgWGt\\_JL5XzppKvw68YE\\_PzmYYcx4it\\_JWZM](https://www.glimpsecorp.com/smart-bar-technology/?fbclid=IwAR0k3iJ_UxUvmTzUx1TEoaQFtgWGt_JL5XzppKvw68YE_PzmYYcx4it_JWZM)



*The proposed project entitled “Smartender: An Automated Bartending Machine using Raspberry Pi” can easily serve the customer’s drink faster.*

**TITLE: FOUR SMART COCKTAIL-MAKING DEVICES THAT MAY BE MAKING YOU A DRINK THIS HOLIDAY SEASON**

**AUTHOR: BY RELAX NEWS**

**DATE PUBLISHED: NOVEMBER 12 2019**

As a holiday host, you're given the responsibility of not only providing the drinks, but also providing drinks that everybody enjoys. While this is both a serious and time-consuming task, technology companies around the world have developed smart devices powered by AI that will make this duty easier or completely take it off your hands -- even if you're a bar owner.

Barsys recently announced the Coaster, a smart saucer that guides the user on how to create a particular cocktail. By connecting the coaster to a smartphone with the complimentary app downloaded, users can choose from Barsys's existing library of cocktails or input their own recipe. Once a cocktail is selected, the user can simply start pouring ingredients one by one, and with each new



alcohol or mixer, the coaster will light up when the correct amount has been added to the glass.

**Reference:** [https://ph.asiatatler.com/dining/four-smart-cocktail-making-devices-that-may-be-making-you-a-drink-this-holiday-season?fbclid=IwAR3-h8mJyy31q4JCyP5rsSOnOhuSQOknlubp4zyA9YbXPRsFERt\\_ZcbVgpk](https://ph.asiatatler.com/dining/four-smart-cocktail-making-devices-that-may-be-making-you-a-drink-this-holiday-season?fbclid=IwAR3-h8mJyy31q4JCyP5rsSOnOhuSQOknlubp4zyA9YbXPRsFERt_ZcbVgpk)

*This study is related to the proposed project entitled “Smartender: An Automated Bartending Machine using Raspberry Pi” since the machine has the capability of mixing drinks.*

**TITLE: ROBOTIC BARTENDERS AND SMART HOTELS: ALIBABA’S VISION OF FUTURE CONSUMPTION**

**AUTHOR: ZEN SOO**

**DATE PUBLISHED: NOVEMBER 16, 2018**

The robotic arm, the brainchild of Shanghai-based start-up Ratio, was one of the many exhibits on display at “The Ideal Living” exhibition – a glimpse into what future living could look like if Alibaba, which owns the *South China Morning Post*, had its way.

Ratio’s robotic arm takes orders via smartphone, where customers scan a QR code, select drinks off a menu and pay via mobile payments service Alipay. The



start-up, which operates a physical store in Shanghai's Raffles Place mall, uses Alibaba's cloud services and its payments system to help facilitate customer orders, founder Gavin Pathross tells me.

**Reference:** [https://www.scmp.com/tech/innovation/article/2173406/robotic-bartenders-and-smart-hotels-alibabas-vision-future?fbclid=IwAR1\\_8Xv2asTYV3V1JcRis60F4qUAnYr7mW9KcUOupL5bqjOpMgHIAPbxFEs](https://www.scmp.com/tech/innovation/article/2173406/robotic-bartenders-and-smart-hotels-alibabas-vision-future?fbclid=IwAR1_8Xv2asTYV3V1JcRis60F4qUAnYr7mW9KcUOupL5bqjOpMgHIAPbxFEs)

*This study is related to the proposed project entitled "Smartender: An Automated Bartending Machine using Raspberry Pi" with the objective of helping bartenders to mix drinks of other customers make fast.*

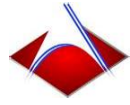
## **2.3 FOREIGN REVIEW RELATED STUDIES**

**TITLE: THE AUTOMATIC BARTENDER**

**AUTHOR: RICHARD WU**

**DATE PUBLISHED: DECEMBER 8, 2018**

For our Senior Design project, we designed and built an Automatic Drink Mixer for at-home use. Our ideal customer is someone who enjoys cocktails, but dislikes the hassle of measuring out ingredients and pouring them for each drink. Instead, they can use our device to make multiple drinks at once,



without needing to measure or pour individual ingredients. We knew that the circuitry and programming would be the hardest part of this project, since we didn't have much experience in those areas. To accelerate the assembly of the machine and focus on the internal components, we bought ready-made parts to create the housing, instead of fabricating them ourselves. For the internal parts, we used a breadboard, jump wires, relays, valves, tubing, and an Arduino. We studied various open-source projects on the internet to learn how to correctly connect everything together. This machine has four containers, which can be filled with any ingredients the user desires. Each container has its own tubing system with an electric solenoid valve that controls the flow. Through Arduino, the user can vary the amounts of each ingredient dispensed into the cup, making for an unlimited amount of mixed drink recipes.

**Reference:**

<https://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1074&context=me ms411>

*This study is related to the proposed project entitled "Smartender: An Automated Bartending Machine Using Raspberry Pi" with the objective at helping bartenders to mix drinks of other customers and to make the job fast.*



**TITLE: ROBOTS CAN MIX YOU A DRINK**

**AUTHOR: REAL TIME ECONOMICS**

**DATE PUBLISHED: 2018**

The Makr Shagr is the creation of an Italian company and consists of robotic arms that mix cocktails, and then place them on a conveyor belt to be carried across the bar to the waiting customer or a server. The first two installations are on Royal Caribbean cruise ships, where they're the centerpieces of "Bionic Bars."

The goal isn't to do away with bartenders, who are still needed to tend the machines and, when necessary, deliver the drinks. Carlo Ratti, a professor at the Massachusetts Institute of Technology and cofounder of Makr Shagr, says the project began when he was asked to design a machine that would allow people to interact with robots in an unexpected setting. "It started as something to shock people in a tangible way," he says, to show them "what the third industrial revolution is all about."

**Reference:** <https://blogs.wsj.com/economics/2015/04/21/robots-can-mix-you-a-drink-but-will-they-listen-to-your-problems/>

*This study is related to the proposed project with the objective at helping bartender especially the people to mix drinks fast as an example of merging technologies in the Internet of Things (IoT) era.*



**TITLE: HOW BARS ARE USING HIGH-TECH EQUIPMENT TO MAKE BETTER DRINKS**

**AUTHOR: CAMPER ENGLISH**

**DATE PUBLISHED: DECEMBER 3, 2018**

Cocktails on tap have become a trend in recent years because customers want fancy, delicious cocktails with fresh, quality ingredients, but they don't want to wait 20 minutes for bartenders to add drops and dashes of 12 different things in every drink. By kegging cocktails, bartenders can make a large batch all at one time and serve them as fast as they could a beer. And though many bars are now offering one or two on tap, at Tavernita they have all sorts of beer and wine, plus ten cocktails on tap, and these include ingredients like paprika-infused rye whiskey, wine-pear syrup, and BBQ bitters. The simplest way to serve a cocktail on tap is to use an inert gas like nitrogen and push it through the line as one would for wine on tap. But this only works for non-carbonated drinks like Negronis and Manhattans (and Sangria at Tavernita as well). Here they also offer some cocktails that are carbonated, like a Gin & Tonic with homemade tonic syrup, and a cachaca drink with grape soda. The kegs are all refrigerated and prepared by their 'batchologist' whose job is to be very exacting with preparations, measuring ingredients by weight rather than by





volume. They even calculate the dilution in advance and add water to the keg depending on whether the drink will be served on ice or not.

**Reference:** <https://www.popsci.com/article/technology/how-bars-are-using-high-tech-equipment-make-better-drinks/>

*This study is related to the proposed project in which smart bartender automated machine is an example of Internet of Things (IoT).*

## **2.4 LOCAL REVIEW RELATED STUDIES**

**TITLE: BAR AND BEVERAGE SERVICE BOOK**

**AUTHOR: ROJO**

**DATE PUBLISHED: 2018**

According to the (Bar and Beverage Service Book) by Rojo (2018), A bartenders should always use a jigger when pouring ad serving the drinks. It depends also on the policy or standard practice in a particular bar. Some are using free pouring. But bartenders must able to master the technique on how to do free pouring without sacrificing the quality of the drink. However, according to (www.edukasyon.ph, 2018) A bartender is someone who mixes and serves drinks to customers, they must know a wide range of drink recipes and be able



to mix drinks accurately, quickly, and without waste. Bartenders work in restaurants, bars, clubs, hotels, and other food service establishments.

**Reference:** <http://opac.auf.edu.ph:8080/newgenlibtxt/View?CatId=66271&OwnLibId=1&LibraryId=1&From=Library>

*The study is related to the proposed project entitled Smartender: An Automated Bartending Machine using Raspberry Pi which can be used to parties and events.*

**TITLE: SAY CHEERS**

**AUTHOR: GNGADMIN**

**DATE PUBLISHED: SEPTEMBER 7, 2019**

Meet Akshet Tewari, an engineer, and his brainchild Barsys, an automated system for making cocktails and mixed drinks. It's a fully automated cocktail maker designed to act as a tool for bar-tenders, enabling them to cater more customers.

In this smart machine, cocktails can easily be ordered by an app on a handheld device and the Barsys allows you to have the system be kept at home/office. It monitors the consumption patterns, pour quantities, and can notify the user for ingredients if they are running low. "The app, stores all the data in the cloud and



can be used to improve inventory management and develop data backed consumer insights”, confirms Akshet. He further adds, “The system combines robotic hardware with cloud-based software to prepare cocktail faster than a bartender and can actually make a perfect drink in less than 45 seconds.”

“It comes in two variants namely Barsys Pro and Barsys Elite which has 6 bottles holding capacity and 5 bottles holding capacity respectively”.

**Reference:** <https://www.gngmagazine.in/say-cheers-barsys-tech-enabled-robot-making-bar-style-cocktails/>

*This study is related to the proposed project entitled Smartender: An Automated Bartending Machine using Raspberry Pi that can serve the menu by an exact time of flowing drinks.*



**TITLE: DRINK MAKER**

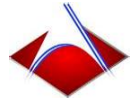
**AUTHOR: KEURIG**

**DATE PUBLISHED: 2018**

The Drinkworks™ drinkmaker prepares cocktails, beer, and more at home using proprietary Drinkworks™ Pods. Each drink is made consistently every time using a Pod-specified mix of chilled water and carbonation. A variety of Drinkworks™ Pod Collections include classic and specialty cocktail offerings, leading beer brands like Beck's, Bass, and Stella Artois, and signature mixers. Enjoying quality drinks at home, both old favorites and new discoveries, has never been easier. The Drinkworks Home Bar includes everything you need to get started. Two CO2 canisters, cleaning tablets and a water filter are included in your purchase (over a \$30 value).

**Reference:** <https://www.drinkworks.com/shop/product/1040197/>

*This study is related to the proposed project entitled “Smartender: An Automated Bartending Machine Using Raspberry Pi” with the objective at helping bartenders to mix drinks of other customers and to make job easy.*



## **CHAPTER 3**

### **RESEARCH METHODS AND PROCEDURE**

This chapter discusses the method of research that will be employed by the proponents to gather the necessary data. It presents the research design and procedure that will be used. The data gathering procedure and the software development model that would be helpful for the proponents in the course of the research.

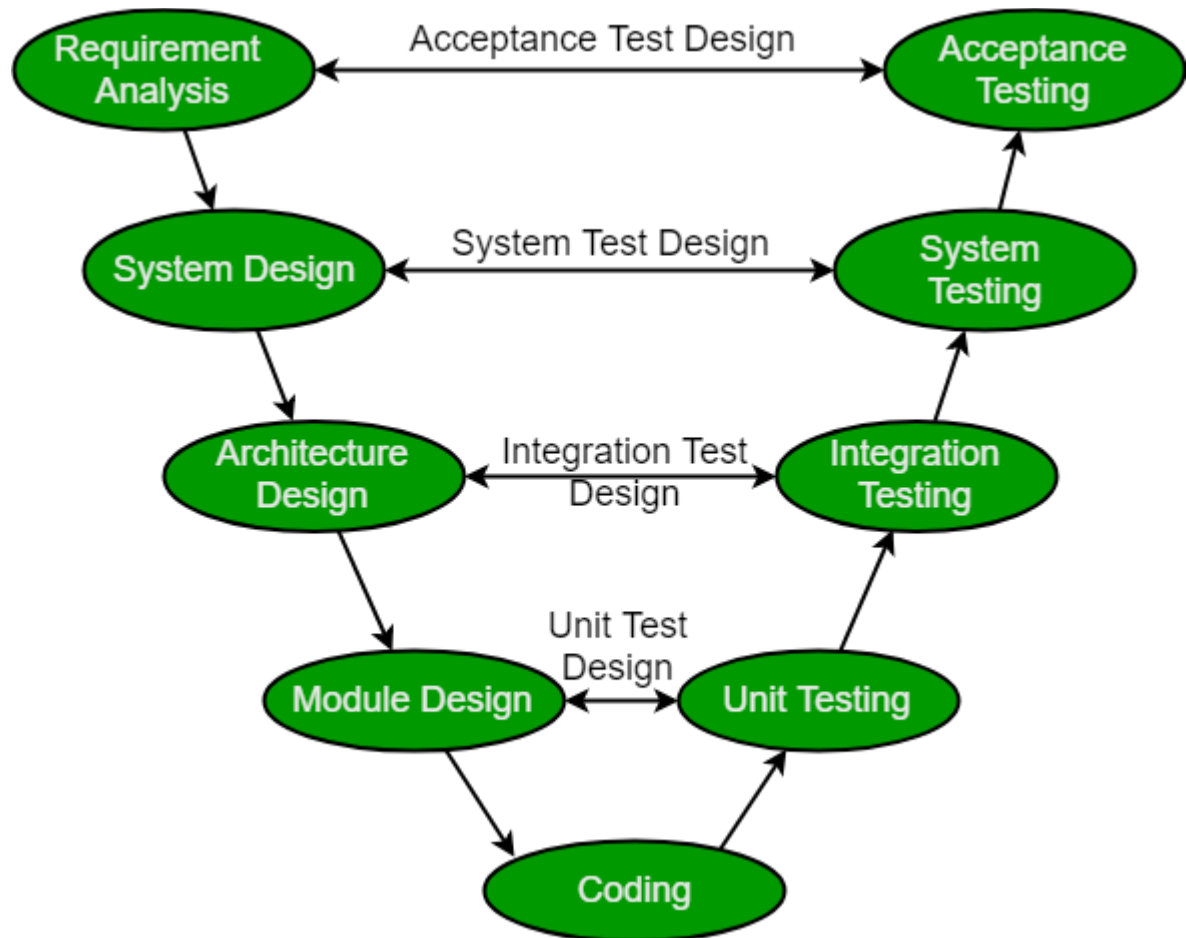
#### **3.1 RESEARCH DESIGN**

The proponents do internet research for video tutorials and library research related to this study, to serve as guide in developing the proposed project entitled *“Smartender: An Automated Bartending Machine using Raspberry Pi”*.



### 3.2 SYSTEM METHODOLOGY

In this part, it will show the system methodology that is being used by the proponents to define the proposed project entitled “*Smartender: An Automated Bartending Machine using Raspberry Pi*”.



**Figure 3.2.1 V-Model**



The proponents used V-Model method to develop the proposed project entitled “*Smartender: An Automated Bartending Machine using Raspberry Pi*”. This method is easy to understand and apply. The proponents also use this method to identify the step by step procedure for making the proposed project a success.

### **Requirement Analysis**

In this phase of building a project plan in the Capstone Project is the requirement analysis. The proponents conduct a research to find out what different devices to use in the project. The proponents made some canvas of every tool that is needed in making the proposed project.

### **System Design**

In this phase the proponents have a system design. A system design made a prototype for testing. The proponents arranged every part of the device, so that the wires will not be a problem for the user.

### **Architectural Design**

In this phase the proponents have architectural design splitting up the System design into components having different functionality. The data exchanged between the core modules and with the external world (other subsystems) will get noted down.



### **Module Design**

In this phase the proponents have module design. The entire system splits into smaller modules. The detailed design of system components is written down with greater clarity. It can be called as the Low-Level Design (LLD) document.

### **Coding Phase**

In this phase the proponents have coding phase. The language that the proponents used is Python, for coding the function of the device. Each device has its own purpose.

### **Unit Testing**

In this phase the proponents conduct unit testing to help eliminate bugs at an early stage.

### **Integration Testing**

In this phase the proponents conduct integration testing to test the co- existence and communication of the internal modules within the system.





## **System Testing**

In this phase the proponents conduct system testing to check the entire system functionality and the communication system under development with the external systems to know the hidden issue of the device.

## **Acceptance Testing**

In this phase the proponents conduct acceptance testing to uncover the compatibility issues with the other systems available in the user environment.

### **3.3 VARIABLES AND MEASUREMENT**

<b>VARIABLES</b>	<b>MEASUREMENT</b>
1. Raspberry Pi	- is a very cheap computer that runs Linux, but it also provides a set of GPIO (general purpose input/output) pins that allow you to control electronic
2. Relay Switch	- relays are switches that open close circuits electromechanically or electronically.



3. Switching Power Supply	- is an electronic device that converts and regulates the voltage of electrical power.
4. DC to DC Converter	- is an electronic circuit device that converts a source of direct current (DC) from one voltage level to another.
5. Mini Water pump	- it transfers the mechanical energy of the prime mover or other external energy of the liquid.
6. Diode	- A diode is defined as a two-terminal electronic component that only conducts current in one direction (so long as it is operated within a specified voltage level). An ideal diode will have zero resistance in one direction, and infinite resistance in the reverse direction.

***Table 3.3.1 Variables and Measurement***

This table shows the variables and measurement used in the study.

### **3.4 SAMPLING TECHNIQUES**

In this study, the proponents will make use of random sampling. The random sampling is a technique where respondent will be handpicked to participate in the study based on identified variables under consideration. The target respondents on this study are the selected 100 people.



### **3.5 DATA GATHERING PROCEDURE**

These are the following tools for gathering data as basis to draw a conclusion. Some of these tools are internet research, library research, interview, questionnaire, survey and evaluation.

**Internet Research** – the proponents used the internet to gather data that are related to the proposed project and to gain ideas in creating an automated bartending machine and watch tutorials in developing a project using Python and Raspberry Pi.

**Library Research** – the proponents used library research for books, articles and thesis that are related to the proposed project. And conduct old information about existing documents to give us the ideas.

**Interview** – the proponents interview a bartender named Lance Daniel Consencino helping the proponents what are the certain order for pouring cocktail ingredients and what are the proper glasses for the liquor.

**Survey Questionnaire** – the proponents make a survey to the events, occasions and celebrations with the total of fifty (50) pieces to gather information about the proposed project entitled *“Smartender: An Automated Bartending Machine using Raspberry Pi”*.



**Evaluation** – the proponents use evaluation for the events, occasions and celebrations to the proposed project entitled “*Smartender: An Automated Bartending Machine using Raspberry Pi*”. The question that will be included in the questionnaire are based on how the project works, the effectiveness of the proposed project considering ease of use of the device.

### **3.6 DATA ANALYSIS**

**Likert Scale** – It is used to interpret the mean result of the evaluation of existing and developed software. The Table below shows how the mean will be given an interpretation after tallying the result.

<b>RANGE OF MEAN VALUE</b>	<b>INTERPRETATION</b>
4.21 - 5.00	Excellent
3.41 - 4.20	Very Satisfactory
2.61 - 3.40	Satisfactory
1.81 - 2.60	Fair
1.00 - 1.80	Poor

**Table 3.6.1 Likert Scale**

This table shows the Range of Rating and Its Qualitative Interpretation.



**Five-Point Scale** – is a psychological measurement device that is used to gauge attitude, values and opinions.

RATING	INTERPRETATION
5	Excellent
4	Very Satisfactory
3	Satisfactory
2	Fair
1	Poor

***Table 3.6.2 Five-Point Scale***

This table shows the rating of the respondents and its equivalent verbal interpretation.



### 3.7 STATISTICAL TREATMENT OF DATA

The proponents use survey and evaluation method for descriptive research methodology.

The following statistical tools were used in the analysis and interpretation of the collected data.

- **Weighted Mean** – This was used to describe the perception of the respondents on each indicator.

The weighted mean formula is:  $WM = \frac{w(f)}{n}$

Where:

WM = summation of weighted mean

w = weight of the scale value

f = frequency of response

n = total number of respondents



### **3.8 SYSTEM REQUIREMENTS**

This part of the research shows the minimum requirements needed in running this proposed project entitled “*Smartender: An Automated Bartending Machine using Raspberry Pi*”. System requirements is split into two parts, the hardware requirements and the software requirements.

#### **3.8.1 HARDWARE REQUIREMENTS**

- Raspberry Pi 4 Model B
- 8 Channel Relay Switch
- Breadboard
- 12V Switching Power Supply
- DC to DC Converter
- Mini Water pump
- LED Strip Light
- Diode
- Jumper Wire

#### **3.8.2 SOFTWARE REQUIREMENT**

- Raspbian Noobs – (New Out of the Box Software) is an easy operating system installer which combines Raspbian and LibreELEC.



### 3.9 PROJECT COST AND BENEFIT

HARDWARE		
ITEM	QUANTITY	TOTAL
Raspberry Pi 4 Model B	1pc	₱3,250.00
8 Channel relay switch	1pc	₱349.75
12v switching power supply	1pc	₱495.00
DC to DC Converter	1pc	₱135.00
Mini Water pump	6pcs	₱600.00
LED Strip Light	1pc	₱80.00
Diode	6pcs	₱104.00
Jumper Wire with breadboard - Female to Female - Male to Male - Male to Female	1pc	₱262.00
Hose	6pcs	₱240.00
ON/OFF Switch	1pc	₱20.00
Heatsink with Dual Fan	1pc	₱750.00
Case	1pc	₱210.00
HDMI to VGA	1pc	₱195.00
SD Card	1pc	₱500.00





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Charger of Raspberry Pi	1pc	₱575.00
Type B to C Adapter	1pc	₱144.00
Power bank	1pc	₱499.00
Clamp	1pc	₱80.00
Soldering Iron	1pc	180.00
Soldering Wire	1pc	62.00
Multimeter Tester	1pc	165.00
Spray Paint (Black)	2pcs	170.00
Pranila	1pc	75.00
Mixing Cocktail Spoon	1pc	80.00
Container	6pcs	240.00
<b>TOTAL</b>		<b>₱9,460.75</b>

***Table 3.9.1 Hardware Cost***

This table shows the hardware costs used by the proponents



SOFTWARE	
ITEM	COST
Windows 10	Free
Raspbian Noobs	Free
<b>TOTAL</b>	<b>N/A</b>

**Table 3.9.2 Software Cost**

This table shows the costs of the Software that is used by the proponents in developing the propose entitled “*Smartender: An Automated Bartending Machine using Raspberry Pi*”.

STATIONARY AND SUPPLY COSTS		
ITEM	QUANTITY	COST
Folder	9pcs	₱90.00
Bondpaper	2pc	₱500.00
<b>TOTAL</b>		<b>₱590.00</b>

**Table 3.9.3 Stationary and Supply Cost**

This table shows the stationary and supply costs used by the researchers.



PERSONAL COSTS		
ITEM	QUANTITY	COST
Food	---	₱2,000.00
Internet	per month(1)	₱1,500.00
Transportation	2	₱1000.00
<b>TOTAL</b>		<b>₱4,500.00</b>

***Table 3.9.4 Personal Cost***

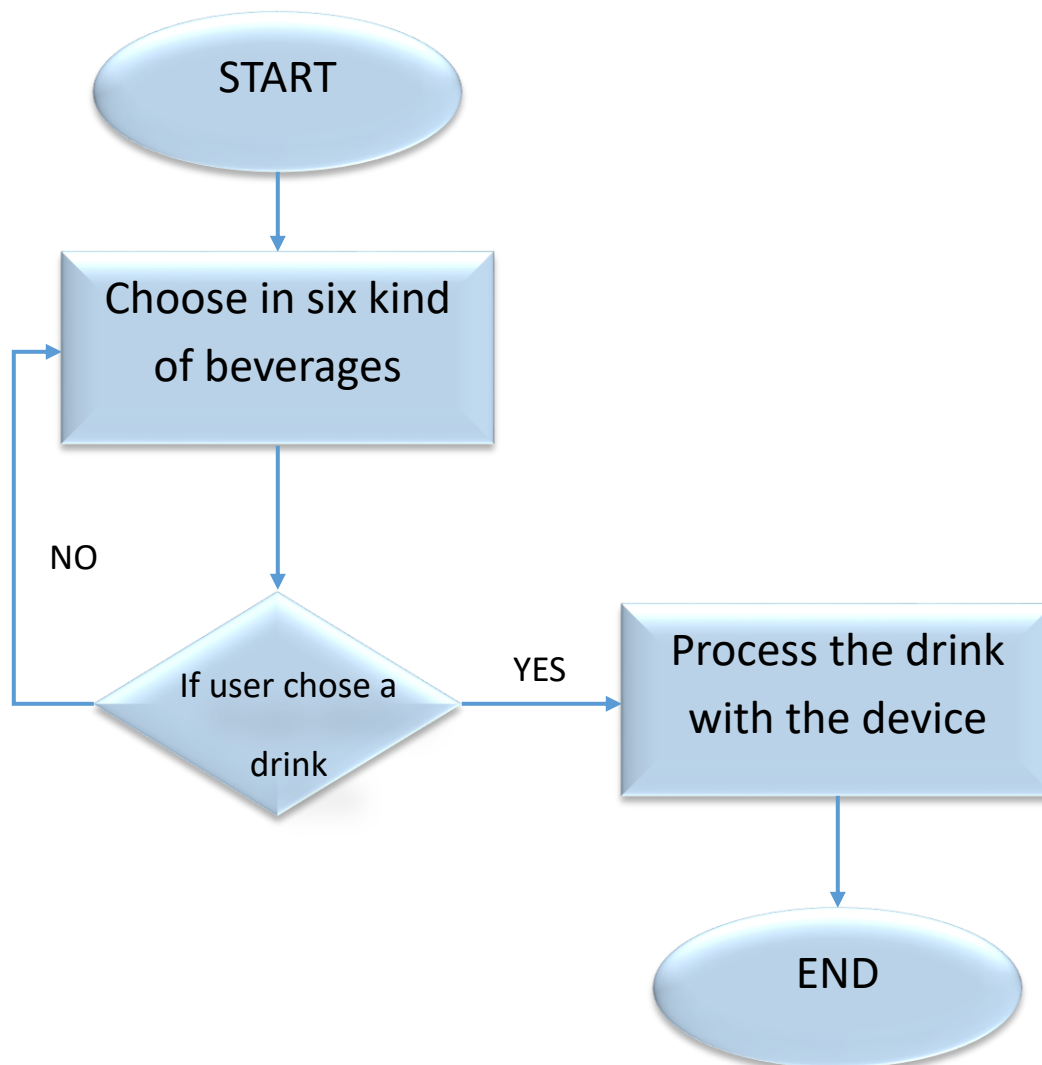
This table shows the personal costs used by the researchers during the research.



### 3.10 DATA PROCESS AND MODELING

In this part, the proponents show how the proposed project entitled “*Smartender: An Automated Bartending Machine using Raspberry Pi*” works and its step by step procedure.

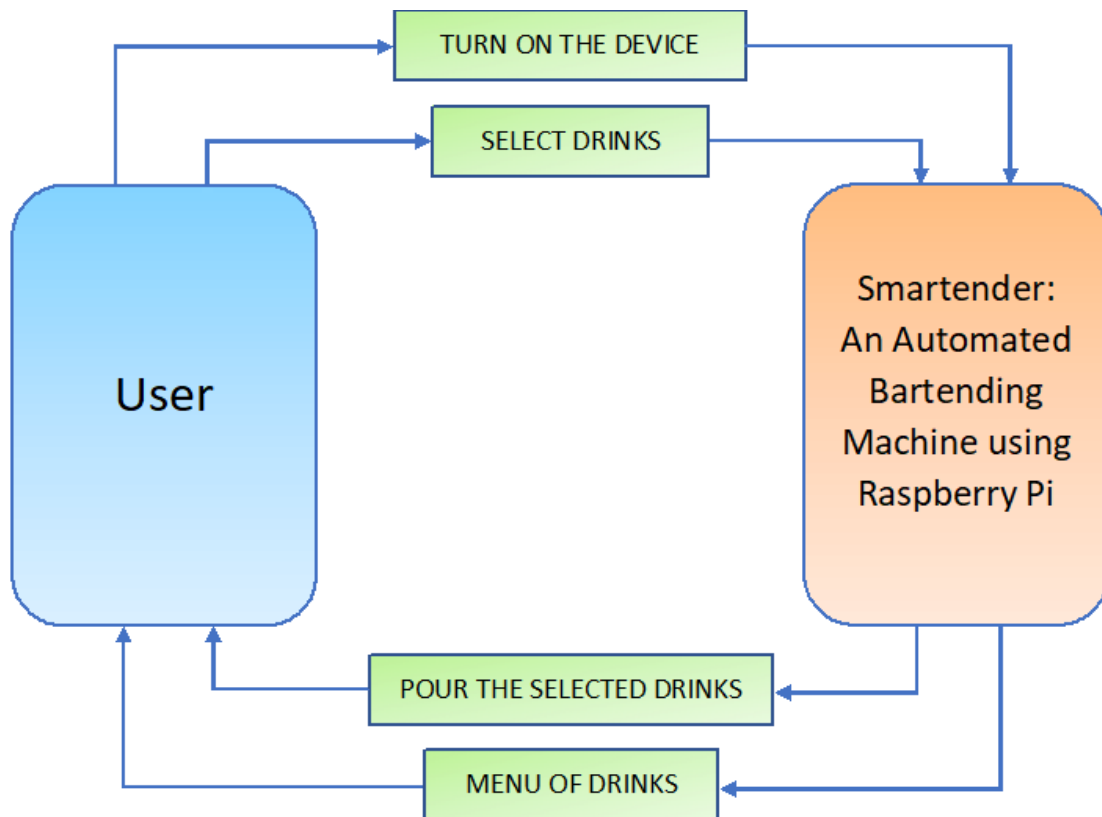
#### 3.10.1 SYSTEM FLOWCHART



**Figure 3.10.1.1 System Flowchart**



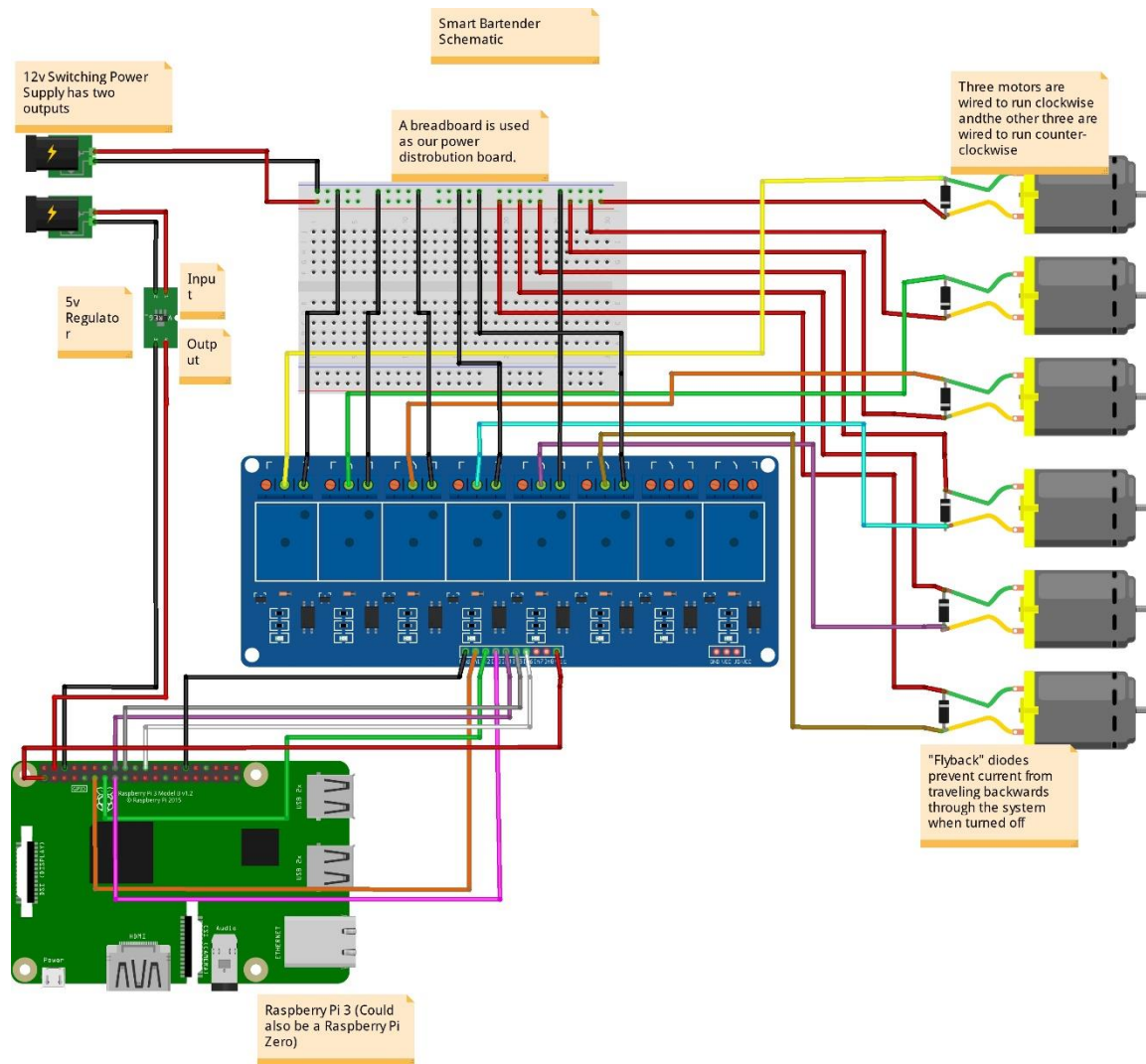
### 3.10.2 CONTEXT DIAGRAM



**Figure 3.10.2.1** context diagram of the Smartender: An Automated Bartending Machine using Raspberry Pi.



### 3.10.3 SCHEMATIC DIAGRAM



*Figure 3.10.3.1 shows the schematic diagram of Raspberry Pi 4B board.*



## **CHAPTER IV**

### **PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA**

This part of the study presents the result of the survey conducted by the proponents. The respondent's perceptions have been the source of information in gathering ideas and developing the proposed application.

The proponents conducted a survey by giving the questionnaire to fifty (50) respondents that is composed of customer and owners.

#### **4.1 RESPONDENT OF THE STUDY**

##### **Profile of the Respondents**

The respondents of the conducted evaluation tool are the Owners and Customers. The respondents are chosen based on their involvement in the proposed system.

##### **Classification of Respondents**

<b>RESPONDENTS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Customers	25	50%
Owners	25	50%
Total	50	100%

***Table 4.1.1 Profile of Respondents for the Survey***

In Table 4.1.1 shows that 25% of the respondents who answered the survey questionnaire are Customers, and the remaining 25% are the owners.



## 4.2 SURVEY RESULT

The proponents proposed a system and made an evaluation tool and survey questionnaire that the respondents will answer to help us analyze and develop the device thoroughly.

### Survey Questionnaire for Customer

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Age: \_\_\_\_\_ Gender: \_\_\_\_\_ Signature: \_\_\_\_\_

**Instruction:** This is a survey questionnaire for the project entitled **“SMARTENDER: An Automated Bartending Machine using Raspberry Pi”**. Please choose the answer that best corresponds to your opinion by answering YES or NO. Put ✓ for each question below.

QUESTION	ANSWER	
	Yes	No
1. Are you drinking alcoholic beverages?		
2. Are you fond of alcoholic mixes?		
3. Are you having a hard time mixing delicious and precise alcoholic beverages?		
4. Have you tried drinking the same alcoholic mix but they have different taste?		
5. Do you like your alcoholic drink to have a precise and accurate mixture?		
6. Have you experienced mixing drinks improperly resulting in waste of money and effort?		
7. Are you familiar with automated machines?		
8. Do you think automated machine is more efficient and precise at mixing drinks?		
9. Are you in favor of using our project "Smartender: An Automated Bartending Machine using Raspberry Pi" as a good tool for mixing precise and accurate drinks?		
10. Do you want to have a "Smartender" to automatically mix and dispense drinks for you, your friends and family?		





### Tally of Survey for Customer

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Age: \_\_\_\_\_ Gender: \_\_\_\_\_ Signature: \_\_\_\_\_

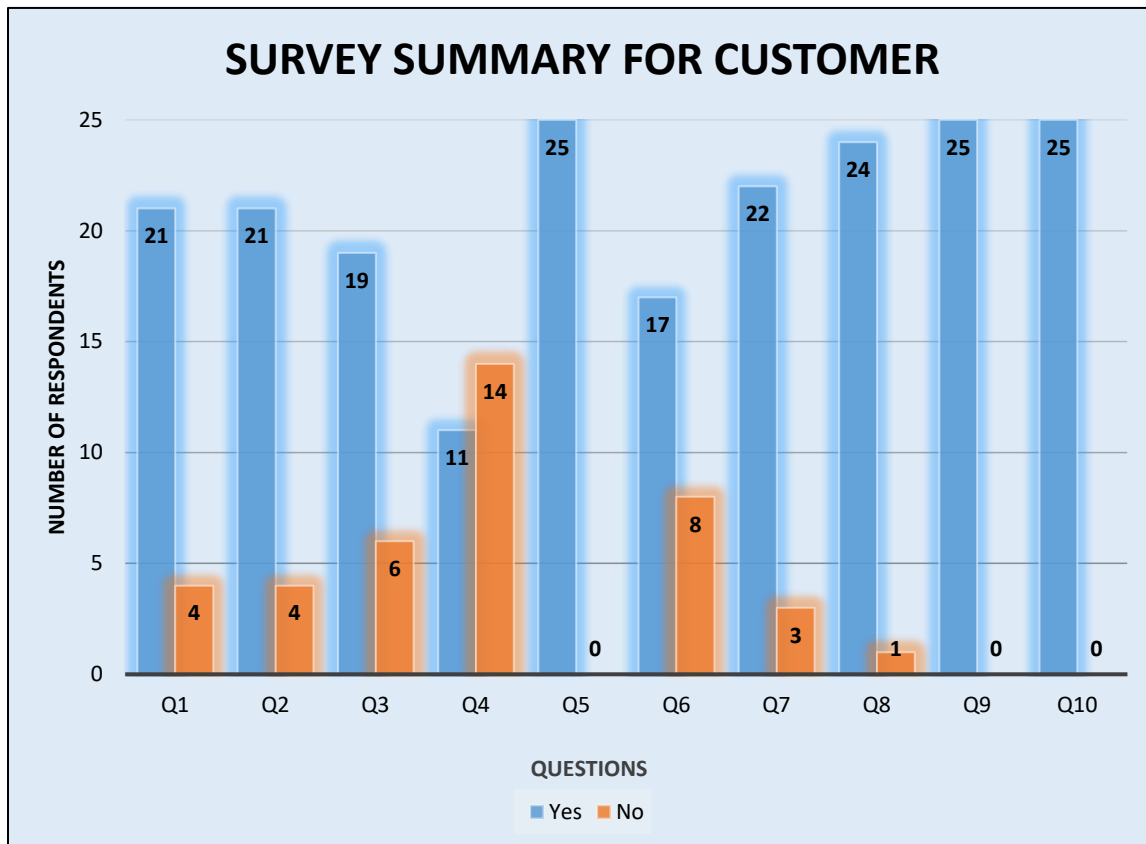
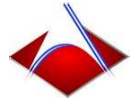
**Instruction:** This is a survey questionnaire for the project entitled  
**“SMARTENDER: An Automated Bartending Machine using Raspberry Pi”.**

Please choose the answer that best corresponds to your opinion by answering YES or NO. Put ✓ for each question below.

QUESTION	ANSWER	
	Yes	No
1. Are you drinking alcoholic beverages?	21	4
2. Are you fond of alcoholic mixes?	21	4
3. Are you having a hard time mixing delicious and precise alcoholic beverages?	19	6
4. Have you tried drinking the same alcoholic mix but they have different taste?	11	14
5. Do you like your alcoholic drink to have a precise and accurate mixture?	25	0
6. Have you experienced mixing drinks improperly resulting in waste of money and effort?	17	8
7. Are you familiar with automated machines?	22	3
8. Do you think automated machine is more efficient and precise at mixing drinks?	24	1
9. Are you in favor of using our project " Smartender: An Automated Bartending Machine using Raspberry Pi " as a good tool for mixing precise and accurate drinks?	25	0
10. Do you want to have a "Smartender" to automatically mix and dispense drinks for you, your friends and family?	25	0

**Table 4.2.1 Tally of Survey for Customer**

*Table 4.2.1 shows the result of the survey questionnaires given to 25 customer respondents who answered YES and NO in 10 questions presented.*



**Figure 4.2.1 Summary result of the Survey for Customer**

Figure 4.2.1 shows the total tally of the conducted survey

In question number 1, 21 of the respondents drinking alcoholic beverages while 4 of them don't.

In question number 2, 21 of the respondents fond of alcoholic mixes while 4 of them are not.



In question number **3**, 19 of the respondents having a hard time mixing delicious and precise alcoholic beverages while 6 of them disagreed.

In question number **4**, 11 of the respondents you tried drinking the same alcoholic mix but they have different taste while 14 are not.

In question number **5**, All of the respondents like alcoholic drink to have a precise and accurate mixture.

In question number **6**, 17 of the respondents experienced mixing drinks improperly resulting in waste of money and effort while 8 of them disagreed.

In question number **7**, 22 of the respondents familiar with automated machines while 3 of them disagreed.

In question number **8**, 24 of the respondents think automated machine is more efficient and precise at mixing drinks while 1 of them disagreed.

In question number **9**, All of the respondents agreed that "Smartender: An Automated Bartending Machine" as a good tool for mixing precise and accurate drinks.

In question number **10**, All of the respondents are in favor to have a "Smartender" to automatically mix and dispense drinks for you, your friends and family.



### Survey Questionnaire for Business Owner

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Age: \_\_\_\_\_ Gender: \_\_\_\_\_ Signature: \_\_\_\_\_

**Instruction:** This is a survey questionnaire for the project entitled  
**“SMARTENDER: An Automated Bartending Machine using Raspberry Pi”.**

Please choose the answer that best corresponds to your opinion by answering YES or NO. Put ✓ for each question below.

QUESTION	ANSWER	
	Yes	No
1. Are you drinking alcohol?		
2. Do you like mixing different kind of alcohol?		
3. Are you having a hard time mixing different of alcohol?		
4. Do you have experienced drinking a liquor where in you are not satisfied with the taste?		
5. Do you think automated liquor mixing will reduce time consume?		
6. Do you have any idea about Automated Bartending Machine?		
7. Have you ever tried using a machine in doing your task?		
8. Do you agree that Automated Bartending Machine is more efficient in mixing liquor?		
9. Are you in favor of using our project "Smartender: An Automated Bartending Machine using Raspberry Pi" as a good tool for mixing precise and accurate drinks?		
10. Would you recommend "Smartender: An Automated Bartending Machine using Raspberry Pi" to your family and friends?		



### Tally of Survey for Business Owner

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Age: \_\_\_\_\_ Gender: \_\_\_\_\_ Signature: \_\_\_\_\_

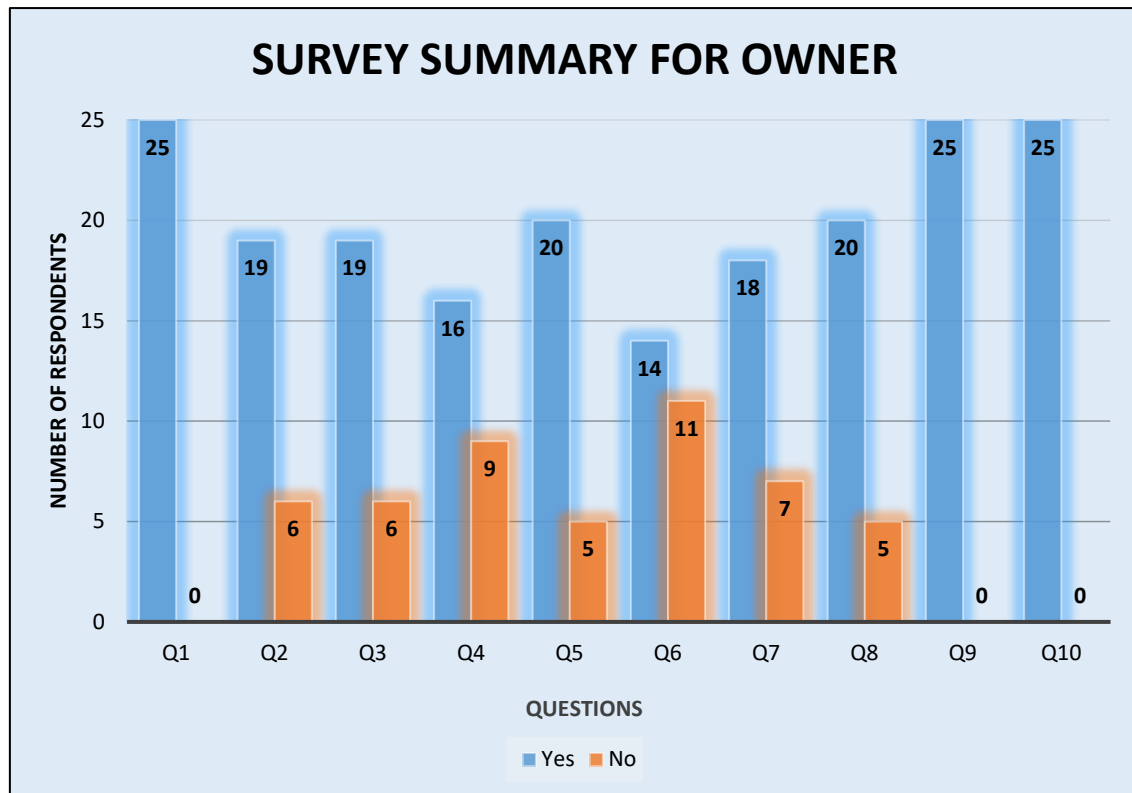
**Instruction:** This is a survey questionnaire for the project entitled **“SMARTENDER: An Automated Bartending Machine using Raspberry Pi”**.

Please choose the answer that best corresponds to your opinion by answering YES or NO. Put ✓ for each question below.

QUESTION	ANSWER	
	Yes	No
1. Are you drinking alcohol?	25	0
2. Do you like mixing different kind of alcohol?	19	6
3. Are you having a hard time mixing different of alcohol?	19	6
4. Do you have experienced drinking a liquor where in you are not satisfied with the taste?	16	9
5. Do you think automated liquor mixing will reduce time consume?	20	5
6. Do you have any idea about Automated Bartending Machine?	14	11
7. Have you ever tried using a machine in doing your task?	18	7
8. Do you agree that Automated Bartending Machine is more efficient in mixing liquor?	20	5
9. Are you in favor of using our project "Smartender: An Automated Bartending Machine using Raspberry Pi" as a good tool for mixing precise and accurate drinks?	25	0
10. Would you recommend "Smartender: An Automated Bartending Machine using Raspberry Pi" to your family and friends?	25	0

**Table 4.2.2 Tally of Survey for Business Owner**

Table 4.2.2. shows the result of the survey questionnaires given to 25 business owner respondents who answered YES and NO in 10 questions presented.



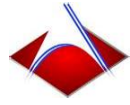
***Figure 4.2.2 Summary result of the Survey for Business Owner***

Figure 4.2.1 shows the total tally of the conducted survey.

In question number 1, All of the respondents are drinking alcoholic beverages.

In question number 2, 19 of the respondents like mixing different kind of alcohol while 6 of them are not.

In question number 3, 19 of the respondents having a hard time mixing delicious and precise alcoholic beverages while 6 of them disagreed.



In question number **4**, 16 of the respondents experienced drinking a liquor where they are not satisfied with the taste while 9 are satisfied.

In question number **5**, 20 of the respondents agreed to the automated liquor mixing to reduce time consume while 5 of them disagreed.

In question number **6**, 14 of the respondents experienced mixing drinks improperly resulting in waste of money and effort while 11 of them disagreed.

In question number **7**, 18 of the respondents tried using a machine in doing they're task while 7 of them are not.

In question number **8**, 20 of the respondents agreed that Automated Bartending Machine is more efficient in mixing liquor while 5 of them disagreed.

In question number **9**, All of the respondents agreed that "Smartender: An Automated Bartending Machine" as a good tool for mixing precise and accurate drinks.

In question number **10**, All of the respondents are in favor to have a "Smartender" to automatically mix and dispense drinks for you, your friends and family.



## EVALUATION FORM

### “Smartender: An Automated Bartending Machine using Raspberry Pi”

Name: \_\_\_\_\_ Gender: \_\_\_\_\_ Date: \_\_\_\_\_

Status: ☐ Owner ☐ Customer Signature: \_\_\_\_\_

The proponents would like to ask for your evaluation of the proposed system entitled “**Smartender: An Automated Bartending Machine using Raspberry Pi**” your favorite action regarding the evaluation is highly appreciate, below are the criteria for evaluating the system. Please check the appropriate rating for each criterion.

CRITERIA		RATING				
		5	4	3	2	1
Efficiency	The capabilities of the device to produce effectively with minimum amount of resources wasted.					
Reliability	The ability of the device conforms the desired results the accuracy of the performance.					
Functionality	The capability of the device to perform its task and provide useful function.					
Usability	The capability of the device to ease the operation, provision for comfort and convenience and user friendliness.					
Accuracy	The degree to which the device produces accurate data, results, and other features that the device provides.					

RATING	VERBAL INTERPRETATION
5	Excellent
4	Very Satisfactory
3	Satisfactory
2	Fair
1	Poor

Comments/Suggestions

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## TALLY OF EVALUATION

### “Smartender: An Automated Bartending Machine using Raspberry Pi”

Name: \_\_\_\_\_ Gender: \_\_\_\_\_ Date: \_\_\_\_\_

Status: ☐ Owner ☐ Customer Signature: \_\_\_\_\_

The proponents would like to ask for your evaluation of the proposed system entitled “**Smartender: An Automated Bartending Machine using Raspberry Pi**” your favorite action regarding the evaluation is highly appreciate, below are the criteria for evaluating the system. Please check the appropriate rating for each criterion.

CRITERIA		RATING				
		5	4	3	2	1
Efficiency	The capabilities of the device to produce effectively with minimum amount of resources wasted.	31	11	8	0	0
Reliability	The ability of the device conforms the desired results the accuracy of the performance.	11	34	5	0	0
Functionality	The capability of the device to perform its task and provide useful function.	27	17	6	0	0
Usability	The capability of the device to ease the operation, provision for comfort and convenience and user friendliness.	19	26	5	0	0
Accuracy	The degree to which the device produces accurate data, results, and other features that the device provides.	28	17	4	0	0

Comments/Suggestions

RATING	VERBAL INTERPRETATION
5	Excellent
4	Very Satisfactory
3	Satisfactory
2	Fair
1	Poor

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### **4.3 EVALUATION OF THE RESPONDENTS**

The proponents conducted an evaluation of the proposed project through the distribution of questionnaires. By using the questionnaires, the proponents can use an evaluation to obtain a clearly defined result of the proposed project.

The respondents who evaluated the proposed project are the Customer and Business Owner. The proponents showed the proposed project to the respondent and guide them to navigate while explaining the ability and functionality of the proposed project.

RESPONDENTS	FREQUENCY	PERCENTAGE
Customers	25	50%
Owners	25	50%
Total	50	100%

***Table 4.3.1 Evaluation of the Respondents***

Table 4.3.1 shows the frequency and percentage of the respondents who evaluated the proposed application.



#### **4.4 SOFTWARE PRESENTATION**

The proponents organized the response of the respondents and used descriptive statistics to provide summaries and description of data. Graphical tools and charts are also utilized to support the data gathered.

The fifty (50) respondents rated the evaluation tool provided by the proponents.

The following criteria are:

- 1. Efficiency** – The capabilities of the device to produce effectively with minimum amount of resources wasted.
- 2. Reliability** – The ability of the device conforms the desired results the accuracy of the performance.
- 3. Functionality** – The capability of the device to perform its task and to provide useful function.
- 4. Usability**– The capability of the device to ease the operation, provision for comfort and convenience and user-friendliness.
- 5. Accuracy** – The degree to which the device produces accurate data, results and other features that device provides.

The proponents used two (2) kinds of scales in rating the proposed project: The Five Point Scale and the Likert Scale. The Five Point Scale was used by the respondents to rate the evaluation of the project while Likert Scale was used to interpret the computed analysis of the evaluation.



RATING	INTERPRETATION
5	Excellent
4	Very Satisfactory
3	Satisfactory
2	Fair
1	Poor

**Table 4.4.1 Five Point Scale**

Table 4.3.1 shows the Five Point scaling that has been used in the evaluation. The respondents rated the project based on their perspective with the criterion of 5 as excellent, 4 as very satisfactory, 3 as satisfactory, 2 as fair and 1 as poor.

RANGE OF MEAN VALUE	INTERPRETATION
4.21 - 5.00	Excellent
3.41 - 4.20	Very Satisfactory
2.61 - 3.40	Satisfactory
1.81 - 2.60	Fair
1.00 - 1.80	Poor

**Table 4.4.2 Likert Scale**

Table 4.3.2 shows the Likert Scale which has been used for rating the project during the evaluation period. It shows the verbal interpretation and its corresponding rating range.



#### 4.5 PROPOSED APPLICATION EVALUATION RESULT

This section explains and shows the computation of the data gathered by the proponents in evaluating the proposed project.

**Efficiency** – The capabilities of the device to produce effectively with minimum amount of resources wasted.

CRITERION	5	4	3	2	1	Total
EFFICIENCY	31	11	8	0	0	50

***Table 4.5.1 Assessment in criterion of Efficiency***

Table 4.5.1 shows the assessment in criterion of efficiency. The acquired tally result in the proposed study rating is 31 for excellent, 11 for very satisfactory, 8 for satisfactory, 0 for fair and 0 for poor.

Total Number of Respondent: 50

The weighted mean formula is:

The weighted mean formula is:  $WM = \frac{\sum (f \cdot w)}{n}$

Where:

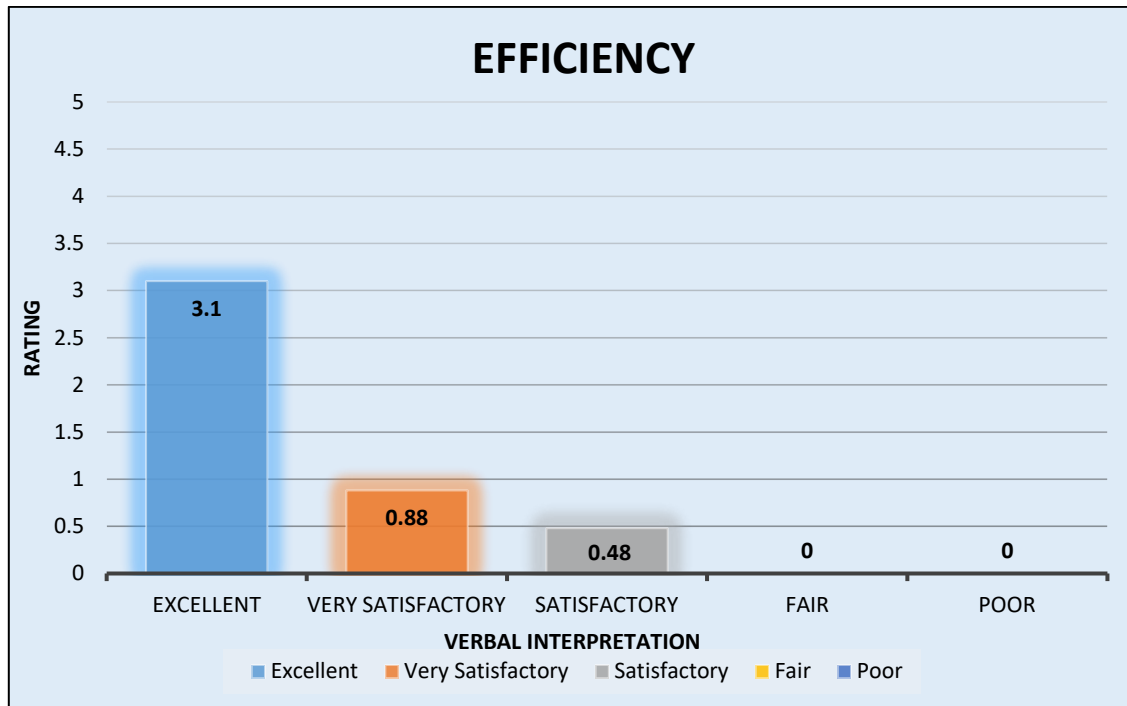
**WM** = summation of computed weighted mean **f** = frequency of response

**w** = weight of the scale value

**n** = total number of respondents

$$\begin{aligned}\text{Efficiency} &= (31 \cdot 5) / 50 + (11 \cdot 4) / 50 + (8 \cdot 3) / 50 + (0 \cdot 2) / 50 + (0 \cdot 1) / 50 \\ &= (3.1) + (0.88) + (0.48) + (0) + (0)\end{aligned}$$

**Efficiency = 4.46 (Excellent)**



**Figure 4.5.1 Bar Graph of the Criterion Efficiency**

- The rating for Excellent is at 3.1
- The rating for Very satisfactory is at 0.88
- The rating for Satisfactory is at 0.48
- The rating for Fair is at 0
- The rating for Poor is at 0

The average rating for Efficiency is at **4.46 (Excellent)**



**Reliability** – The ability of the device conforms the desired results the accuracy of the performance.

CRITERION	5	4	3	2	1	Total
RELIABILITY	11	34	5	0	0	50

***Table 4.5.2 Assessment in criterion of Reliability***

Table 4.5.2 shows the assessment in criterion of reliability. The acquired tally result in the proposed study rating is 11 for excellent, 34 for very satisfactory, 5 for satisfactory, 0 for fair and 0 for poor.

Total Number of Respondent: 50

The weighted mean formula is:

The weighted mean formula is:  $WM = \frac{w(f)}{n}$

Where:

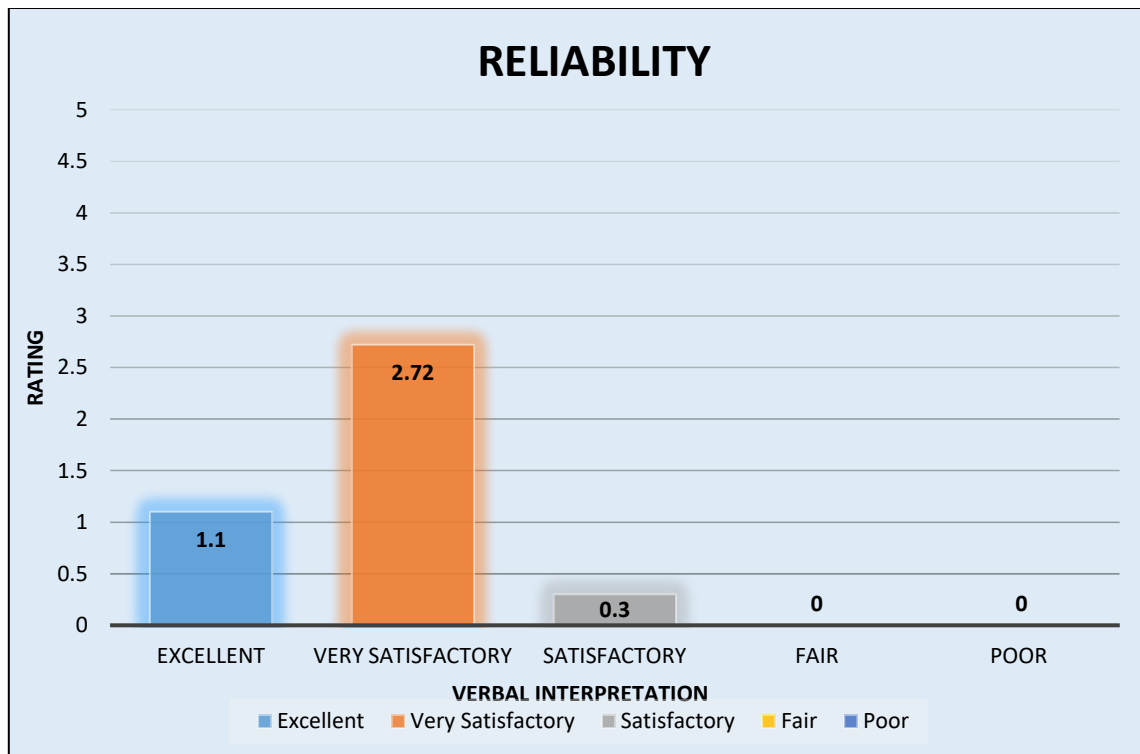
**WM** = summation of computed weighted mean **f** = frequency of response

**w** = weight of the scale value

**n** = total number of respondents

$$\begin{aligned}\text{Reliability} &= (11 \cdot 5) / 50 + (34 \cdot 4) / 50 + (5 \cdot 3) / 50 + (0 \cdot 2) / 50 + (0 \cdot 1) / 50 \\ &= (1.1) + (2.72) + (0.3) + (0) + (0)\end{aligned}$$

**Reliability = 4.12 Very Satisfactory**



**Figure 4.5.2 Bar Graph of the Criterion Reliability**

- The rating for Excellent is at 1.1
- The rating for Very satisfactory is at 2.72
- The rating for Satisfactory is at 0.3
- The rating for Fair is at 0
- The rating for Poor is at 0

The average rating for Reliability is at **4.12 (Very Satisfactory)**





**Functionality** – The capability of the device to perform its task and to provide useful function.

CRITERION	5	4	3	2	1	Total
FUNCTIONALITY	27	17	6	0	0	50

***Table 4.5.3 Assessment in Criterion of Functionality***

Table 4.5.3 shows the assessment in criterion of functionality. The acquired tally result in the proposed study rating is 27 for excellent, 17 for very satisfactory, 6 for satisfactory, 0 for fair and 0 for poor.

Total Number of Respondent: 50

The weighted mean formula is:

The weighted mean formula is:  $WM = \sum (w \cdot f) / n$

Where:

**WM** = summation of computed weighted mean **f** = frequency of response

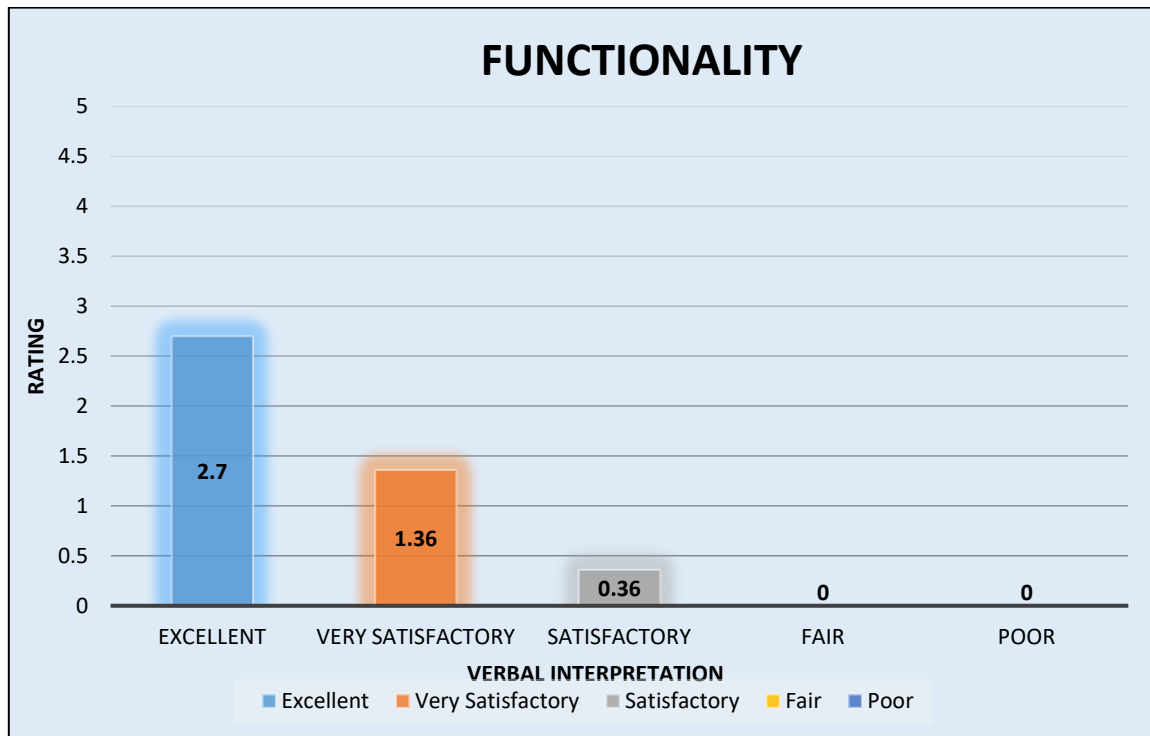
**w** = weight of the scale value

**n** = total number of respondents

**Functionality** =  $(27 \cdot 5) / 50 + (17 \cdot 4) / 50 + (6 \cdot 3) / 50 + (0 \cdot 2) / 50 + (0 \cdot 1) / 50$

=  $(2.7) + (1.36) + (0.36) + (0) + (0)$

**Functionality = 4.42 (Excellent)**



**Figure 4.5.3 Bar Graph of the Criterion Functionality**

- The rating for Excellent is at 2.7
- The rating for Very satisfactory is at 1.36
- The rating for Satisfactory is at 0.36
- The rating for Fair is at 0
- The rating for Poor is at 0

The average rating for Functionality is at **4.42 (Excellent)**



**Usability** – The capability of the device to ease the operation, provision for comfort and convenience and user-friendliness.

CRITERION	5	4	3	2	1	Total
USABILITY	19	26	5	0	0	50

***Table 4.5.4 Assessment in Criterion of Usability***

Table 4.5.4 shows the assessment in criterion of usability. The acquired tally result in the proposed study rating is 19 for excellent, 26 for very satisfactory, 5 for satisfactory, 0 for fair and 0 for poor.

Total Number of Respondent: 50

The weighted mean formula is:

The weighted mean formula is:  $WM = \frac{w(f)}{n}$

Where:

**WM** = summation of computed weighted mean **f** = frequency of response

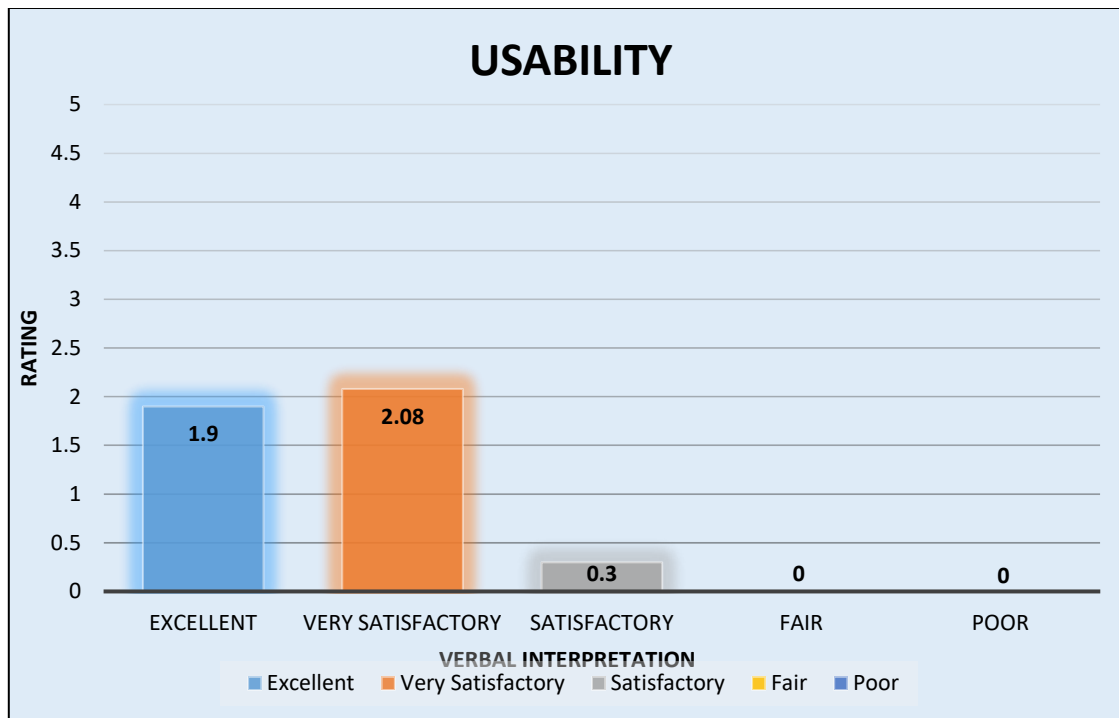
**w** = weight of the scale value

**n** = total number of respondents

**Usability** =  $(19 \times 5)/50 + (26 \times 4)/50 + (5 \times 3)/50 + (0 \times 2)/50 + (0 \times 1)/50$

=  $(1.9) + (2.08) + (0.3) + (0) + (0)$

**Usability = 4.28 Excellent**



**Figure 4.5.4 Bar Graph of the Criterion Usability**

- The rating for Excellent is at 1.9
- The rating for Very satisfactory is at 2.08
- The rating for Satisfactory is at 0.3
- The rating for Fair is at 0
- The rating for Poor is at 0

The average rating for Usability is at **4.28 Excellent**



**Accuracy** – The degree to which the device produces accurate data, results and other features that device provides.

CRITERION	5	4	3	2	1	Total
ACCURACY	28	17	4	0	0	50

**Table 4.5.5 Assessment in Criterion of Accuracy**

Table 4.5.5 shows the assessment in criterion of usability. The acquired tally result in the proposed study rating is 28 for excellent, 17 for very satisfactory, 4 for satisfactory, 0 for fair and 0 for poor.

Total Number of Respondent: 50

The weighted mean formula is:

The weighted mean formula is:  $WM = \sum (w \cdot f) / n$

Where:

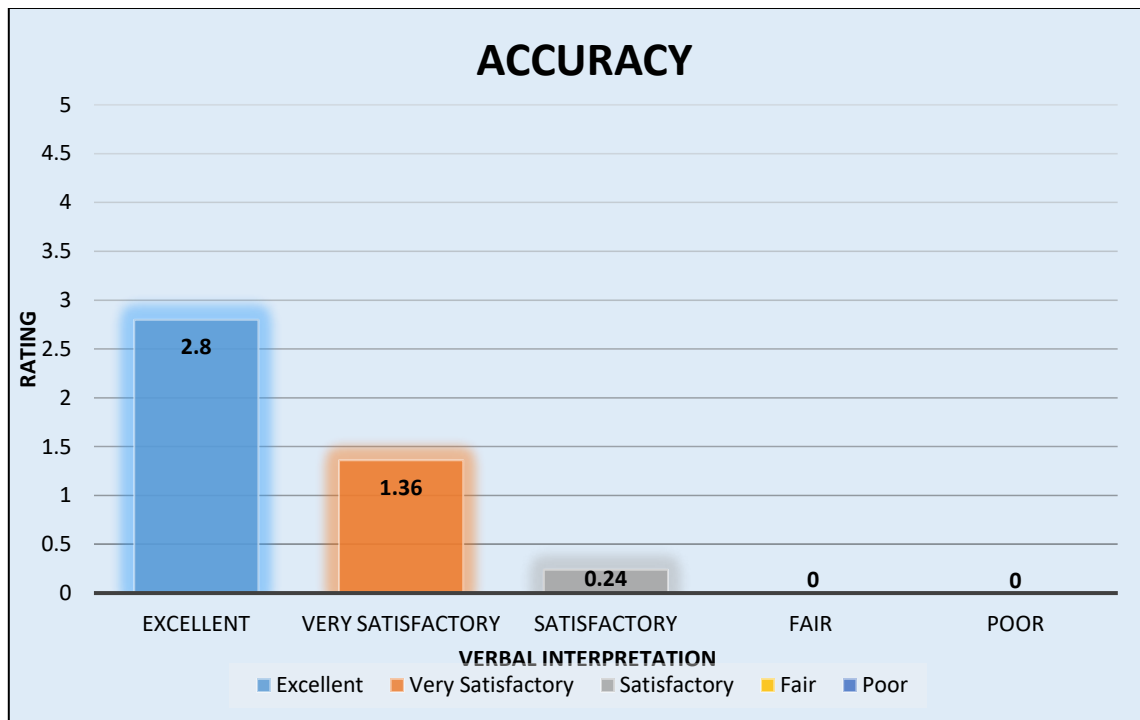
**WM** = summation of computed weighted mean **f** = frequency of response

**w** = weight of the scale value

**n** = total number of respondents

$$\begin{aligned}\text{Accuracy} &= (28 \cdot 5) / 50 + (17 \cdot 4) / 50 + (4 \cdot 3) / 50 + (0 \cdot 2) / 50 + (0 \cdot 1) / 50 \\ &= (2.8) + (1.36) + (0.24) + (0) + (0)\end{aligned}$$

**Accuracy = 4.4 Excellent**



**Figure 4.5.5 Bar Graph of the Criterion Accuracy**

- The rating for Excellent is at 2.8
- The rating for Very satisfactory is at 1.36
- The rating for Satisfactory is at 0.24
- The rating for Fair is at 0
- The rating for Poor is at 0

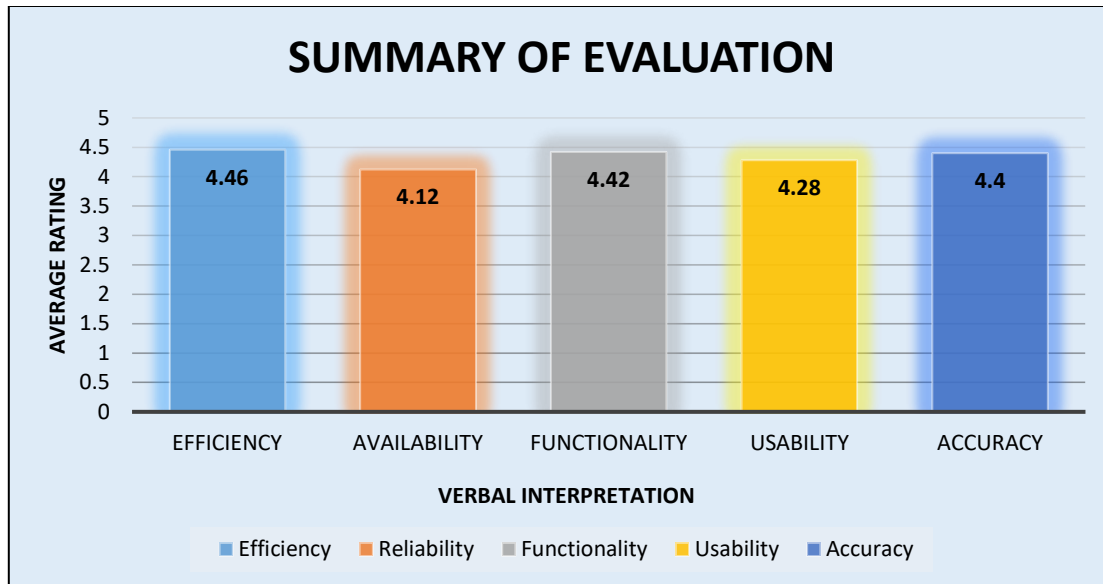
The average rating for Accuracy is at **4.4 Excellent**



CRITERIA	AVERAGE	VERBAL INTERPRETATION
Efficiency	4.46	Excellent
Reliability	4.12	Very Satisfactory
Functionality	4.42	Excellent
Usability	4.28	Excellent
Accuracy	4.4	Excellent
<b>Total Average</b>	<b>4.33</b>	Excellent

***Table 4.5.6 Summary Result of the Evaluation***

Table 4.5.6 shows each criterion with their corresponding averages computed by the proponents and their equivalent verbal interpretation. It can be seen that the grand total weighted mean is 4.33 which has an interpretation of excellent.



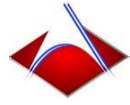
**Figure 4.4.6 Summary of Evaluation in Bar Graph**

Figure 4.4.6 shows the overall result of the proposed project in terms of the following below:

- Efficiency with the weighted mean of 4.46
- Reliability with a weighted mean 4.12
- Functionality with a weighted mean of 4.42
- Usability with a weighted mean of 4.28
- Accuracy with a weighted mean of 4.4

As stated in the table, it reveals that all the criteria are rated “Excellent” but they vary in the weighted means. Overall, the proposed project entitled: “Smartender: An Automated Bartending Machine using Raspberry Pi” is ranked 5 with the weighted mean of 4.33 therefore, the proponents conclude that the outcome of this study is successful.





## **CHAPTER V**

### **SUMMARY, CONCLUSION AND RECOMMENDATION**

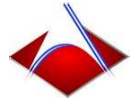
This chapter presents all the summaries of the proposed application, conclusions and recommendations according to their findings.

#### **5.1 SUMMARY**

The project entitled “Smartender: An Automated Bartending Machine using Raspberry Pi” was developed to make things easier and time efficient by making liquor. It is a device that can automatically mixed selected liquor with juice and serve to the customer in just 30 seconds.

Typical bar scenario during happy hour involves people ordering drinks simultaneously every now and then thus, making the bartender the busiest person. Due to time pressure and demands from the costumers, bartenders are prone to make mistakes during the actual cocktail making process. Because of the inaccuracy of the bartender, the quality of drinks produced may be at stake and worst it may cause hazard for the costumer's health. This project aims to solve those irregularities to avoid jeopardy by eradicating such issues relating to the poor-quality control and put some time consumption which a typical bartender usually deals with.

How to use the “Smartender”? Simply plug in the power you will use it remotely after you open the application you will see the menu there are six



liquors options, when you select a liquor automatic relay switch on which a liquor is connected it will flow in the hose going to the glass.

The main purpose of “Smartender: An Automated Bartending Machine using Raspberry Pi” is to provide events, occasions and celebrations a machine that will precisely dispense mixed liquor while reducing the requirements of human labor to perform it is user-friendly making it very simple to operate.

After conducting a series of evaluation and survey, the proponents arrived with the following findings:

- In terms of Efficiency, the system Evaluation’s Weighted Mean gathered a 4.46 which translated to an Excellent Rating.
- In terms of Reliability, the system Evaluation’s Weighted Mean gathered a 4.12 which translated to an Very Satisfactory Rating.
- In terms of Functionality, the system Evaluation’s Weighted Mean gathered a 4.42 which translated to an Excellent Rating.
- In terms of Usability, the system Evaluation’s Weighted Mean gathered a 4.28 which translated to an Excellent Rating.
- In terms of Accuracy, the system Evaluation’s Weighted Mean gathered a 4.4 which translated to an Excellent Rating.
- Has a high interpretation of Excellent in total of 4.33 Grand Total weighted mean



- That proposed device is technically and operationally feasible for implementation

## **5.2 CONCLUSION**

The proponents have concluded that the device entitled “Smartender: An Automated Bartending Machine Using Raspberry Pi” can be used in a restaurant, bars and occasions to help the bartender to facilitate their work.

The main problem of the proposed project is how to make a device that is automated in order to lessen the time, effort and make work easier and faster for events, occasions and celebrations.

The objective of this study is to provide a machine that can produce sets of drinks fast, accurate, consistent and efficient that can accommodate a big number of drinkers.

- To develop a machine that can mix multiple drinks.
- To develop a machine that can select drinks in mobile application.
- To design a machine that is a user friendly, wherein the customer can operate the machine.
- To develop a machine that can manage the customer’s order.

In the survey conducted by the proponents 100% of the respondents like alcoholic drink to have a precise and accurate mixture.



In the system evaluation with 50 respondents, the total average rating that the device received was 4.33 (Excellent)

### **5.3 RECOMMENDATION**

The proponent's development of this project resulted to better understanding of the many types of microcontrollers, and the language that are used and integrated in order to make multiple peripherals connected to the microcontroller work together. Through the proposed project entitled "Smartender: An Automated Bartending Machine using Raspberry Pi" the proponents were able to learn different technical methods that is relevant to the device and the language used.

The proponents recommend the following statement to the next developers:

1. To increase the container capacity of the liquor and juice.
2. To add dispense ice automated.
3. To upgrade the pump into peristaltic pump and/or other hardware devices used for more efficient service.
4. To have limitation to the user for avoiding drunk.
5. Add more choices of drinks.
6. Create a better design for the enclosure.