EXAMINING THE ADOPTION OF PETROL STATION MANAGEMENT SYSTEM: A SYSTEMATIC LITERATURE REVIEW

A THESIS SUBMITTED TO THE GRADUATE SCHOOL OF APPLIED SCIENCES OF NEAR EAST UNIVERSITY

By
GABRIEL AUGUSTINE AYUK

In Partial Fulfillment of the Requirements for the Degree of Master of Science in Computer Information Systems

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I hereby declare that all the information in this document are retrieved and presented in accordance to the academic rule and ethical conduct. I also declare that, as required by the rules and conducts, I have fully cited and referenced all material and results that are not original to this work.

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To my Parents…

ABSTRACT

In recent times, it's difficult to manage petrol stations due to the old manual way of keeping records of petroleum products. Different studies have been conducted to examine the adoption of petrol station management systems. The aim of this study was to investigate the adoption of petrol station management system by reviewing the research methodology used, the theoretical framework used and the missing gap of the previous studies. After the analysis, the result shows that in this study, a systematic literature review of 35 articles were conducted to assess the adoption of petrol station management system from the year 2013 to 2018. Of the 35 articles used for the study, 16 was extracted from Ebsco, 10 was extracted from science direct, 3 was extracted from Emerald insight, 6 was extracted from Scopus. results from the analysis shows that most of the studies use the TAM, Extended TAM and UTAUT model while some studies did not use any technology acceptance model in their study. The result of the study also shows that the research methodologies used by the studies are case study, survey and system development. The analysis finally revealed that the some of the gaps in the previous studies are that many of the studies focused on system implementation. Some of the studies didn't make use of any research model some of the studies focused only on system development. This study will be beneficial to researchers who would like to research further on the research topic and also add to the existing stock of knowledge on the research area.

***Keywords*:** petrol station; management system; information system; information technology; petroleum system; automated system

ÖZET

Günümüzde, benzin istasyonları yönetiminin geleneksel yöntem ile sürdürülmesi oldukça zordur. Bu bağlamda, literatürde farklı benzin istasyonu yönetim sisteminin benimsenme sürecini inceleyen çeşitli çalışmalar gerçekleştirilmiş, bu araştırmada ise bu çalışmalar incelenmiştir. Bu araştırmanın amacı, benzin istasyonu yönetim sistemlerine yönelik literatürdeki çalışmaların araştırma yöntemini, kuramsal çerçevesini ve konuya yönelik litaretürdeki eksikliği araştırmaktır. Benzin istasyonu yönetim sistemini konu alan ve 2013-2018 yılları arasında gerçekleştirilmiş 35 makale bu araştırma kapsamında incelenmiştir. Araştırma kapsamına dahil edilen makaleler 5 farklı veri tabanından elde edilmiştir. Elde edilen sonuçlara göre, araştırmaların büyük bir kısmı TAM ve UTAUT modelini kullanırken, birkaç araştırma ise çalışmalarında herhangi bir teknoloji kabul modelini kullanmadığını göstermektedir. Çalışmalarda kullanılan araştırma yöntemlerine bakıldığında, durum çalışması ve sistem geliştirme yöntemlerinin araştırmacılar tarafından tercih edildiği görülmektedir. Bu çalışmanın, benzin istasyonları yönetimi konusunda daha fazla araştırma yapmak isteyen araştırmacılar için yol gösterici ve faydalı olacağı düşünülmektedir

***Anahtar Kelimeler*:** Petrol istasyonu; yönetim sistemi; bilgi sistemi; bilgi teknolojisi; petrol sistemi; otomatik sistem

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LIST OF ABBREVIATIONS

VANET	Vehicular Ad-Hoc Network
GSM	Global System for Mobile Communication
RFID	Radio Frequency Identification
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
TRA	Theory of Reasoned Action
TPB	Theory of Planned behavior

CHAPTER 1

INTRODUCTION

This chapter presents the topic of study and gives a short overview on the topic, the objective of this research is also discussed, an overview of the chapters and importance of the study also follows.

1.1 Introduction

Day to day, technology is advancing and systems are being implemented to make business or organization easy to run. Management information systems is a set of arranged procedures which provides information to support decision making and management in an organization. Ali et al. (2015) implemented a management system to manage the account of petrol station to keep records of each transaction time efficiently and also to ensure the petrol station is selling at the standard approved price.

Petrol station management system is an integrated system that manages petrol product, account inventory, enhance usefulness, accuracy, timeliness and reporting system of petroleum product information (Okemiri et al, 2016). Petrol station management system adoption is on the rise in the energy sector as it provides an all-round monitoring of the entire fuel station business. Fuel station management system controls the front end and backend of the activities that runs in the enterprise. (Ahmed et al. 2014) assert that management system is inevitable for the smooth running of big and medium businesses in current technology age. He further that management system provides the managers the opportunity to view stock, manage stock level, schedule activity, manage payroll and help in forecasting company revenue.

Different studies such as Siang et al. (2013) have explained the importance of management system in oil industry. They opined that the volume of data processed daily requires automation for activities within the business. Fuel station process data such as logistics information, staff details, customers' information and stakeholder information. Proper management of these information affords the company to succeed and competitive in the among other players in the market.

Throughout the years, fuel pump management has faced several challenges. For example, in 2015, a petrol station fuel pump in Nigeria was tempered with and the meter settings were adjusted to read more money and dispense less fuel (Yinka et al., 2016). This happens when the staff of the petrol station has full access to the fuel pump and no proper secured management has been adopted to protect the meter readings.

However, studies on management system have examined management system in other sector aside fuel station. It is in the light of this that study seek to systematically review studies on petrol station management systems.

1.2 Problem Statement

Limited systematic review were found on petrol station management system Areeg et al. (2017), many of the systematic review found were focused on management information of organization, school management system. Studies such as Ludmila. (2015) examined management system in the educational sector. Other studies such as Nang et al. (2015) and Kulkarni and Tawara (2014) examined petrol station management from the system development angle only. Limited study was found to systematically review petrol station management systems. In order to address this gap, this study seek to conduct a systematic review on studies that has examined petrol station management system.

1.3 Purpose of Study

The aim of this research is to conduct a systematic literature review on the adoption of petrol station management system. To accomplish the point of this study, the researcher will analyze the following research questions.

1.4 Research Questions

As per the distinguished research issue, beneath is the issue and sub-addresses of the investigation, the research question is outlined and the answers to the questions will be explained and analyzed in chapter 5.

- **RQ1:** What methodologies were used in the studies that examined the adoption Petrol Station Management System?

- **RQ2:** What technology acceptance model were used in the studies that examined the adoption Petrol Station Management System?
- **RQ3:** What region dominated the studies conducted on the adoption of Petrol Station Management?
- **RQ4:** What is the research method that examined the adoption of petrol management system?
- **RQ5:** What is the focus of the studies that examined the adoption of Petrol Management System?
- **RQ6:** What is the research gap of the studies that examined the adoption Petrol Station Management System?
- **RQ7:** System development of the studies that examined the adoption Petrol Station Management System?

1.5 Importance of Study

Due to the fast changes in technology, a lot of researchers are eager to understand the importance of such technology in management information systems and its effect on the present trend. There are limited systematic literature review on this topic, the importance of this study is to bridge the research gap, understand various issues, increase awareness and also to build knowledge to aid business success.

To fully understand this, petrol station management system is important to the following:

i. **User**: Reduces manpower in dispensing fuel and record keeping.
ii. **Customers**: Time efficient.
iii. **Owner**: Little or no errors in the record keeping, avoid shortage of fuel and accurate fuel tank level
iv. **Government**: Ensure the owner of the station is selling petroleum product at government approved price to avoid fraud.

1.6 Limitations of the Study

There are a number of limitations for this study which the researcher recommends to be taken note of for future research. The following limitations were noted:

i. The research only focused at publications from the year 2013 to 2018.

ii. The research only focused at articles published on four highly cited journals indexed EBSCO, Emerald Insight, Science Direct and Scopus databases.
iii. Articles was retrieved using Near east university library platform to access the database.
iv. The review included articles that were only available in the aforementioned journals.
v. Articles that were reached by author as full text were the only ones included in the study.
vi. The study is limited to the articles gotten from the keyword used for the study such as management system; information system; petrol station; information technology.
vii. The duration of this study was 32weeks, started on January 2019 to July 2019.

1.7 Overview of the Study

The study is divided into four well defined chapters which are outlined below:

Chapter 1: This chapter presents the topic of study and gives a short overview on the topic, the objective of this research is also discussed, an overview of the chapters and importance of the study also follows.

Chapter 2: This section reviews management information system in depth, with emphasis on previous studies regarding the current trends in petrol station management information system, an in-depth literature review, petrol station system challenges as well as adoption of petrol station management system.

Chapter 3: This chapter presents the concept around management system. The chapter further explains the importance of petrol station management system, factors that affects the establishment of management systems as well as the characteristics of successful management system and causes of management system failure

Chapter 4: This section looks at the research methodology used with reference to systematic review and analysis, search strategy, study selection, inclusion/exclusion criteria used, data source and coding as well as data coding and analysis

Chapter 5: This chapter sums up the study by providing results of the study, identified gaps of the study and discusses the results.

Chapter 6: This is the last chapter of the study and gives a summary of what the study was all about together with recommendations for future work.

CHAPTER 2

RELATED RESEARCH

This section reviews in depth the adoption of Petrol Station Management System with prominence on previous studies regarding the current development in management system for easy management of account inventory, records etc. A comprehensive literature review is conducted on Petrol Station Management System to access the challenges, determine the advantages and also to implement the adoption of petrol station management system.

2.1 Fuel Station Monitoring and Management

This reviews the studies conducted on fuel station monitoring and management. Most researchers conducted studies to understand the day to day running and monitoring of the financial records of a Fuel station. This subheading reviews previous studies.

Muhamad and Kodrat (2012) conducted a study on management system for gas station inventory control. The aim of their research was to build an inventory control system. They designed a system that manages ordering and control the inventory of gas using the waterfall model which consists of system analysis, system design, system implementation and testing programs. After testing the system, they found that management system for inventory control increases the security of gas station and also provide effective tracking of the inventory.

Maheshwari et al. (2014) conducted a study on resource planning system for petrol station to integrate the old pattern of manually keeping records on the day to day running of a petrol station to an automated way of using one computer. It is hard for the supervisor to track the daily records so this study introduced an easy way to maintain daily records. In this study, there are several forms for different purposes, one which is inventory management, to help the supervisor find detailed data on the daily records. there is also a module named product cost in which the cost of each product is displayed. A module named staff management in which the information of each staff working in the company can be viewed. All these modules are secured with password to provide full safety of classified records. There are many more forms in this project that makes petrol station easy to maintain (Nathwani and shah. 2014).

Ali et al. (2015) Developed an automated fuel management system that can keep up the records of the petrol stations. The results from this system prints out a receipt consequently after each transaction and can track transactions from remote areas by means of internet. In the meantime, this framework can store data in the database that can generate every day to day, week by week, month to month and yearly business reports in ireport. This management platform is increasingly productive, low cost and efficient compared to existing systems likewise encourages the fuel station to become faster and lessen fraudulent.

Okemiri et al. (2016) conducted a review to solve the issue of corruption in petrol stations, missing files and documents, time inefficiency due to manual processing, inaccurate inventory, unprotected data and poor storage. This study further tackle to issue of fraud amongst staffs, unapproved access to classified documents and information, mismanagement of petroleum product. This system gives right to privacy and secrecy in reducing inventory shortages of staff corruption and funds mismanagement. The platform also monitors the activities of all staffs through the attendance inventory included in the system.

Areeg et al. (2017) focus on the monitoring system to Track and understand the changes which takes place in petrol stations. Their study further explained in details how effective and useful remote monitoring and data collection system is essential to collect data from the petrol tank storage. In this study, a monitoring device was built on the raspberry- pi computer to send information about the level of fuel in the tank in real time through a sensor and stream it live to the site and then upload the data to a web based application where it can be accessed anywhere and at any time through the use of internet. In this study, the administration of monitoring systems in view of internet of things technology to secure the tower sites from theft and give protection to remote locations (Siddig et al., 2017). Their study is aimed at measuring the fuel tank level that can be accessed on the web based platform and at the same time, the management information system can store information about the day to day transaction records in the database and can also generate monthly and yearly reports from the database at any time.

Kaushik et al. (2017) design and developed an automated fuel station management system to eradicate the disadvantages of the present system. This study result to cashless transactions and an authorized system to help boost the country financial status. The need of

fuel is becoming more and more important because day by day, there's rapid growth of machines and automobiles that depends solely on fuel to perform. This study makes me understand that the system will enable petrol station to function faster and effectively at a very less time and also eliminate fraud in fuel station

Chefi and Nasr (2017) conducted a study that examined periodic petrol station replenish problem. The aim of their study was to determine how effective management system can solve problem of shortage due to replenish problem. They designed a system that tracks the quantity and inventory of the fuel available in the tanks using the mathematical optimization model. At the end of their study they found out that the use of management system for fuel tracking, monitoring and management increases efficiency and reduces shortage of petrol stations.

Raghupathi (2017) conducted a study to implement automation petrol bunk management with the use of smartcard reader. The aim of this is to completely abolish the need of human interaction to dispense fuel and also to avoid loss or shortage of fuel. The study further explained that the smartcard is used to complete transactions in essence, when fuel has been dispensed, an automated bill will be printed out showing the date, time and amount of petrol bought.

Surjandari et al. (2017) conducted a study aimed at solving a planning problem of petrol product delivery. The problem of haulage has been a problem in petrol station management whereby it's difficult to get a truck to load petrol products from assigned depots and deliver in the stations, so this study used the Tabu Search algorithm to solve the problem to determine the available truck for delivery and designing routes to deliver petroleum products at minimized cost.

Janani (2018) focused on petrol bunk management system with prepaid card using GSM Technology. His study aimed at allowing verified users to access and manage the opening and closing of the tank according to liters demanded with the aid of PIC microcontroller and GSM Technology to reduce manpower and make the provide a secure and easy to distribute fuel product. This system is time efficient and accurate to avoid fuel shortages or mismanagement.

In conclusion to this subheading, many studies have been conducted on the monitoring and management of fuel station. Researchers are aimed at making the running of a fuel station essay and efficient.

2.2 Development and Implementation of Fuel Management System

This explains the studies conducted on the implementation and development of fuel management system. This subheading reviews the implementation and development of fuel management system, studies review the testing and implementation of the system.

Ahmed et al. (2014) focus on the risk and safety to control the length of awareness of hazards and take safety measures in filling station to avoid terrible situations that can lead to death of people or damage of property. This study is focused in minna, Niger state Nigeria. This study further explained safety and proper orientation measures should be administered the staffs of a filling station in case of an incident so they'll have proper knowledge on how to contain the situation.

Aniket et al. (2014) focused on the user security of fuel pump, a lot has been done in the recent years to improve fuel management but the safety of fuel pump is still a worry. Leakage and theft of petroleum product is still a big concern. The purpose of this system is to advance an authentication to the user to enable the user control the opening or closing of the tank valve depending on the amount of petrol demanded by the consumer. This system will run on GSM technology.

Kulkarni et al. (2014) focus on embedded security using RFID and GSM to provide maximum security while distributing petrol products. The purpose of this system is make sure inventory keeping of distributed petroleum products is secured and also to control the leakage and theft of petroleum product.

Poonacha et al. (2015) developed a system which focus on the security of petroleum products using computer interface to enhance inventory keeping of the sales and distribution of petroleum products. The aim of this system is to completely eradicated the existing system used by most petrol pumps which require human in person to perform a task like operating the electric pumps and selling the products to a customer. Testing, this system provides

security for petroleum products and will also help improve the financial sector of the company.

Chukwudi et al. (2015) conducted a study to access the suitability assessment of petrol filling station in Nigeria. They developed Geographic information systems to identify, find and survey petrol filling station site for appropriate standard siting. After testing, this system has proven to be very effective in resolving the problems of space

In conclusion from my review, most system developed were implemented to completely erased the traditional ways or running a fuel station. Most studies used RFID and GSM to enable the system function properly.

2.3 Problems and Challenges of Management Systems

In management system, there are problems and challenges faced in running secured system. This subheading reviews the studies conducted to analysis the challenges and also find a way to access the problems.

Siang et al. (2014) conducted a study on energy management on electric vehicles. This paper is aimed at reviewing the state of the art of energy source, energy generator for electric vehicle, control converter, low-level control energy the management strategy and high control algorithm use in vehicles. Due to fuel crisis and environmental issues, the sales of electric vehicles has increased worldwide.

Brocke et al. (2015) analyzed the challenges faced in information systems literature search and discussed recommendations that can be made to deal with the challenge. The objective of this study is to make available checklist and guidelines to assist researchers plan and organize researches.

Yasunori et al. (2015) conducted a study to manage the supply of power and heat in energy management strategy by making effective costs of demands for electricity and heat and also by reducing fuel consumption. After reviewing existing research, this study came to the conclusion that electricity hot or cold heat should be taken into consideration specially to utilize renewable resources to process the systems.

Ujakpa et al. (2016) conducted a study that focus on the challenges of adoption and acceptance of e-procurement on supply chain management in Multinational Companies in

the Oil and Gas Industry. The objective of this study is to decide variables considered in the obtainment arranging stage and initiate factors that influence the adoption of e-procurement and find the challenges involved at ENI Oil Exploration Company.

Tynchenko et al. (2018) conducted a study to tackle the problem of creating an automated system to monitor and control the oil pumping station of a conveyor shop. The developed automated system gives access to collect numerical data to predict alarming situations. The system tracks elements on the platform that initiate failure.

Sahar et al. (2018) conducted a study that focus on oil spill detection by hyperspectral imaging. The objective of this study is to tackle and approach identification of oil spill. The researches attempted to use different classification approaches to identify the areas of oil spill. After the study, the researcher selected areas identified as oil spill areas in Adriatic Sea and Gulf of Mexico.

Alberto et al. (2018) conducted a study which focused on the oil risk management system based on high resolution hazard, the study was innovative and high accuracy to facilitate the routine of decision makers and crisis response in management. The system gives updated data to the end user concerning the condition or oil spill disaster.

Nazmul et al. (2018) focus on traffic management system to ease fuel efficient route planning with the use of Vehicular AdHoc Network. The objective of the research is to minimize carbon emission and minimized trip time. The system is proficient of sharing accurate information routes and data of vehicles on the road and roadside unit in real time. With the proposed system, route planning and scheduling of vehicles will be analyzed and coordinated by traffic central monitoring system

From the studies reviewed, there are few challenges and problems faced in management system, most studies found a way to minimize the challenges and maximize the effectiveness of management system.

2.4 Management Systems

Management system is essential in our today business world, this subheading review studies conducted on management system and the ways its essential in general.

Chibuzor et al. (2016) characterized management information system as the way towards creating, transiting, accepting, storing and recovering of images. Subsequently, information is the gathering and association of bits of information in a significant structure to expand the learning of whomever that will utilize the system. For example, an ecological administration framework empowers establishments to improve their environmental performance and security system.

Okemiri et al. (2016) clarified that administration data framework as a framework utilizes formalized strategies to give reports which help the administrative checking and control of hierarchical capacities, assets or different duties. The executives Information Systems include an expansive and complex subject. To make this theme progressively sensible, limits will be characterized. To begin with, due to the tremendous number of exercises identifying with Management Information Systems, an absolute review is not attainable. Those talked about here is just a few inspecting of activities, reviewing the author's perspective of the more typical and fascinating improvements. likewise, a manner where there were different impacts in a comparable region of improvement, just chosen ones will be used to show concepts. This is not to say that one effort is more imperative than another.

In summary to this chapter, various researchers have conducted researches to explain different ways in making petrol station management system easy and efficient to management. Most studies reviewed in this chapter were system development and implementation. This chapter further reviews studies that focused on the problems and challenges of management system.

CHAPTER 3

THEORETICAL FRAMEWORK

This chapter presents the concept around management system. The chapter further explains the importance of Petrol Station Management System, factors that affects the establishment of management systems as well as the characteristics of successful management system and causes of management system failure.

3.1 Information Systems

This explains in details the definition and importance of information systems. This subheading further review the studies conducted on information system.

An information system can be characterized in facts, as a lot of interrelated parts that collect procedure, store, and convey data to help basic leadership and control in an organization (Ogawa and Ratombo, 2013). They include in their study that information system helps managers and employees to dissect issues, picture complex subjects, and make new items. There are three exercises in any data framework that produce the information that associations need to decide, control activities, break down issues, and make new products or administrations. These exercises are input, handling, and output. Information catches crude information from inside the association or from its outside condition.

Preparing changes over this raw contribution to a progressively important structure. Output moves the handled data to the general population who will utilize it or to the exercises for which it will be utilized. Information system additionally require input, which is yield that is come back to suitable individuals from the association to enable them to assess or address the stage (Angeles, 2015).

Information system allude to frameworks giving innovation based data and correspondence benefits in an association (Davis, 2014). A data framework is characterized as a lot of interrelated components that gather, control, store and scatter information and data with a criticism component (Stair and Reynolds, 2013). A data framework can be manual or electronic. An electronic administration framework comprises of equipment, programming,

databases, media communications, individuals and methodology that are arranged to gather, control, store and procedure information into usable data (Stair and Reynolds, 2013)

At last, Ogawa and Ratombo (2013) portray a data framework as a sociotechnical framework. They are of the view that however information frameworks are made out of machines, gadgets, and physical technology, they require generous social, authoritative, and scholarly ventures to make them work appropriately. These, point to the human factor, which is a fundamental component if the Management System is to work appropriately.

In summary, Information System is essential in our today's world to collect, process, store and distributed information.

3.1.1 Management System

Management system is essential in our today business world, this subheading review studies conducted on management system and the ways its essential in general.

Okemiri et al. (2016) defined Management Information System as an integrated system which provides information to assist and enhance the managerial operations, analysis management and decision making in an establishment. A management information system deploys computer hardware, computer software, database, models for analysis, control, planning and decision making.

A management system is a lot of arrangement, procedures and strategies utilized by an establishment to guarantee that it can satisfy tasks required to accomplish its objectives. These targets spread numerous parts of the establishment activities (accounting related achievement, product quality, safe task, customer connections, administrative conformance and employer's management).

Management system allude to information frameworks overhauling the management function. They give administrators online reports on the association's present and verifiable execution (Ogawa and Ratombo, 2013) They outfit data for directors to play out the elements of arranging, controlling and basic leadership. They depend on exchange handling frameworks and they are utilized to abridge aftereffects of exchange preparing into reports used to screen, control and survey exercises, and for arranging (Cloete, 2013).

As indicated by Larsson and Malmsjö (2018), the management system is a data framework utilized for supporting basic leadership when all is said in done on all levels in an association. Management system serve the administration level of the association, giving supervisors with reports and access to the association's present execution and chronicled records. Ordinarily, Management System are situated only to inside, not ecological or outer, occasions. Management System essentially serve the elements of arranging, controlling, and basic leadership at the administration level (Ogawa and Ratombo, 2013).

In Robek, et al. (2015) perspective, Management system can't be comprehended without first recognizing among information and data. Information are natural certainties that give no understanding by themselves while data is prepared or changed information that help somebody settle on a choice or increase understanding. For instance, contrasting a full the management information system incorporates every one of the frameworks an organization uses to produce the data that aides the executives' choices and activities. In enormous foundations, the Management system will in general be for the most part or totally PC based, requiring programming projects to catch and write about the vital data. The improvement and the board of data innovation devices help officials furthermore, the general workforce in playing out any assignments identified with the handling of data. Management system and business frameworks are particularly valuable in the examination of business information and the generation of data as reports to be utilized as instruments for basic leadership. (Ogawa and Ratombo, 2013).

In conclusion, management system makes planning and monitoring of day to day running of an organization easy and efficient.

3.2 Applications of Management System

This discuss the application of management system with PCs being as pervasive as they are today, there is not really any huge business, which does not depend widely on their PC frameworks in producing a portion of the data required for powerful task of the business (Petter et al., 2013.). With the guide of PCs, Management system has progressed toward becoming important in supporting a few parts of the business exercises, for example, the system, data extraction and introduction (information preparing), and evaluating the

exhibition of the business utilizing the destinations set out by the business (Petter et al., 2013.).

3.2.1 Management by Objectives

While Management System are very helpful in creating factual reports and information analysis, they can likewise be of utilized as a Management by Objectives apparatus. Management by Objectives is an administration procedure by which subordinates concur upon a progression of targets for the subordinate to endeavor to accomplish inside a set period (Petter et al., 2013). Targets are set utilizing the SMART rule: that is, targets ought to be Specific, Measurable, Agreed, Realistic and Time Specific. He included that, the point of these targets is to give a lot of key execution pointers by which a venture can pass judgment on the exhibition of a worker or undertaking. The accomplishment of any Management by objective depends upon the constant following of advancement. In following this presentation, it very well may be incredibly helpful to utilize an administration data framework. Since every SMART goal are by definition quantifiable, they can be followed through the age of the board reports to be examined by leaders.

3.3 Petrol Station Management System

This explains management system in petrol station and how efficient management can be with a web-based platform.

Ali et al. (2015) define Petrol station management system as an integrated system designed to manage the sales of petroleum product electronically without the stress of managing the sales manually. In this system Operating data is gathered in the type of records, discovered issues in the computation of day by day sales. Siddig et al. (2017) Also, record orders. Information can be lost and day by day records may not be precise. By filling the management contextual investigation Kanok Kan oil is determined day by day sales. Record Order Employee Data Oil Info in the type of a PC Has brought about an increasingly helpful and lessen blunders to less work. Lessen issues and increment the exhibition considerably further.

3.3.1 Importance of Petrol Station Management System

There are merits in having a management system in petrol station and this subheading explains and reviews the advantages.

The field of Management System can convey a lot of advantages to endeavors in each industry. In this examination, petroleum station the executive's framework with saw diaries, for example, management system quarterly proceed to discover and report better approaches to utilize Management System to accomplish the business goals. Oil station use the executive's frameworks for social event and apportioning the data required for settling on opportune choices. Since officials process so much data, they utilize PCs broadly. They use them for putting away, recovering, extricating, and apportioning information. PCs give innovation backing to the Management framework utilized by petroleum station and methodically help in identifying issues and in social affair significant data (Odendaal, 2014).

Ganeswara. (2017) The Management framework contains pointers that demonstrate the strength of the petroleum station, for example, benefits, income, stock levels, money related status, advertise conduct, profitability levels, timetables, and quality control. These markers might be shown as content, tables, charts, or time arrangement. Aside from the above general advantages that the organization can get from Management System, the executives framework further improves its center fitness, upgrade the inventory network the board and give speedy reactions to changing patterns in the business (Odendaal, 2014).

The utilization of Management system brings about an improved announcing of business forms which drives unavoidably to an increasingly streamlined creation process. With better data on the creation procedure, the capacity to improve the executives of the production network, including everything from the sourcing of materials to the assembling and dispersion of the completed item turns into a simple errand (Gu et al., 2013)

3.4 Factors that affect the establishment of Petrol Station Management System

Everything that has an advantage have a disadvantage, this subheading reviews the factors that affects the establishment of petrol station management system.

Maheshwari et al. (2014) discussed on the advantages that petrol station can get from a decent Management system has been recognized, and it has turned out to be obvious that

each station needs a kind of Management system, the following assignment is to decide how to arrangement a hearty system for gathering, putting away, preparing, and conveying data. A few methodologies have been recommended for the foundation of a petrol station management system however the last type of a specific Management system is to a great extent an element of the amount of data to be gathered and the degree of assets (human, physical, and money related) accessible for the advancement and support of the framework (Odendaal, 2014). It is sheltered to accept that, by and large; an enormous association will produce more information and, along these lines, require a generally refined automated framework for data the executives. Then again, a little organization may just require a manual system. An assortment of framework designs is conceivable, contingent on the size of the organization and assets accessible. Therefore, this area won't survey writing on a solitary model management system; rather it will give exceptional contemplations required to structuring such a system. The factors to be considered in setting up a management system incorporate the association (individuals, structure and job description), the storage and preparing of information just as the technological framework.

3.5 Characteristics of a Successful Petrol Station Management System

This reviews the characteristics of a successful petrol station management system based on previous research conducted.

While explicit capacities performed by successful frameworks are as differed as the administrations to which they contribute, three basic characteristics of a successful petrol station management system or maybe more effectively nature, in which successful frameworks work, can be noted.

- The system ought to be established on the board's origination of the choice condition,
- The administrator must comprehend the system structure,
- The framework ought to be founded on disaggregated information documents and the system advancement ought to have continued from expanding levels of refinement through a procedure of slow advancement (Petter et al., 2013).

3.6 Causes of Management System Failure

Management system are perplexing and costly bits of programming, and numerous individuals are engaged with the structure both inside the association and from outside. Regularly the product parts of a management system are worked by programming houses to the exact necessities of the association. Accordingly, the customer association should be clear concerning what it needs, and the product house examiners should be clear about the necessities (Areeg et al., 2017).

Kaushik et al. (2017) said Management system disappointments can be costly and carry terrible exposure to all gatherings. They can emerge because of insufficient investigation issues, when requirements and limitations are not comprehended in the beginning times, and when there is absence of the executive's contribution in the plan and foundation of the administration data framework. The executives stand to profit most from the management system work and should along these lines take dynamic part in its foundation. (Areeg et al., 2017) Absence of the board learning of ICT frameworks and abilities can likewise bring about the disappointment of a thoroughly thought out management system technique. Directors realize what they need from the framework however may not comprehend the innovation, procedure and results of the framework.

Chefi and Nasr (2017) said the Absence of collaboration can likewise add to the disappointment of a very much idea management system. The management system administrators must co-ordinate the records, promoting, human asset/organization and every other office and help everybody comprehend the advantages of the framework. The management system staff must be very much prepared to comprehend the data needs of the board successfully so as to fill the need of the board. The human side of management system must be given genuine consideration since more often than not the disappointment of the framework radiates from that side (Isti Surjandari et al., 2017).

3.7 Technology Acceptance Model

The technology acceptance model has been a theory that is most widely used to explain an individual's acceptance of an information system (Okemiri et al. 2016). This study has reviewed numerous articles that used technology acceptance model. The different articles were evaluated to understand the models that were used. The TAM is an information system

theory that propagates stages to be followed by information seekers or learners in the acceptance, inculcating and utilization of new technology to achieve information literacy skills. TAM is contextualized by analyzing and explaining how the variables are applied in relationship among school teachers. The outcome provides a deeper understanding and development of TAM as an appropriate model for Information Communication and Technology for Development social informatics/community informatics studies and for explaining the relationship between Information Literacy skills and technology acceptance.

3.7.1 Technology Acceptance Model (TAM)

TAM has been widely used model to help understand and explain user behavior in an information system, many studies reviewed to conduct this study used TAM to test the model and results have been reliable. TAM, adapted from the Theory of Reasoned Action (Chefi and Nasr 2017) and originally proposed by (Ganeswara. 2017) assumes that an individual's information systems acceptance is determined by two major variables:

- **Perceived Usefulness (PU):** The degree to which an individual believes that using a particular system would enhance his or her job performance
- **Perceived Ease of Use (PEOU):** The degree to which an individual believes that using a particular system would be free of physical and mental effort.

The article has explained the technology acceptance model and the different crucial factors in it. In the opinion of (Ahbishek et al. 2017), (Aishwarya et al.2017), (Alberto et al. 2018) The gap in the research of the Technology Acceptance Model (TAM) is discussed regardless of the wide application of the model in many areas focusing on on-line shopping behavior, business intelligence system, teachers' intention to use technology respectively. TAM model to explain the acceptance of their system. In this study, about 37.86% of studies used TAM.

3.7.2 Extended TAM

Extended TAM builds on TAM by modeling the determinants of perceived usefulness. The expanded model includes subjective norm as a causal antecedent of perceived usefulness and as a predictor of intention to use a technology system. In addition to subjective norm, Aniket et al. (2017) used Extended TAM to posits two other social forces (voluntariness and image) that influence perceived usefulness and behavioral intention. Moreover, Extended TAM

proposes four cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use), that influence perceived usefulness (Kaushik et al. 2017). Finally, Extended TAM excludes attitude toward use as an antecedent of behavioral intention (Izatul et al. 2017).

(Chefi and Nasr 2017) reported that perceived usefulness is based on usage intentions in many empirical TAMs. It is important to understand the determinants of the perceived usefulness construct because it drives usage intentions and how these determinants influence changes over time, with increasing system usage. Although the original TAM model was based on the determinants of perceived ease of use, the determinants of perceived usefulness enabled organizations to design organizational interventions that would increase user acceptance and usage of new systems. For this reason, (Chefi and Nasr 2017) conducted a study published to extend TAM that examined how the perceived usefulness and usage intention constructs change with continued information system usage.

3.7.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and the Use of Technology model which aims to explain technology acceptance, is based on eight technology acceptance theories or models. In particular, the UTAUT draws on the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the motivational model, the Theory of Planned behavior (TPB), the combined TAM and TPB, the model of personal computer utilization, the Innovation diffusion theory and the social cognitive theory (Ali et al. 2015). At the core, the UTAUT model uses behavioral intention as a predictor of the technology use behavior. The included predictors of behavioral intention are based on the components the eight technology adoption models reviewed.

Although, attitude which refers to the individuals' feelings (positive or negative) towards the use of the technologies (Chefi and nasr (2017)) is an important component of the TRA and the TAM, it is not explicitly included in the UTAUT model. According to (Francisco et al. 2017), the effect of attitude on behavioral intention is spurious and it emerges only when performance expectancy and effort expectancy are omitted from the model. This means that attitude towards the use of the technologies does not provide enough unique information

beyond that which is already provided jointly by performance expectancy and effort expectancy. In this study 28.57% used UTAUT model.

3.8 System Development

Systems development is the process of defining, designing, testing, and implementing a new software application or program. It could include the internal development of customized systems, the creation of database systems, or the acquisition of third party developed software. Most of the studies reviewed in the adoption of petrol station management system developed a system to enable management more convenient and time efficient. Areeg et al. (2017) developed a fuel management system, this system is web-based and it's written with C++ using Oracle database and Ganeswara et al. (2017) developed an Automation petrol bunk management using prepaid smart cards by wireless technology written in Java programming language using MySql database.

3.8.1 Object Oriented Languages

Different studies reviewed in the adoption of petrol station management system used different programming languages to develop this system. Studies conducted by (Hosian and martin 2015), (Kaushik et al. 2017), (Ali et al. 2015) and (Tynchenko et al. 2018) used python programming language to develop their system. Many other studies reviewed developed their system using PHP language.

Furthermore, most studies used C++ programming language to develop their system, studies like (Poonacha et al. 2015), (Muhamad et al. 2011) and (Areeg et al. 2017). Other studies like (Aishwarya et al. 2017), (Ganeswara et al. 2017), (Kulkarni and Tawara 2014) etc developed their system using Java. Many system developers prefer to use C++ programming language to develop because it is a reliable programming language and it's easy to maintain and not complex to operate by the users, its user friendly.

3.8.1.1 PHP Language

PHP is a recursive acronym for "PHP: Hypertext Preprocessor" -- It is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML.

- PHP runs on different platforms (Windows, Linux, Unix, etc.)

- PHP is compatible with almost all servers used today (Apache, IIS, etc.)
- PHP is FREE to download from the official PHP resource: www.php.net
- PHP is easy to learn and runs efficiently on the server side

3.8.1.2 Python Programming Language

Python is an object-oriented programming language that is widely used in Artificial Intelligence. Python was created by Guido Rossum in 1989. It is ideally designed for rapid prototyping of complex applications.

Some of the features of Python include:

- If you would like to expand the programming language, it is easy to extend into other modules like C or C++.Python programming can be run on any unit including Unix, Linux, Windows, and Mac OS X.
- An elegant syntax which will make the programs so easy to read.
- Language that is easy to use so that the program will work without a lot of bugs.
- If you are doing ad hoc programming tasks or prototype development because it works well without issues with maintaining the program.
- The software is free. You won't have to pay anything to download and use Python in your own life.
- Has a large library that will work with other programming tasks such as changing files, searching for text, and connecting with web servers. Python is really interactive.
- This makes it easier for you to test out small bits of code to see if they work.

3.8.1.3 C++ Language

C++was designed to deliver the flexibility and efficiency of C for systems programming together with Simula's facilities for program organization (usually referred to as object-oriented programming). Great care was taken that the higher-level programming techniques from Simula could be applied to the systems programming domain. That is, the abstraction mechanisms provided by C++were specifically designed to be applicable to programming tasks that demanded the highest degree of efficiency and flexibility. These aims can be summarized:

- C++ makes programming more enjoyable for serious programmers.
- C++ is a general-purpose programming language
- C++ is a better programming language
- C++ supports data abstraction
- C++ supports object-oriented programming
- C++ Supports generic programming.

3.8.1.4 Java Programming Language

Java programming language, originated in Sun Microsystems and released back in 1995, is one of the most widely used programming languages in the world, according to TIOBE Programming Community Index. Java is a general-purpose programming language. It is attractive to software developers primarily due to its powerful library and runtime, simple syntax, rich set of supported platforms. Below outline the merits of java programming language:

- Java is easy to learn.
- Java was designed to be easy to use and is therefore easy to write, compile, debug, and learn than other programming languages.
- Java is object-oriented.
- This allows you to create modular programs and reusable code.
- Java is platform-independent.
- One of the most significant advantages of Java is its ability to move easily from one computer system to another. The ability to run the same program on many different systems is crucial to World Wide Web software, and Java succeeds at this by being platform-independent at both the source and binary levels

3.8.2 Applications

There are various types of applications that can be used in a system, from the studies reviewed to conduct this research, many studies that focused on system development developed a web based application and desktop application, few studies focused on developing a mobile application like (Kulkarni and Tawara 2014). Studies conducted by (Abhishek et al. 2017), (Ali et al. 2015), (Aniket et al. 2014), (Janani 2018), (Nang et al. 2015), (Ofoegbu 2014), (Ruth et al. 2018), (Poonacha et al. 2015), (Nazmul and Arunita 2018), (Muhamad et al. 2011), (Kaushik et al. 2017), (Hosian and martin 2015), (Ganeswara et al. 2017), (Areeg et al. 2017) and (Aishwarya et al. 2017) developed a desktop application. Studies focused more on web-based applications because it can be managed anywhere and anytime, the administrator does not have to be in the petrol station in other to management the business. On the other hand, desktop applications are and reliable to petrol stations that do not have internet connection to manage the system, example stations that are in rural areas and have limited network coverage can use a desktop application to manage their system.

3.8.2.1 Web-based Application

A web application enables information processing functions to be initiated remotely from a browser and executed partly on a web server, application server and/or database server. A web application is an application which has been specifically designed to be executed in a web-based environment (Finkelstein et al., 2002), it is more than just a set of webpages setup with navigational links.

Some of the advantages of web applications include:

- Accessible from any Internet-enabled computer.
- Usable with different operating systems and browser applications.
- Easier to roll out program updates since only software on the server needs to be updated and not on every desktop in the organization.
- Centralized storage on the server means fewer security concerns about local storage (which is important for sensitive information such as health care data).

3.8.2.2 Desktop Applications

Desktop application is an application that runs stand-alone in a desktop or laptop computer. Desktop applications have been ported to the world wide web in order to reduce (multiplatform) development, distribution and maintenance costs. However, there is little data concerning the usability of web applications, and the impact of their usability on the total cost of developing and using such applications. The merits of desktop applications are included below:

- Simplified Infrastructure
- Reduced Implementation Costs
- Simplified Management
- Reduced Ongoing Costs
- Increased Efficiency
- Flexibility
- Increased Performance
- Increased Security
- Operating system flexibility.

3.8.3 Databases

Database is essential in when developing a system to store and retrieve information, many studies reviewed used MySql database, studies by (Ali et al. 2015), (Ganeswara et al. 2017), (Janani 2018), (Ofoegbu 2014), (Poonacha et al. 2015) and (Ruth et al. 2017) while (Abhishek et al. 2017), (Aishwarya et al. 2017), (Areeg et al. 2017), (Kaushik et al. 2017), Muhamad et al. (2011), Nang et al. (2015), (Nazmul and Arunita 2018), (Aniket et al. 2014), (Hosian and martin 2015), (Susanta and Farida 2013) and (Tynchenko et al. 2018) used Oracle database. Oracle database is widely used when developing a system, system developers prefer to use oracle and MySql database because it is reliable, portable in the sense that it is ported to more platforms than any other databased, it runs on more than a 100 hardware platforms and 20 networking platform. The performance too on oracle database is quite good.

3.8.3.1 MYSQL Database

- MySQL is a very popular, open source DBMS
- MySQL databases are relational
- Officially pronounced “my Ess Que Ell” (not my sequel).
- Handles very large databases
- Very fast performance; reliable
- MySQL is compatible with standard SQL

MySQL is important because of the following reasons:

- Free (much cheaper than Oracle)
- Each student can install MySQL locally.
- Multi-user access to a number of databases offered
- Easy to use Shell for creating tables, querying tables, etc.
- Easy to use with Java database connectivity.
- MySQL is frequently used by PHP.
- Commercial version of MySQL is also provided (including technical support).

3.8.3.1 Oracle Database

Oracle is a database that delivers excellent performance when challenged with demanding tasks. The ACID test, which is an important tool used to ensure the integrity of data stored, was easily passed by Oracle databases. This test is important since reliable data storage is the main purpose of a database.

Here are some interesting Features and Advantages of Using Oracle Database:

- The Oracle Database is perfectly used for all corporation level applications including Business, large enterprise, small size business etc.
- It has capability to handle large amount of data without any single point of failure.

- It also comes with an important tool called ACID which ensures the integrity of data which easily passed by the oracle databases.

- The Oracle has capability to provide industrial strength support for online backup and recovery

3.8.4 Software Testing

Software testing is the process of testing bugs in lines of code of a program that can be performed by manual or automation testing. (Tynchenko et al. 2018) The theory of software testing involves problem definitions of testing such as test team, failure after testing, manual testing, uncertainty principle, participation, and incorrect test case selection. (Kulkarni and Tawara 2014), Articles in this study shows the details of a critical part of software testing, which is how to test the performance of new software and the entire system. Most articles like (Aniket et al. 2014), (Alberto et al. 2017), (Bhagyashree et al. 2014), (Janani 2018) failed to test which is a research gap in their study.

CHAPTER 4

RESEARCH METHODOLOGY

This chapter views the research methodology applied with reference to systematic literature review and analysis, study selection, search strategy, data source and coding, inclusion/exclusion criteria applied and also data coding and analysis.

4.1 Search Strategy

The objective of carrying out a systematic literature review is to pinpoint primary studies associated with the current trends in petrol station management system. To satisfy the target of the primary aim, developed search strategy created by Steiner et al. (2002) as portrayed in Figure 4.1 was received and utilized as the reason for the search strategy and connected to the databases under examination. Likewise, a trail search was kept running in every journal database to get a general idea of the quantity of articles recorded. Moreover, the search criteria were altered by putting cites on keywords utilized for article recovery. The legitimacy of the article was evaluated dependent on the subject title and if the contents were appropriate, the article was put aside for further examination.

Figure 4.1: Search Strategy (Daniel et al., 2019)

4.2 Search Source

A computerized and manual search was led to look for significant journal papers and articles produced from year 2013 to year 2018 in databases specifically EBSCO, Science Direct, Emerald Insight, Scopus as appear on Table 3.1, Relevant productions were sought utilizing the keywords.” petrol station” AND “management system” OR adoption OR acceptance. A large number of journal papers similar to the keywords were recovered and dissected and the pertinent papers were further analyzed.

Table 4.1 Search sources

Language	English
Period	2013-2018
Search Keywords	Main Keyword:" petrol station" AND "management System" OR adoption OR acceptance
Information Resources (Database)	• EBSCO • Science Direct • Emerald Insight • Scopus

4.3 Study Selection

A search was carried out in the journal database without information parameters and results recovered were 35 journal papers, conference papers and articles published. Results gotten from this search were a reasonable sign that seek terms being utilized were wide and were being confounded by web indexes. The article results were checked and it demonstrated that the term management system was changing its significance in the search procedure bringing about wrong outcomes. To cure the issue what more, guarantee that the search criteria recovered pertinent material identified with petrol station board framework current trends, the publication years were limited to 2013-2018 until current articles identified with the subject showed up in the searched items. Besides, to limit the outcomes, the researcher as it were centered at results acquired from four exceedingly referred to journals in particular; EBSCO, Emerald Insight, Science Direct and Scopus. Articles were additionally limited based on inclusion and exclusion criteria as clarified in detail in the areas to follow.

Table 4.2 below demonstrates the number of articles extricated from every database.

Table 4.2: Number of articles extracted from each database

Database	Number of articles
EBSCO	16
Science Direct	10
Emerald insight	3
Scopus	6
Total	**35**

4.3.1 Inclusion/ Exclusion Criterias

To completely comprehend the present study and examine all sectors associated with the present trend in petrol station management system, it was fundamental for the researcher to additionally limit the selection criteria by including key factors in the search criteria and by likewise barring some key elements. For any journals, article or on the other hand conference paper to be incorporated into this examination it needed to meet every one of the states of the consideration what's more, inclusion criteria as portrayed in Table 4.3.

Table 4.3: Inclusion and Exclusion Criteria

	Inclusion Criteria	Exclusion Criteria
Inclusion and Exclusion criteria	• Published between year 2014 and year 2018	• Presentation, Thesis, editorials duplicated articles.
	• Articles reporting on management system acceptance and adoption	• Older articles published before 2013
	• Journals reporting on the present trends in petrol station management system	• Foreign languages
	• English language	• Opinion pieces, conference proceedings
	• Petrol station management system structures design.	• Conceptual procedures or mental introductions

4.4 Systematic Review and Analysis

The Figure 4.2 expresses a search procedure that was utilized to recover articles that were utilized to conduct this study. As appeared on the diagram below, the first search recovered 79 articles using the search term “petrol station “and “management systems”. A very much point by point analysis was done and results constrained to 51 articles as 28 articles were excluded based on title and abstract review was not related. This exclusion depended on accessible full content articles sources, sources which did not have open sources were removed or articles that required a purchase to be access were excluded. In addition, copied papers were excluded. Therefore, the title and abstract of articles were reviewed to check for related content. articles that was not related were extracted and 51 were maintained.

The 51 articles maintained after analysis were additionally restricted down to 35 articles after excluding 11 articles as there were thesis and dissertation. Another 5 articles were excluded as they were not written in English language.

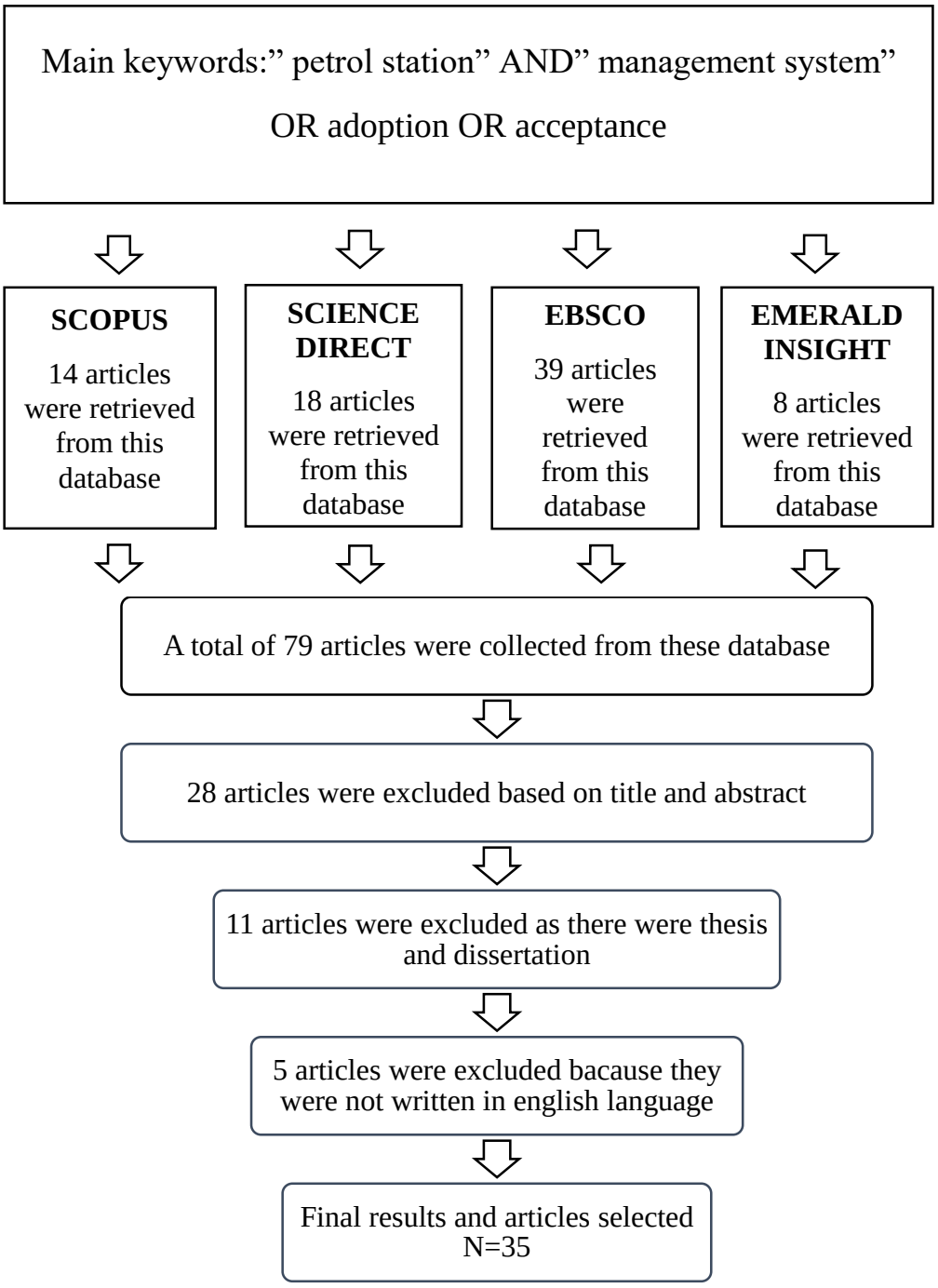

Figure 4.2 Literature Search and Process of the Systematic Review

4.5 Research Schedule

Each study follows a research plan for viable time and resource management. This thesis started early January 2019 and completed in July 2019. Each phase of the thesis was allocated a period of completion to empower smooth planning for the thesis. A few phases of the thesis need to follow after the past stages are finished while a few runs simultaneous with a progressing stage. The literature review phase as a continuous phase runs simultaneous with different phases of the thesis with no issues or difficulties. The schedule of the thesis is exhibited in Table 4.4

Table 4.4: Research Schedule

TASKS	**DURATION (WEEKS)**
Literature review	10
Writing thesis proposal	2
Proposal submission	3
Data collection	7
Data analysis	4
Writing the concluding chapter of the thesis	5
Final review by the supervisor	4
Making corrections and amendments	5
Jury and final correction	3
Total	**32 Weeks**

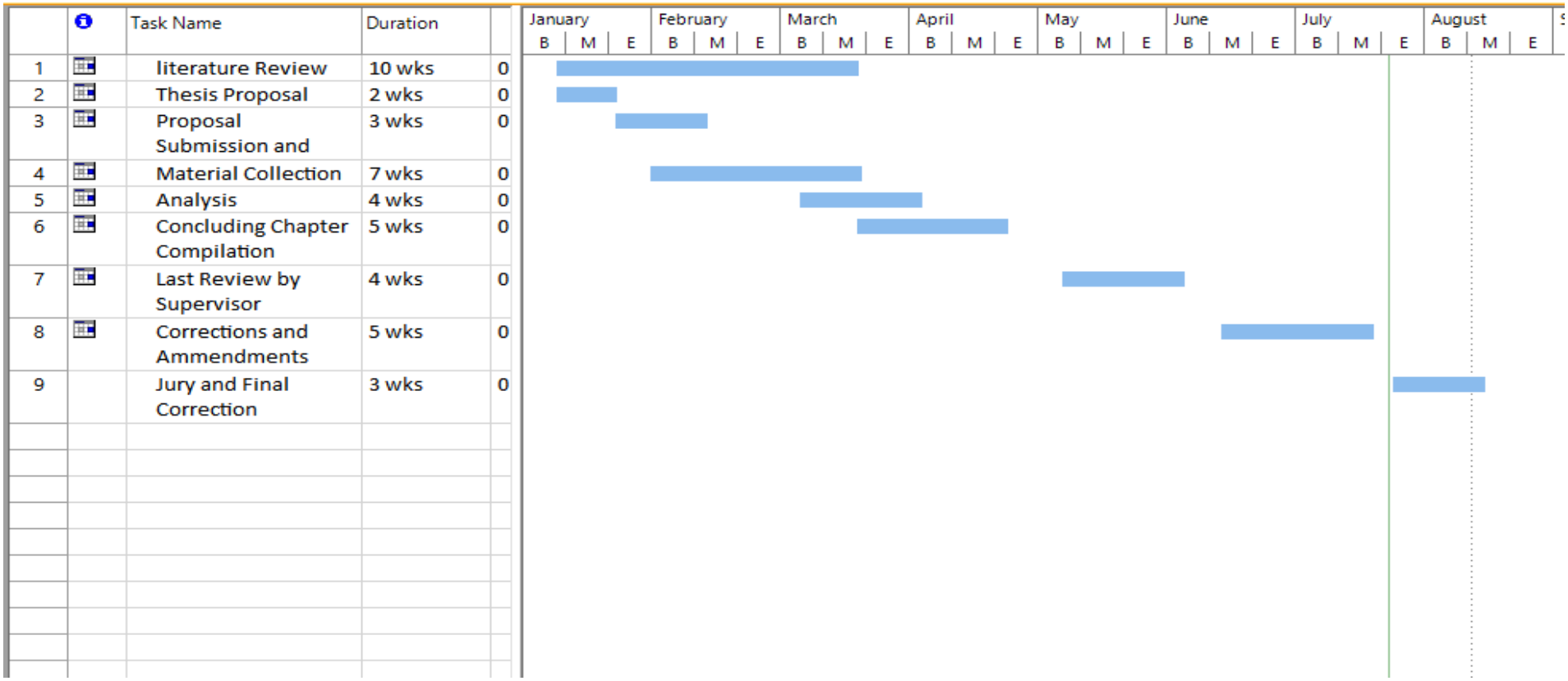

Figure 4.3: Gantt Chart Of The Study

CHAPTER 5

RESULTS AND DISCUSSION

This chapter presents the results of the study based on the research questions. The chapter specifically presents the analysis of the past literature in terms of research types, focus of the study and the country of previous studies.

5.1 Methodologies used in the Studies that Examined the Adoption of Petrol Station Management System in the Literature

This section reviews the methods used by many researchers to collect and analyze data such as experimental design methods used, surveys, system development and document analysis and how effective these methods were in aiding Petrol Station Management System implementation.

Figure 5.1 below showcase the methodology used to examine the adoption of Petrol Station Management System in the literature review.

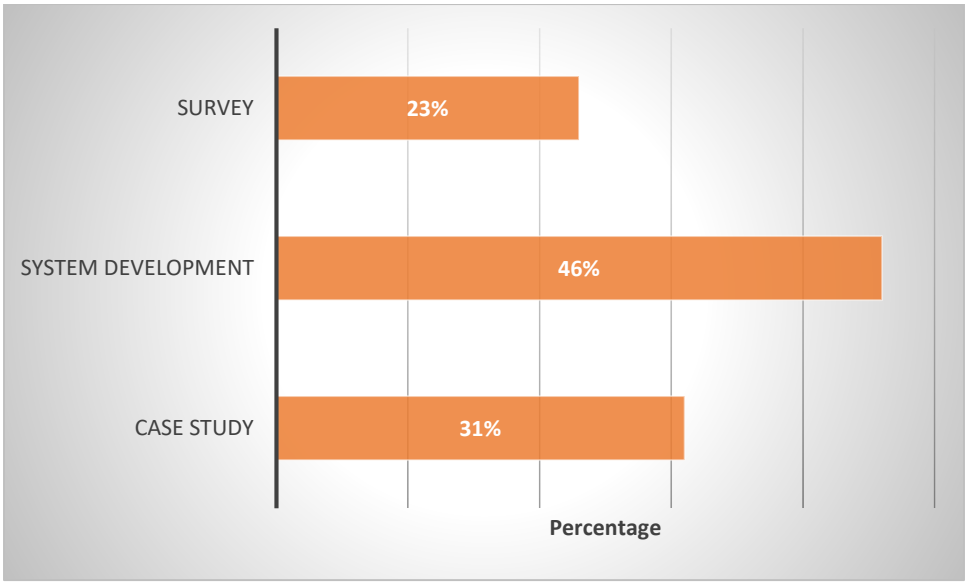

Figure 5.1: Methodology used in studies that examined the adoption Petrol station Management System in the Literature review

Table 5.1 below explains in detail the methodology used to examine the adoption of Petrol Station Management System in the literature review.

Table 5.1: Methodology used to examine the adoption of Petrol Station Management System in the Literature review

No	Data source	Methodology	Number of research	Percent
1	Aishwarya et al. (2017)	Survey		
2	Bhagyashree et al. (2013)	Survey		
3	Brocke et al. (2015)	Survey		
4	Francisco et al. (2017)	Survey		
5	Hosian and martin (2015)	Survey	8	23%
6	Izatul et al. (2017)	Survey		
7	Ahmed et al. (2014)	Survey		
8	Ujakpa et al. (2016)	Survey		
9	Abhishek et al. (2017)	System Development		
10	Alberto et al. (2018)	System Development		
11	Ali et al. (2015)	System Development		
12	Aniket et al. (2014)	System Development		
13	Areeg et al. (2017)	System Development		
14	Chrysovalantou et al. (2017)	System Development		
15	Chukwudi and Alaybe (2015)	System Development		
16	Janani (2018)	System Development	16	46%
17	Isti et al. (2011)	System Development		
18	Kaushik et al. (2017)	System Development		
19	Kulkarni and Tawara (2014)	System Development		
20	Masheshwari et al. (2014)	System Development		
21	Muhamad et al. (2011)	System Development		
22	Nang et al. (2015)	System Development		

23	Nazmul and Arunita (2018)	System Development		
24	Ofoegbu (2014)	System Development		
25	Okemiri and Nweso (2016)	Case study		
26	Poonacha et al. (2015)	Case study		
27	Ruth et al. (2017)	Case study		
28	Susanta and Farida (2013)	Case study		
29	Tynchenko et al. (2018)	Case study	11	31%
30	Yasunori et al. (2015)	Case study		
31	Chefi and nasr (2017)	Case study		
32	Clara et al. (2017)	Case study		
33	Ganeswara et al. (2017)	Case study		
34	Sahar et al. (2018)	Case study		
35	Siang et al. (2013)	Case study		

From table 5.1, 46% of studies were on system development and 31% were on case study while 23% were on survey. System development has the highest percentage of studies because to fully understand the adoption of petrol station management system, system must be developed, tested and implemented. Survey studies. Similar findings were also mentioned by many researchers in their studies. This could be so because a Survey is a data collection tool that is ideal when the sample size is broad, however because of the nature of the instrument used, it is important to note that responses are based on honest opinions of participants and this is a limitation factor for such studies.

5.2 Technology Acceptance model used in the Studies that Examined the Adoption of Petrol Station Management System in the Literature

Technology acceptance model explains the concept of this study and also the models used in the studies that was reviewed.

Table 5.2 below showcases the technology acceptance model used to examine the adoption of Petrol Station Management System in the literature review.

Table 5.2 Technology acceptance model used to examine the adoption of Petrol station Management System in the Literature review

No	Data Source	Technology Acceptance Model
1	Abhishek et al. (2017)	Technology Acceptance Model
2	Aishwarya et al. (2017)	Technology Acceptance Model
3	Alberto et al. (2018)	Technology Acceptance Model
4	Ali et al. (2015)	UTAUT
5	Aniket et al. (2014)	Extended TAM
6	Areeg et al. (2017)	Technology Acceptance Model
7	Bhagyashree et al. (2013)	UTAUT
8	Brocke et al. (2015)	Technology Acceptance Model
9	Chefi and nasr (2017)	UTUAT
10	Chrysovalantou et al. (2017)	
11	Clara et al. (2017)	Technology Acceptance Model
12	Chukwudi and Alaybe (2015)	UTAUT
13	Francisco et al. (2017)	UTAUT
14	Ganeswara et al. (2017)	Extended TAM
15	Janani (2018)	Technology Acceptance Model
16	Hosian and martin (2015)	Technology Acceptance Model
17	Isti et al. (2011)	Technology Acceptance Model
18	Izatul et al. (2017)	Extended TAM
19	Kaushik et al. (2017)	Extended TAM
20	Kulkarni and Tawara (2014)	UTAUT
21	Masheshwari et al. (2014)	Extended TAM
22	Muhamad et al. (2011)	Technology Acceptance Model
23	Nang et al. (2015)	Technology Acceptance Model
24	Nazmul and Arunita (2018)	Extended TAM
25	Ofoegbu (2014)	
26	Okemiri and Nweso (2016)	UTAUT

27	Poonacha et al. (2015)	Extended TAM
28	Ruth et al. (2017)	
29	Ahmed et al. (2014)	Technology Acceptance Model
30	Sahar et al. (2018)	UTAUT
31	Siang et al. (2013)	UTAUT
32	Susanta and Farida (2013)	Extended TAM
33	Tynchenko et al. (2018)	Technology Acceptance Model
34	Ujakpa et al. (2016)	UTAUT
35	Yasunori et al. (2015)	Extended TAM

Table 5.2 shows 37.86% used the TAM model, 23% used extended TAM 28.57% used the UTAUT model, and 11% of the researchers did not state the model they used as a research framework in their studies as they focused on system development. TAM is widely used because it's one of the most reliable and influential models of technology acceptance, TAM serves as a useful general framework also it suggests when users are presented with a new technology. Authors used Extended TAM model because they propose four cognitive instrumental processes (job relevance, output quality, result demonstrability and perceived ease of use). Researchers used UTAUT to determine the technology acceptance based on eight technology acceptance theories or models.

5.3 Region Dominated the Studies Conducted on the Adoption of Petrol Station Management in the Literature

The result in Table 5.2 shows the region of the studies conducted from petrol station management system. Majority of the studies in Figure 5.3 representing 57.10% are from Asia region, studies representing 20.00% are from African region, studies representing 11.43% are from Europe region while studies representing 9% are from the Middle East and studies representing 3% on the chart in Figure 5.3 are from America. It is evident that more studies on petrol station management are conducted in the Asia region. This may be because of good system development in the region. Studies from Janani (2018) developed petrol bunk automation within prepaid card using GSM identification in the Asia region and Kaushik et al. (2017) developed automated fuel station system.

Figure 5.2 below explains the region of studies that examine the adoption of Petrol Station Management System in the literature review.

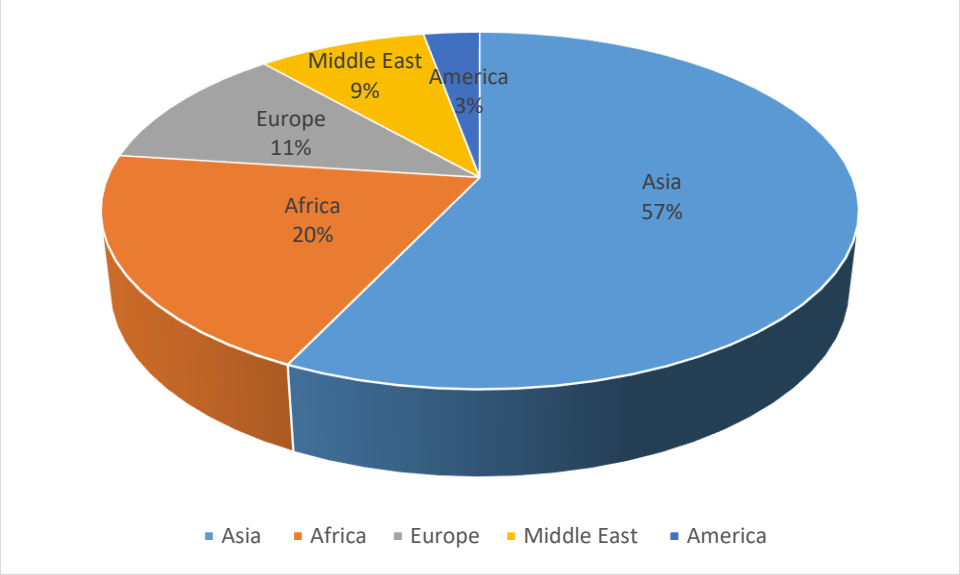

Figure 5.2: Region of Studies that Examine the Adoption Petrol Station Management System

Results in Figure 5.2 have shown that most studies on Petrol Station Management System are system development and are mostly developed in the Asia region. The reason for this could be that these research type provide a better understanding of technology development by covering all essential areas and they have been widely used in the technological sector to measure system development levels. Few studies were conducted in America reasons because America is a developed country and have adopted this system for many years now, so researchers from that region do not see the need to conduct a study on the adoption of petrol station management system as shown is Figure 5.2. Africa is yet to adopt petrol management system because the government in that region do not provide the necessary criteria and support to adopt the system and make it work efficiently. The countries in the middle east are developed and that region is an oil producing region so the adoption of petrol station management system have long been adopted in that region.

5.4 Research Method Used in the Study that Examined the Adoption of Petrol Station Management System in the Literature

A look at Table 5.3 shows that 46% of the studies reviewed were based on quantitative research, 31% on qualitative research and 23% on applied research.

Table 5.3 below explains the Research method used to examine the adoption of Petrol Station Management System in the literature review.

Table 5.3: Research method used to examine the adoption of Petrol Station Management System in the Literature Review

No	Data source	Research Method
1	Isti et al. (2011)	Quantitative research
2	Kaushik et al. (2017)	Quantitative research
3	Kulkarni and Tawara (2014)	Quantitative research
4	Masheshwari et al. (2014)	Quantitative research
5	Muhamad et al. (2011)	Quantitative research
6	Nang et al. (2015)	Quantitative research
7	Nazmul and Arunita (2018)	Quantitative research
8	Ofoegbu (2014)	Quantitative research
9	Abhishek et al. (2017)	Quantitative research
10	Alberto et al. (2018)	Quantitative research
11	Ali et al. (2015)	Quantitative research
12	Aniket et al. (2014)	Quantitative research
13	Areeg et al. (2017)	Quantitative research
14	Chrysovalantou et al. (2017)	Quantitative research
15	Chukwudi and Alaybe (2015)	Quantitative research
16	Janani (2018)	Quantitative research
17	Aishwarya et al. (2017)	Applied research
18	Bhagyashree et al. (2013)	Applied research
19	Brocke et al. (2015)	Applied research

20	Francisco et al. (2017)	Applied research
21	Hosian and martin (2015)	Applied research
22	Izatul et al. (2017)	Applied research
23	Ahmed et al. (2014)	Applied research
24	Ujakpa et al. (2016)	Applied research
25	Okemiri and Nweso (2016)	Qualitative research
26	Poonacha et al. (2015)	Qualitative research
27	Ruth et al. (2017)	Qualitative research
28	Susanta and Farida (2013)	Qualitative research
29	Tynchenko et al. (2018)	Qualitative research
30	Yasunori et al. (2015)	Qualitative research
31	Chefi and nasr (2017)	Qualitative research
32	Clara et al. (2017)	Qualitative research
33	Ganeswara et al. (2017)	Qualitative research
34	Sahar et al. (2018)	Qualitative research
35	Siang et al. (2013)	Qualitative research

Table 5.3 explains the research method and it's shown that 46% of studies that examined the adoption of petrol station management system were quantitative research which means the researcher collected secondary data by reviewing past studies, 31% of studies were qualitative research which involves the researchers to collected primary data through verbal or behavioral data and analyze the observation, applied research on the other hand was 23% which means that the researchers conducted their study based on existing practical problems and also find a wat to resolve this existing problems in their study.

5.5 The Focus of the Studies that Examined the Adoption of Petrol Station Management System in the Literature

Most studies focused on system development especially in the Asian region. Ali et al. (2013) developed an automation approach for Fuel Station Management System, the results from this system prints out a receipt consequently after each transaction and can track transactions from remote areas by means of internet. Maheshwari et al. (2014) conducted a study on resource

planning system for petrol station to integrate the old pattern of manually keeping records on the day to day running of a petrol station to an automated way of using one computer. They are many aspects of this study that makes Petrol Station Management easy to maintain.

Table 5.4 below shows the Focus used to Examine the Adoption of Petrol Station Management System.

Table 5.4: Focus Used to Examine the Adoption of Petrol Station Management System

No	Data Source	Focus
1	Abhishek et al. (2017)	Petrol pumps using RFID cards and biometric impression technique
2	Aishwarya et al. (2017)	Smart automatic petrol pump system
3	Alberto et al. (2018)	Oil risk management system based on high-resolution hazard and vulnerability calculation
4	Ali et al. (2015)	Automatic approach for fuel management system
5	Aniket et al. (2014)	Multi-atomized fuel pump with user security
6	Areeg et al. (2017)	Fuel management system
7	Bhagyashree et al. (2013)	Microcontroller based oil dispensing unit
8	Brocke et al. (2015)	Challenges and recommendations of literature search in information systems.
9	Chefi and nasr (2017)	The periodic petrol station replenishment problem
10	Chrysovalantou et al. (2017)	Optimum energy management of Pem fuel systems.
11	Clara et al. (2017)	Energy management in plugin hybrid electric vehicles.
12	Chukwudi and Alaybe (2015)	Assessment of petrol filling stations in oyo town, Nigeria

13	Francisco et al. (2017)	An energy management strategy and fuel cell configuration proposal for a hybrid renewable system.
14	Ganeswara et al. (2017)	Automation petrol bunk management using prepaid smart cards by wireless technology
15	Janani (2018)	Petrol bunk automation with prepaid card using GSM identification
16	Hosian and martin (2015)	Implementation in a world context of waha oil company
17	Isti et al. (2011)	Petrol delivery assignment with multi product multi-depot, split delivery and time window
18	Izatul et al. (2017)	Routing model of oil palm fibre waste toward gas fuel production supply chain management.
19	Kaushik et al. (2017)	Automated fuel station
20	Kulkarni and Tawara (2014)	Embedded security system using RFID and GSM
21	Masheshwari et al. (2014)	Resource planning system for petrol station
22	Muhamad et al. (2011)	Design system fuel inventory control in gas station
23	Nang et al. (2015)	Fuel monitoring and control of dispenser for fuel station
24	Nazmul and Arunita (2018)	Fuel efficient route planning using VANET
25	Ofoegbu (2014)	Using remote monitoring technology for pump output monitoring in distributed fuel stations.

26	Okemiri and Nweso (2016)	Critical review of petrol station management system with emphasis on the advent if digitalized in Nigeria
27	Poonacha et al. (2015)	Atomized fuel pump using global system for mobile technique and uses security.
28	Ruth et al. (2017)	Automated petrol pump
29	Ahmed et al. (2014)	Health, Risk and safety of petrol station in minna town
30	Sahar et al. (2018)	Hyperspectral image analysis for oil spill detection
31	Siang et al. (2013)	Energy sources and energy management system in electric vehicles
32	Susanta and Farida (2013)	Automobile fuel pump control system using embedded system.
33	Tynchenko et al. (2018)	Automation of monitoring and management of conveyor shop oil-pumping stations.
34	Ujakpa et al. (2016)	Challenges of adoption and acceptance of e-procurement on supply chain management practices in multinational companies in the oil and gas industry.
35	Yasunori et al. (2015)	Distributed cogeneration of power and heat within an energy management strategy for mitigation fossil fuel consumption

Results from table 5.4 explains that most researchers focused their research on fuel station management system in other to monitor the sales of petrol product. In other word authors focused on system development in the past 5 years. This is because in other to effectively manage a petrol station, a system must be implemented and tested. Most studies focused on tackling the problem of haulage because this has been an existing problem in many countries in the past years.

5.6 Research Gap Identified in the Studies that Examined the Adoption of Petrol Station Management System in the Literature

This analyze the research gap from studies that was reviewed to conduct this literature review. According to Kulkarni and Tawara (2014), there was a missing gap in the implementation. The researchers reviewed academic journals to find out the progress of security using RFID in Petrol Station Management System, Results showed that the system didn't test, very few studies or even no studies have tested a system, hence there is a missing gap in the literature.

Many of the studies reviewed from Aniket et al. (2014), Clara et al. (2017), Kaushik et al. (2017), Janani (2018) and Siang et al. (2013) had no technology acceptance models. Studies from Abhishek et al. (2017), only focused on system implementation. Limited papers were used to conduct studies from Areeg et al. (2017).

Table 5.5 below shows the research gap and focus used to examine Petrol Station Management System

Table 5.5: Research Gap and Focus Used to Examine Petrol Station Management System

No	Research Gap	Data Source
1	Developed remoted monitoring system. No security measures discussed	Abhishek et al. (2017)
2	Focused only on system development.	Aishwarya et al. (2017)
3	System didn't test	Alberto et al. (2018)
4	Research Focused on system development	Ali et al. (2015)
5	System didn't test	Aniket et al. (2014)
6	There was a loop in the security	Areeg et al. (2017)
7	System didn't test	Bhagyashree et al. (2013)
8	There was a loop in the security	Brocke et al. (2015)

9	Developed remoted monitoring system. No security measures discussed	Chefi and nasr (2017)
10	System failed to test	Chrysovalantou et al. (2017)
11	Researcher had little knowledge on the topic of research	Clara et al. (2017)
12	Was limited in one town in a country	Chukwudi and Alaybe (2015)
13	There was a loop in the security	Francisco et al. (2017)
14	System aimed at using prepaid smart cards, other models can be adopted	Ganeswara et al. (2017)
15	System didn't test	Janani (2018)
16	Focused on system implementation	Hosian and martin (2015)
17	There was a loop in the security	Isti et al. (2011)
18	Research focused on user perspective of management system	Izatul et al. (2017)
19	System didn't test	Kaushik et al. (2017)
20	There was a loop in the security	Kulkarni and Tawara (2014)
21	There was a loop in the security	Masheshwari et al. (2014)
22	No implementation for this study	Muhamad et al. (2011)
23	There was a loop in the security	Nang et al. (2015)
24	There was a loop in the security	Nazmul and Arunita (2018)

25	Developed remoted monitoring system. No security measures discussed	Ofoegbu (2014)
26	Only focused on digitalizing petrol station management system in Nigeria	Okemiri and Nweso (2016)
27	Data was collected from limited studies	Poonacha et al. (2015)
28	System did not test	Ruth et al. (2017)
29	Focused in a region	Ahmed et al. (2014)
30	Very few studies focused on oil spill detection	Sahar et al. (2018)
31	Only focused on system implementation	Siang et al. (2013)
32	Security measures was not discussed in the study	Susanta and Farida (2013)
33	System didn't test	Tynchenko et al. (2018)
34	Few studies focused of challenges	Ujakpa et al. (2016)
35	Only focused on energy management strategy	Yasunori et al. (2015)

5.7 System Development of studies that Examined the Adoption of Petrol Station Management System in the Literature

Many studies reviewed in this study developed a system in other to make the management of petrol station and petrol product easy. About 18 articles focused on system development on the adoption of petrol station management system.

Table 5.6 below analyze the studies that developed Petrol station management systems.

Table 5.6: System Development that analyze the studies that developed Petrol station management system

No	Data Source	Programming Language	Databases	Technology model	Applications
1	Abhishek et al. (2017)	PHP	Oracle	TAM	Web-based
2	Aishwarya et al. (2017)	JavaScript	Oracle	TAM	Desktop App
3	Ali et al. (2015)	Python	MySql	UTAUT	Web-based
4	Aniket et al. (2014)	PHP	MySql	Extended TAM	Web-based
5	Areeg et al. (2017)	C++	Oracle	TAM	Desktop App
6	Ganeswara et al. (2017)	Java	MySql	Extended TAM	Desktop App
7	Janani (2018)	PHP	MySql	TAM	Web-based
8	Hosian and martin (2015)	Python	Oracle	TAM	Desktop App
9	Kaushik et al. (2017)	Python	Oracle	Extended TAM	Desktop App
10	Kulkarni and Tawara (2014)	Java	MySql	UTAUT	Mobile App
11	Muhamad et al. (2011)	C++	Oracle	TAM	Desktop App
12	Nang et al. (2015)	C#	Oracle	TAM	Web-based
13	Nazmul and Arunita (2018)	PHP	Oracle	Extended TAM	Desktop App
14	Ofoegbu (2014)	JavaScript	MySql	Model was not used	Web-based

15	Poonacha et al. (2015)	C++	MySql	Extended TAM	Desktop App
16	Ruth et al. (2017)	PHP	MySql	Model was not used	Web-based
17	Susanta and Farida (2013)	JavaScript	Oracle	Extended TAM	Web-based
18	Tynchenko et al. (2018)	Python	Oracle	TAM	Desktop App

Table 5.6 analyze the system development explaining the programming language, database, technology acceptance model and application. Majority of studies analyzed developed their system using Java. Many system developers prefer to use C++ programming language to develop because it is a reliable programming language and it's easy to maintain and not complex to operate by the users, its user friendly. Most studies used web-based applications because it can be accessed anywhere and at any time, the administrator does not have to be in the petrol station in other to management the business. Kulkarni and Tawara (2014) developed a Mobile application, this article was the only article that developed a mobile application on the development of petrol station management system because a mobile application is not conducive and cannot manage petrol station effectively and efficiently. On the other hand, a higher percentage of studies used desktop applications because it's reliable to petrol stations that do not have internet connection to manage the system. Oracle database is widely used when developing a system, system developers prefer to use oracle and MySQL database because it is reliable, portable in the sense that it is ported to more platforms than any other databased, it runs on more than a 100 hardware platforms and 20 networking platform.

5.8 Data source and coding

As soon as the literature search process was analyzed, open data coding unfolds to be analyzed so as to fully understand the literature to be reviewed. The interpretation of participant data as well as analysis done by the initial researcher is a process involved in systematic literature review. Also, the researchers explained that when undergoing a systematic literature review, it is predominant

that researchers ensure the original genuine meaning and data from the study is not weaken after secondary research.

The examination types utilized by the researcher in the coding procedure were three and they are clarified in detail below:

- **Quantitative research:** involves statistical and mathematical tools where the researcher tries to quantify the research and understand how predominant the research is by reviewing past studies.
- **Qualitative research:** involves collecting verbal or behavioral data and analyzing the observation. This research does not require numeric figures.
- **Applied research:** is conducted to resolve existing practical problems.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The management of petrol station is a challenge for business owners. In order to tackle the problem, many researcher has examined various studies on petrol management system to implementation and advantages to make management of petrol station easy, convenient, reliable and time efficient. Results from this study shows that 46% of studies focused on system development because to fully understand the adoption of petrol station management system, system must be developed, tested and implemented also, many studies used TAM models because it's one of the most reliable and influential models to determine how users come to accept and use a technology. Results also analyzed the region dominated with this study and results shows that Asia has 57.10% which is the highest percentage of studies that examined the adoption of petrol station management system.

In addition, based on this research gap, the researcher conducted a systematic review to explain the nature of research that has been conducted on the research topic. Also many studies that developed a system had a loop on their security and most system failed to test. Many studies on that developed petrol station management system were written in PHP, C++, Java programming language and used Oracle and MySQL database to store and retrieve data. It can thus be concluded that limited studies on Petrol Station Management are available and this study will be of help to inform future researcher on the research area as to where more literature are needed or lacking. This will further enrich the stock of literature available on the research area in future.

6.2 Recommendations

Although results provided in this study gives a detailed review on Petrol Station Management System, the researcher would also like to suggest further research in order to enhance the current reviewed results. Results of this study aimed at answering three research questions, the following areas should be explored:

- Survey research should be conducted more, not just focus on system implementation so as to bridge the research gap of limited studies on petrol station management system.

- System developers should pay more attention to the security when developing a system. Many loop holes were found in the reviewed studies which give room to threat.
- The results revealed from the study should be used as reference to examine the adoption of petrol station management system.
- Researches should focus more on developing desktop application using JavaScript programming language and MySql database so the system can run without internet.

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APPENDICES

APPENDIX 1

ETHICAL APPROVAL LETTER

YAKIN DOĞU ÜNİVERSİTESİ

BİLİMSEL ARAŞTIRMALAR ETİK KURULU

18.06.2019

Dear Ayuk Gabriel Augustine

Your project "Examining The Adoption Of Petrol Management System: A Systematic Literature Review" has been evaluated. Since only secondary data will be used the project it does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee

Direnc Kanol

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.

APPENDIX 2

SIMILARITY REPORT