Enhanced Newspaper Subscriptions Payment Platform

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By

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Abstract

The drive behind development of The Patriots web based payment platform and marketing tool was to provide Zimbabwe Heritage Trust with a technological solution to market their authored books and to facilitate convenient fund transactions for customers and the organisations marketing department. The enhanced newspaper subscriptions payment platform project will provide benefits for the organisation by implementing a computerised system of the manual subscription process being used currently in the marketing department. The platform will allow for centralised data storing using the MySQL database, providing data integrity in the system. Zimpapers distributers of the newspaper will also be included in the system access levels so that they can receive client distribution details automatically. Payment notifications are an included functionality of the system to engage users with the system. For development of the system to be successful, findings and analysis of the user requirements were obtained through various methodologies and communication forms. Based on the requirements revealed, planning of the project was done by carrying out feasibility studies to certify the project as economically, technically and operationally feasible. Analysis of the system was also done to compare the weaknesses of the manual subscription system that was used in the organisation and the payment platform. This analysis was done with the aid of visual diagrams. Design of the system was then carried out to provide the best user interfaces for user-system interaction before the enhanced newspaper subscriptions payment platform was then implemented into the working environment. Parallel changeover was defined as the best method of installation as running both the computerised system and manual system would not clash and allow for backup of data. In future, other modules can be added to the system like developing on the payment platform for subscribing for advertising space.

Declaration

I **Tapiwa W Karimbika**, hereby declare that I am the sole author of this dissertation. I authorise the **Midlands State University** to lend this dissertation to other institutions or individuals for the purpose of scholarly research.

Signature   …………………………………………..

Date   …………………………………………..

Approval

This dissertation entitled "**Enhanced Newspaper Subscriptions Payment Platform**" by **Tapiwa W Karimbika** meets the regulations governing the award of the degree of **BSc Honours Information Systems** of the **Midlands State University**, and is approved for its contribution to knowledge and literacy presentations.

Supervisor's Signature   ………………………………………….

Date   ………………………………………….

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First and foremost my deepest gratitude goes to God whose endless love saw me through this dissertation. I would like to thank my supervisor and colleagues for all the support and criticism they offered to help me improve my research. Special thanks also go to staff members at The Patriot who offered great assistance in gathering research and understanding operations in the organisation. Lastly, I would like to acknowledge all my lecturer with the university for the knowledge they availed to me throughout my four years that I was able to utilise in my dissertation.

Dedication

I would like to dedicate this research to my parents for their unwavering love and continued support in my educational studies. Without them none of this would have been possible. Dedication also goes to all my family and friends.

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LIST OF ACRONYMS

ARR…………………………………………………………...Accounting Rate of Return

CEO………………………………………………………....Chief Executive Officer

ROI …………………………….…………………………...…Return on Investment

SQL   …………………………………………………..Structured Query Language

UML…………………………………………………...Unified Modelling Language

ZHT……………………….…………………………….....Zimbabwe Heritage Trust

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CHAPTER ONE: INTRODUCTION

1.1 Introduction:

Focus in this introductory chapter will be on the topic, its objectives, background of the organisation it will be implemented in, and the instruments and method that will be utilised for development. This chapter serves a starting point of this dissertation, which will enlighten on a computerized system that will be implemented in place of the current system. Envisioned is an integrated newspaper subscription and book purchase system. This system will aid the marketing department at The Patriot Newspaper advertise their reading material online at a wider scale and automate their subscriptions and payments.

1.2 Background of the study:

To carry out study of an organisations background, analysis of the business environment, data documented issues, previously analysed system flaws and collection of adequate history on the current problems must be conducted (Baligh, 2006). The Patriot Newspaper publishes its newspapers weekly and allows readers or corporate clients subscribe for delivery of copies. Subscriptions payments are done directly at the company's offices in the marketing department. Payments are then manually recorded, and details are taken to document for delivery purposes and invoicing. The production department then liaises with the Herald printing house and newspapers are printed. The marketing team gets in contact with Zimpapers and then their papers are delivered to the detailed location on a Friday morning.

1.2.1 Background of the organisation:

The Patriot is a production company of a weekly newspaper, run under Zimbabwe Heritage Trust. It has been producing reading content since May 2011. This weekly tabloid is published every Fridays and it is filled with well refined educational content based on traditional Zimbabwean roots. The articles written in the newspaper aim to represent and shape true perspectives of the Zimbabwean national identity. Stories published by the organisation aim to engage all members of a typical Zimbabwean family. In previous years, printing of the newspaper was done by a subsidiary of ZHT called Heritage Printing House (PVT) LTD. However due to lack of foreign currency, Zimpapers has the distribution and printing contract (zimbabweheritagetrust.inc, 2018).

1.2.2 Organisational structure:

Baligh (2006) defines an organisational structure as an immediate vertical relationship between various levels inside an organisation. It is a progressively creating idea of subordination of substances that basically consolidate and save one typical purpose of the building plan both imperceptible and unmistakable. The structure decides the way and degree to which force and commitments are dispensed, controlled and encouraged and how information channels between levels of organisation.

The different types of organisational structure include, the divisional structure which alludes to organisations that structure authority as per diverse product or project, the matrix structure where employees have multiple bosses and reporting lines due to projects they may be involved in, the functional or bureaucratic structure which separates the company based on specialty, and lastly the administrative structure which is commonly used in large organisations and incorporate a particular level of regularization.

Thought it is not that much of a large organisation, used by The Patriot is the administrative structure which seeks to open up the lines of communication and collaboration within the organisation.
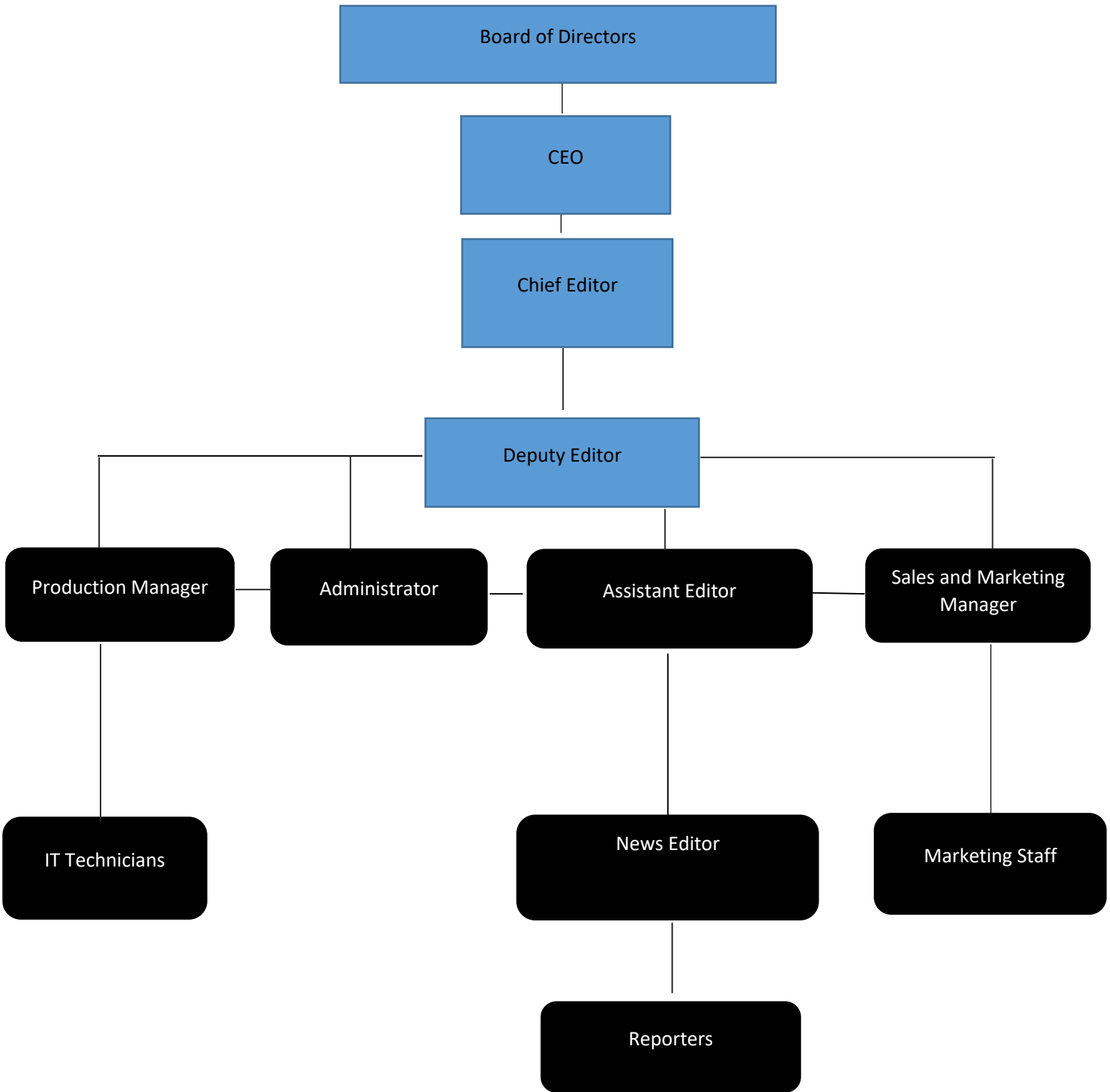
Fig 1. 1 Organisational structure

1.2.3 Vision:

Vision is defined by Buelens, Sinding and Waldstrom (2011), as an aspirational description of objectives and goals that an organisation would like to achieve in the near future. The main achievement Zimbabwe Heritage Trust has been trying to uphold is to help all generations appreciate Zimbabwean history and protect its heritage for the future generations to come.

1.2.4 Mission statement:

Buelens et al. (2011) view mission statement as a short statement of an organisation's goal of operations and reason of existence, what sort of services it offers, its essential clients or market, and its topographical district of activity. The Patriot's goal of operations is:

To mend negative thoughts of our Zimbabwean heritage and aid in the personal fulfilment that black culture is beautiful.

Their values are:-

- ❖ **Patriotism** – Working staff is driven by the principal of being patriots in their everyday operations of the business and celebrate their Zimbabwean heritage and culture.

- ❖ **Non –partisanship** – Political affiliations are disregarded in the organisation as heritage is not regard on socio-political orientation.

- ❖ **Sovereignty** – Sovereignty, independence and freedom to express ones opinions on culture is duly welcome despite any influences.

- ❖ **Professionalism** – Together with the board, shareholders, society and different stockholders associated with business values, effective communication is key to maintain relations.

- ❖ **Commitment** – Zimbabwe Heritage Trust is committed to educating the entire national community on lost cultures and preserve heritage.

- ❖ **Diversity** – General acceptance of different cultures and ethnic backgrounds is a strong belief at the organisation.

1.3 Problem definition:

In problem solving and decision making processes, the definition of a problem must be identified first. A problem can be regarded as a difference between the actual situation and the desired situation (Cannon, 2015). The marketing department at The Patriot has to rent point of sale (POS) machines to allow for customers to subscribe for weekly newspapers and purchase books which is a bit costly. Clients also have to travel to The Patriot which is not located at a central position within the CBD. This integrated system could benefit the organisation by taking care of problems like that of customers who are located out of Harare who cannot subscribe for newspapers or make payments at their own convenience. Publications of authors are not marketed on the website and there is no delivery of books while newspapers are delivered to the customers' doorstep. Subscribers don't receive reminders or notifications of due subscriptions.

1.4 Aim:

The aim was to develop an automated system that is web based and facilitates transaction of funds or payments. The payment platform will offer clients more convenient payment methods when subscribing for the weekly newspaper, purchasing books and all other payments. Automation of subscriptions should allow payments to be confirmed and notify users of new payments due. The aim is to also market publications of the organisation. Management of reports, invoicing and data capturing will also be automated by the system.

1.5 Objectives:

- ❖ To develop a web based subscription platform that enables applicants to specify their subscriptions orders through pricing details, number of copies and issue number.
- ❖ To provide subscribers a platform to make online payments through PayNow integration.
- ❖ To automate the confirmation of subscriptions payments via sms and email.
- ❖ To notify users when subscriptions are due through email and sms.
- ❖ To market publications of freelance authors of the organisation by providing an online bookstore.

1.6 Instruments and Methods:

1. **MySQL** – This a database architecture with standard protocol layers to protect data from being accessed by unauthorized users. These security protocols will encrypt passwords to regulate who is allowed to view what, or who has access to what information. MySQL is the right database to use as it is compatible with most platforms like windows and Linux. It is also an open source software, so all users are legally liable to use the database.

2. **PHP** – O'Brien and Maracas (2012) state PHP as a programming language best used for building web-based applications or systems that require the use of server tools like apache and MySQL. It helps when creating the design of the web system.

3. **Adobe Dreamweaver** – It is a web authoring tool utilised to test and debug code. This development tool allows for modeling of user interfaces that will be used in the website created.

1.6.2 Methods

Methods are defined by Jackson (2007), as activities utilized for data gathering, examination of data and the use of that assembled information. The beginning of a project is marked by information gathering and analysis to recognize flaws within the current system. Methods used for gathering information include meetings, interviews, questionnaires and analyzing of existing documents. Methods were sufficient to give off required data that will aid in the development of the web based payment platform.

❖ Questionnaire is defined by Boston (2005), as a data gathering technique that relies on answers derived from a set of questions provided for system users and stakeholders. Subscribers will be given these to identify issues with the current system.

❖ A meeting is defined by Boston (2005), as a scenario whereby interested parties in a project or task force team come together to discuss an issue and devise ways to reach a common goal. System users will be prompted to voice their input and give their ideas for the proposed system.

❖ An interview is defined by Boston (2005), as an information gathering methodology where by questions are asked and answers are directly given face to face. Developers can use this method to fully understand the requirements of the system users.

1.7 Justification and rationale:

Since newspapers are delivered to the doorsteps, books can also be delivered to willing clients. Productivity and efficiency is improved in the marketing department as payments are done electronically instead of physically. The Patriot has sufficient computers and peripheral devices to support the proposed system. A web-based form of subscription and payment is justified as they can be done on all internet capable devices. Rent for POS machines will be reduced as a result of less clients coming down to the office to make physical payments. Also due to cash crisis the system offers a more convenient option for customers.

1.8 Conclusion:

In this introduction phase, the background and instruments reveal that The Patriot will benefit from this system as it will prove to be convenient for both the organisation and their clients. Objectives and tools are recognised above to assist in coming up with this proposed system. This will increase advertisement of their reading material on a wider scale. The next chapter will be the planning phase where feasibility of the project will the dealt with and analyzed.

CHAPTER TWO: PLANNING PHASE

2.1 Introduction

Thorough justification and analysis of the payment platform for The Patriot Newspaper shall be dealt with in this planning phase. Its main objective and purpose is to validate the benefits given by an automated system. Characteristics of the phase that will be estimated include the project scope, benefits and costs. Findings from the project plan will determine whether the proposed system should be carried on or not. If a decision is made to accept the project, this chapter becomes the foundation on which the system is laid.

2.2 Business Value

Cummings (2006) states that a business value incorporates every one of the types of qualities that come about because of adopting the proposed project. The organization is the focal point of these business values. Cost benefit analysis will be performed to measure all advantages and disadvantages of the system. There are a whole lot of stakeholders influenced by this project, so they will also be mentioned. To be developed is a system that will turn out to be of incredible incentive to the organization. The project must offer services that promote efficient speeds and reduce inconveniences to news subscribers. Repetitive procedures must be automated, in turn reducing human errors and mistakes. This will result in an increase in sales of The Patriot Newspaper.

2.2.1 Shareholder value

According to Hubbard (2009), shareholder value is an assessment of effects of the project and how it impacts the different parties be it positively or negatively. More newspapers being distributed nationwide can be a positive advantage for shareholders of Zimbabwe Heritage Trust as this means that the paper will circulate on a wider scale due to the convenience of online payments. That is it hope to increase 5% profit as a percentage of turnover on shares.

2.2.2 Customer value

How an organization holds the esteem of its client base is the major focus of the customer value (Bentley and Whitten, 2007). This definition explains the efforts The Patriot Newspaper invests to meet its customer's needs. The proposed system aims to value the customer's time by offering them the option of making online payments in their own convenient free time.

2.2.3 Managerial Value

As indicated by Bentley and Whitten (2007), managerial value concerns how a business perceives the significance of administrators and the endeavors the organization takes to expand the spirit of managers by making their tasks and obligations simpler. Management in the marketing and sales department are relieved of tasks like generating invoices and a whole lot of paper work as the system will do some of these tasks. Less Point Of Sale machines will also need to be hired and cleared for use by management in the marketing department as more clients have no need to be come down to the offices to make a purchase.

2.3 Feasibility Study

This study is more of an examination done so as to learn whether it is to our advantage to continue with the project inside the planned assets or resources, working conditions and time (Humbling and Gotham, 2013). It likewise uncovers the dangers related with the undertaking of that system. "Can we make this system happen" are the kind of enquires that are meant to be answered by findings of the feasibility study.

2.3.1 Technical Feasibility

According to Blanchard and Fabric (2006), technical feasibility sorts out the topic of whether the project proposed will accomplish its objectives. At present the system of making subscription payments, booking advertisement space and book purchases requires clients to be physically present at the marketing department. Various hardware is required to influence the possibilities of implementing this system. It relies upon the accessibility of specified equipment, or resources to create and work the project. These resources needed can be gathered into two classifications that is: Hardware and Software.

Table 2. 1 Hardware requirements

Item	Description	Quantity Available	Quantity Needed
Computer	HP Intel Core i5, 2.1 GHZ processor, 4GB RAM	1	4
Printer	HP LaserJet	1	3
Ups	Unintegrated power supply	None	3
Ethernet cable	RJ45 cable	None	60m

Table 2. 2 Software requirements

Item and description	Quantity needed
Adobe Dreamweaver	1
XAMPP	1
Notepad++	1
MySQL	1

Once the essential gear is accessible, staff training for the marketing department to utilize the system will be feasible.

2.3.2 Economic Feasibility

Alexander (2011) views economic feasibility as an examination carried out to decide if the benefits given off by the project will exceed the expenses or costs of the project. In the event that short-term costs aren't dominated by long-term benefits or do not deliver quick operating costs decrease, then at that point we can declare that the system isn't financially achievable. We need to carry out a cost benefit analysis to investigate if it is cost effective or financially practical to complete the new system.

2.3.2.1 Cost Benefit Analysis

Cost benefit analysis is a technique used by top management of a project to realize the total costs they will acquire from start off the project until the payback period elapses (Young, 2002). It surrounds itself on the development costs and moneys available for the creation of the proposed project. When revenue and expenses are weighed out, costs and benefits of the system begin to shape out. If benefits outweigh costs, then the payment platform for The Patriot Newspaper will be considered feasible.

2.3.2.2 Benefits

According to Cummings (2006), a benefit is the positive outcome from doing a certain task or something that encourages well-being. In order to be deemed feasible the project must meet this definition. This analysis technique is partitioned into two classes, which are tangible and intangible costs. Intangible costs being indirect and tangible costs being immediate or direct. Every one of these components are essential basics in deciding the reasonability of proposed project.

2.3.2.3 Tangible Benefits

According to Kostelac (2013), these types of benefits are monetary therefore they come with a measurable figure as compare to the intangible benefits which do not.

Table 2. 3 Tangible benefits

Benefit	value ($USD) 2018	value ($USD) 2019	value ($USD) 2020
Reduction in POS rent costs	400	1000	1200
Rise in market share	1500	3000	4000
Decrease in stationery costs	2500	3000	4000
Increase in productivity	3000	5000	7500
Total benefits	**7400**	**12000**	**16700**

2.3.2.4 Intangible Benefits

These benefits are recognized by Bentley and Whitten (2007), as advantages to the organization and its shareholders but are indirectly accountable for, meaning they do not offer any monetary value. However they are hard to measure as estimates may be subject to

common human error and bias. So of the intangible benefits The Patriot may gain include increased efficiency due to less human errors, reduced workload for the marketing department as more payments done online and improved data capturing of invoices and financial paperwork.

2.3.2.5 Development costs

Kostelac (2013) mentions that development costs are required expenses meant to be paid for before and during the development and implementation phase of the proposed system. The monetary values of these costs will be put to use in working out total costs incurred and then later in the cost benefit analysis. Development costs for the system were analysed at $4200 below.

Table 2. 4 Hardware costs

Item	Quantity	Cost(USD)
Computer	3	3500
Printer	2	340
UPS	3	300
Ethernet cable	60m	60

Total hardware costs   **$4200**

Table 2. 5 Software costs

Item	Quantity	Cost(USD)
Adobe Dreamweaver	1	Free
MySQL	1	Free
Notepad++	1	Free
XAMPP	1	Free

2.3.2.6 Operational costs

Operational costs are the day to day costs acquired from running the system in a business environment (Randall, 2012).

Table 2. 6 Operational costs

Operational costs	value ($USD) 2018	value ($USD) 2019	value ($USD) 2020
Maintenance	3000	2000	1000
Internet	515	515	515
User training	350	250	100
Hardware repairs	485	350	200
Stationery	785	600	480
Total	**5135**	**3715**	**2295**

Table 2. 7 Cost benefit analysis

COSTS AND BENEFITS	COST US$ 2018	COST US$ 2019	COST US$ 2020
Benefits			
Tangible	7400	12000	16700
Benefits (total)	**7400**	**12000**	**16700**
Costs			
Operational Costs	5135	3715	2295
Development costs	4200	-	-
Total cost	**9335**	**3715**	**2295**
Net profit	(1935)	8285	14405

Positive results of the cost benefit analysis proved to show that the project is feasible in terms of net profit acquired over the years.

2.3.2.7 Payback Period

Young (2002) elaborates that the payback period is defined as the time necessary for the project to run for it to pay off all costs used for its development and start giving back or producing returns.

The following are the estimated cash flows from the year 2019, 2020 and 2021.

Year 1: 2019 …………………………………… $8 000

Year 2: 2020…………………………………… $12 000

Year 3: 2021…………………………………… $17 000

Table 2. 8 Payback period

Year	Cash flows ($)	Net cash flows ($)
0	(9 335)	(9 335)
1	8 000	(1 335)
2	12 000	10 668
3	17 000	27 665

Payback period = 1 year (1 335 / 12 000) * 12 months

= 1 year 1 month

Calculations carried above show that the proposed project will take a year and one month to pay back investments made, which is a short period.

2.3.2.8 Return On Investment (R.O.I)

It is also known as **Accounting Rate Of Return (A.R.R)**, which can be used to compare Net Profit (N.P) to the investment, required and is expressed as a percentage (%).ROI is used to calculate the viability of the project (Randall, 2012).

FORMULAE

$$ROI = \frac{\text{TOTAL BENEFITS} - \text{INVESTMENT}}{\text{INVESTMENT}} * 100\%$$

$$\text{calculation} = \frac{16700 - 9335}{9335} * 100\%$$

$$= \underline{\textbf{78.8\%}}$$

Net profit = total benefits – total costs

= $36 100 – $15 345

Net benefits = **$20 755**

Making the payment platform system economically feasible, considering the net benefits calculated which add up to $20 755 and the return on investment which is a favourable 78%.

2.3.3 Social feasibility

Kumar (2016) states this analysis of the society as an evaluation that tries to check whether and how the proposed system will influence the general public in a positive way. This project will be considered socially feasible as it allows the society and organisations around the public to make convenient payments, based on the current cashless economy. This projects also lifts the Zimpapers publishers as this gives them more business within the community and around the country.

2.3.4 Operational feasibility

Operational feasibility is analysed by Franchet (2011), as the ability to make productive use of, aid and carry out the necessary tasks of a project. This includes all stakeholders of the project who will make use of the system. So some checks and analysis will be done to make sure the system proposed does not give off any negative aspects that may affect all users of the system. Hence users need to be given a prototype so that they may see if the system may be adaptable or of use to them to be deemed feasibly operational. The system will be feasible to the marketing department as this platform allows for growth in subscriptions and production. Subscribers will also benefit as they will receive notifications of due subscriptions.

2.4 Risk analysis

It is a thorough evaluation of the potential dangers that can influence the task (Hubbard, 2009). Risks are grouped as qualitative and quantitative. It is essential that we observe these dangers and come up with answers to avoid the outcomes. The most ideal approach to manage these risks is to partition it into two segments that is risk assessment and risk management. Assessment includes distinguishing, assessing and estimating the likelihood while management includes dealing with the dangers. Some of the dangers are examined beneath.

2.4.1 Electric power cuts

Devices and hardware used within this project all use electricity as source of power. Hence it is highly essential that this equipment has sufficient power at all times to avoid the risk of damaging computers and its peripheral devices. This would increase hardware maintenance costs and purchases. So we have managed the risk by installing Unintegrated Power Supply (UPS) devices to keep the devices on and avoid data loss and damage while the generators are preparing to come on.

2.5 Stakeholder analysis

Haimes (2004) states that stakeholder analysis alludes to the general population or groups that are important to the organization project and its use. It distinguishes every one of the partners to the project and how they will be affected by the system. Some of The Patriots shareholders will be discussed below;

2.5.1 Subscribers

Subscribers or news readers of The Patriot Newspaper expect to be able to make payments and receive their papers on time. So they wish to be able to make payments at their own convenience and at the same time do it securely without fear of being robbed. The system will cater for their needs by offering secure online payments through PayNow that also allow them to subscribe from anywhere at any time.

2.5.2 The marketing department

The marketing department expect the system to make their tasks and goals easier to reach by automating reports and invoices and also notify them of all subscriptions and payments. They should also be able to account for all payments made and their respectful addresses that the papers should reach.

2.6 Work plan

According to Mir (2006), work plan is a drafting of the considerable number of exercises that are to be done in the development and implementation phase of the project being proposed. Activities are drafted from beginning to end when the system has been delivered. This is done to plan accordingly when certain work must be done and how long it should take for it to be completed.

Table 2. 9 Work plan

Phase	Start date	Completion date	Duration in weeks
Project proposal	26/02/2018	18/03/2018	3
Planning	19/03/2018	15/04/2018	4
Analysis	16/04/2018	27/05/2018	6
Design	28/05/2018	05/08/2018	10
Implementation	06/08/2018	28/10/2018	12
Maintenance	29/10/2018	On going	On going

2.6.1 Gantt chart

A Gantt chart is a portrayal of project exercises and their span gauges (Haimes, 2004). It consists of every single one of the exercises beginning from the proposition up to the completing and conveying of the project and this anticipates assets needed, giving strategic advantages not to waste resources.

Table 2. 10 Gantt chart

Phase/Months	1	2	3	4	5	6	7	8	9	10
Proposal	■									
Planning		■	■							
Analysis			■	■						
Design				■	■	■	■			
Implementation							■	■	■	
Maintenance									■	■
Documentation	■	■	■	■	■	■	■	■	■	■

2.7 Conclusion

This chapter elaborated and enlightened on how planning for the payment platform for The Patriot will be carried out. An assessment on the feasibility of the system was also carried out to compare if benefits outweighed costs. The project has proven to be worth moving forward with as return on investment in year three was 78% and net benefits were $20 755. Payback period was also estimated to be a year and one month. These facts have been backed by workings, calculations and numbers which show that the project is technically, economically, socially and operationally feasible. The next phase or chapter will be the analysis phase.

CHAPTER THREE: ANALYSIS PHASE

3.1 Introduction

According to Agarwal and Gupta (2010), the analysis phase is whereby there is a top to bottom examination of how the organisation processes its information into the system up to the point where the concluding outcome is produced. Some of the concepts focused on in this analysis chapter include an assessment of information gathering methodologies utilised to collect data. Some of the methods encompass questionnaires, interviews, analysis of existing documents and meetings. The present system processes need to be analyzed to draw out the flaws and weaknesses faced in the current system. Only then are alternatives and solutions drafted out.

3.2 Information gathering methodologies

Jackson (2007) defines information gathering methodologies as undertakings that result in gathered data, analysis of data and the effective use of that collected information. This task is considered vital as it is the starting point of system development. These activities are performed to single out flaws and weaknesses within the current system and come up with corresponding solutions. Methodologies that were utilized to gather data for this project include:

- ❖ Meetings
- ❖ Questionnaires
- ❖ Interviews

3.2.1 Meetings

A meeting is scenario whereby interested parties in a project or task force team come together to discuss an issue and devise ways to reach a common goal (Boston, 2005). Meetings are started by having a dialogue on a common subject matter that needs to be dealt with. Stakeholders of the proposed system that will make use of the system include the subscribers, marketing team, management and distributers. Information collected from these meetings will devise solutions and achieve user requirements. In every meeting, a secretary is present to take down minutes and important issues raised up and discussed.

3.2.1.2 Advantages

- ❖ System users were able to clearly define their grievances and state out what they wanted the new system to do as opposed to the current one. Newspaper subscribers

were able to define their lack of confidence in the convenience of the payment methods used to the developers.

❖ Meetings promoted better communication within the organisation and gave a platform to hear ideas from all involved members. The marketing department voiced their idea on how books could be added to the online payments to improve their online marketing.

❖ Promoted by this methodology was the ability for users to express themselves freely. System users offered their criticism without any fear in hopes of coming up with a system that is solid and benefits all.

❖ The planning and drafting of exercises that will be done all through the development of the system were done. This helped by giving enough time span so that there will be no wastage of time and assets in development.

❖ Socialization was one important aspect touched by the meeting. Interaction with subscribers and all system users gave a clear picture of the payment platform needed, and highlighted where more detail was needed to be gathered.

❖ In meetings, members of the marketing team were able to voice out how they needed reports and invoicing of payments to be more automated.

3.2.1.3 Disadvantages

❖ Meetings tended to be time consuming as all members were required to be present in the conversation. In the meetings held, users of the system mention the same thing over and over reducing the rate at which progress was made. We had management of the marketing and production department also disputing over some of the development ideas brought forward, stretching valuable time.

❖ Due to the fact that some top management was present in meetings, other system users like the subscribers and members in the marketing team were not comfortable to give their quires. In the meeting, other users tended not to express their views on the current system in fear of criticism.

3.2.1.4 Meetings results/findings

Results and findings from the meetings held gave the development team a detailed analysis of information that the system users would like to see amended to the current system. System requirements have been heard and taken down to be addressed and dealt with in the proposed payment platform. Information gathered includes that of newspaper subscribers, how they found the methods of payment a bit inconvenient for them. They expressed how traveling to

the offices was not practical for them, and how it would be easier for them to make payments online at their own time. Findings also expressed how subscribers also need to be notified when theirs subs are due. However meetings did prove to have some flaws as not all members concerned with the proposed system showed up for the meeting.

3.2.2 Questionnaires

As stated by Gillman (2008), a questionnaire is another data gathering technique that relies on answers derived from a set of questions provided for system users and stakeholders. For the developers to obtain the best responses from this methodology, the questions asked must be drafted in a way that they start from simple general questions to complex more specific ones. In cases where you need feedback from a large quantity of people and interviews seem impractical, this technique is the most likely to gather required information. Questionnaires include two types which are open and closed questionnaires.

3.2.2.1 Open questionnaires

According to O'Brien and Maracas (2012), open questionnaire provides system users a platform to give detailed answers of their own understanding of the current system and their views. This type of questionnaire is used in situations where detailed answers are required from stakeholders and respondents in order to receive appropriate information for the development of the payment platform.

3.2.2.2 Closed questionnaires

Gillman (2008), distinguishes this type of questionnaire as one that limits the respondent to a specific and straight forward answer based on the content provided on the questionnaire. This deals with quantified information that is provided by the system users as raw data. Closed questionnaires usually contain check boxes which make them easy to answer. All respondents give their different views on the same questions as this type contains the same set of questions to be answered by all users.

3.2.2.3 Advantages

❖ They were less time consuming, quick and reliable as answers were given there and then to avail significant data. This advantage was mainly for gathering information from subscribers who were usually corporate employees with little time to spare.

❖ Questionnaires were used to simultaneously extract data from a wide population in a short time period. Users of the system consisted of management in the organization,

and subscribers found all over the country. This methodology was able to reveal the concern of payments for news readers located out of Harare.

❖ Cost effectiveness is one aspect this technique obtained. The Patriot was able to draft their own questions and print these questionnaires with their own office printers.

❖ Standardization of questionnaires allowed respondents to be asked similar questions that were ordered in the same sequence. Questionnaires given to all subscribers, management and all system users were able to gather information of how payments are more manual and non-automated in the current system. Leading to propositions to develop a new system that will facilitate these issues as well as promote advertisement.

❖ Since time factor is not that much of an issue in questionnaires, respondents were given questions and asked to take their time in making precise responses before returning their answers any time before Thursday when production of the weekly paper is at its peak in the offices.

❖ Confidentiality was promoted since information gathered from ones answers was based on their own views and intellect. Questionnaires given to each system user resulted in non-uniform, non-bias data being collected as respondents answer on their own, free of influence. So news readers were able to express their convenience issues of making subscriptions.

3.2.2.4 Disadvantages

❖ People directing the research did not know whether the respondents had comprehended the question that was being inquired. This is one of the issue that the questionnaires tended to give off. System users were given questionnaires and asked to return their response before production of the next paper. So issues raised in the questions were not clearly understood.

❖ Due to the standardization of questionnaires, answers were not clearly answered by respondents as compared to questions ask face to face with a direct response where all parties clarified understandings. Further answers were not obtained that could help in the development of the new system for those subscribers that indicated that they were okay with the current system.

3.2.2.5 Findings from questionnaires

Quite a significant amount of findings of information was gathered from this methodology in a limited time frame as compared to all other techniques. This promoted reference of data

used. Keen system users willing to give their input gave their response in a practical and efficient manner. However not all respondents were literate enough or enthusiastic for change. Therefore some stakeholders of the system did not give proper answers as it was revealed that some managers within the organization are scared of change.

3.3 Analysis of the existing system

According to Shelly and Rosenblatt (2011), an analysis of the existing system is a top to bottom evaluation of how the organization is completing its everyday tasks. Mainly analyzed is how the system inputs , processes and outputs its information .Reason for this is to come up with a more efficient and effective information system that will deal with the current issues being face in the existing payment and advertisement system. Documentation of the system is vital to understand how software and hardware is used currently in business processes, and making them suitable for making decisions. Discussed below in this phase will be the details of entire processes carried out.

3.3.1 Description of the existing system

The Patriot used methods of subscription payments, book purchases and all other payment by offering cash facilities, Point Of Sale machines and an EcoCash merchant. However these facilities required customers to be physically present at the offices for them to be processed.

When clients come down to the Patriot offices located on the outskirts of the CBD, they come and make a physical payment of the subscriptions they wish to make or any other payments they want to make, be it purchasing books, buying newspapers or booking for advertisement space. Customers get in touch with a marketing representative, and they describe all the services that they wish to be provided with. The marketing representative analyzes if the requested services by the client are available, and begins to accept payment from the client. Invoices are then filed and the payment is documented. Details of the subscribers email and physical address are taken down for contact purposes and for delivery of newspapers.

The marketing manager, together with the production manager get in touch with the Zimpapers who are the contracted printers and distributers of the Patriot newspaper. The weekly newspaper print is sent, together with subscriber details to allow them to be able to make accurate distribution of papers. Distribution schedules are formulated and the newspaper is sent out to the valued customers.

3.4 Process analysis

This analysis is done whereby there is a diagrammatic overview of all the procedures happening in the general operations of the organization. The point where the organization inputs its information for processing, is when they are undertaken (Darnton, 2012). Process analysis involves how The Patriot handles its subscriptions orders and requests, up to the point where newspapers are distributed to clients. This stage aims to represent the procedures and activities that are performed in the present system and the information that streams all through that exact system. Each procedure will be broken down and analysed what it produces, under process analysis. It will also give a diagrammatic view on what occurs in the subscription and payments procedure of the current system.

3.4.1 Activity diagram of the current system

An activity diagram is defined as a portrayal of work processes of stepwise exercises and activities with support for decision, concurrency and iteration (Shelly and Rosenblatt, 2011). Entities active in the handling and production of data from the system are what the activity diagram looks at. Each entity or element has an impact in the organizations general activities. For The Patriot, there is communication between the subscriber and the marketing personel for transactions to occur in the activity diagram.

Customer	Marketing personnel	Administrative Manager	Distributor

Start

Customer visits Marketing department

Request book purchase

Request to subscribe

Are resources available?

Yes

Client makes payment

Invoicing

Manage report details

Customer details documented for delivery

No

Check and notify next availability

End

Key:

Action State

Process

Decision

Information flow

Fig 3. 1 Activity diagram of the existing system

25

3.5 Data analysis

Jackson (2007) defines data analysis as a projection of data processing and how the final output is produced within an organisation. Focused in this phase is the analysis of information to cater for changes and improvements that will be introduced in the proposed system.

3.5.1 Context diagram of the proposed system

According to Kendall and Kendall (2013), a context diagram is a visual representation that gives system boundaries and displays what information is inputted and extracted from the system by each user or entity. The current systems context diagram outlines the system boundaries and relates it to the outside environment.
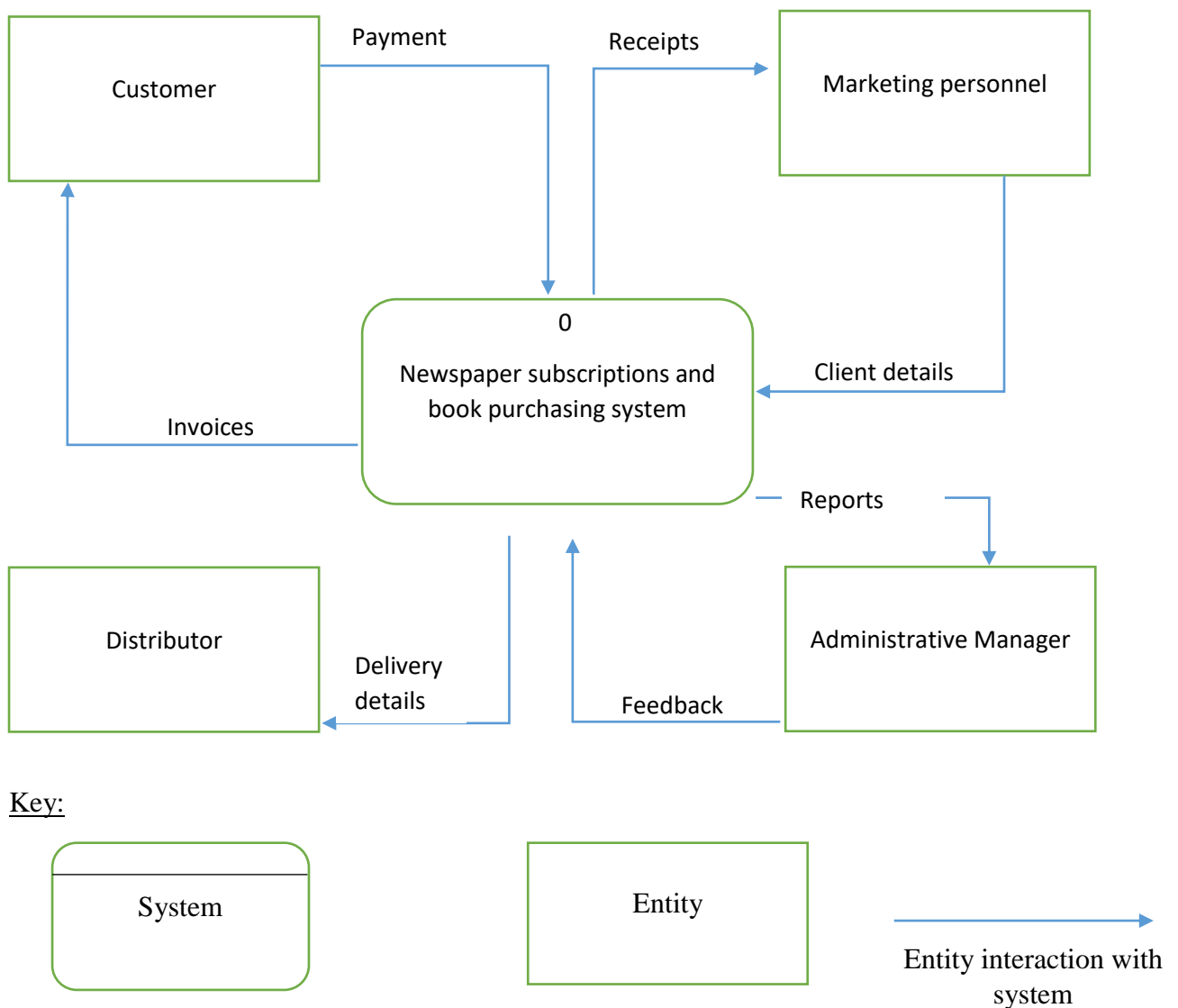
Fig 3. 2 Context diagram of the current system

3.5.2 Data Flow diagram

As stated by Hathaway (2016), a data flow diagram is a graphical representation of information flowing through an expert or information system. They can be used for the visualization of data processing that is the structured design. The diagram displays the type of information that will be inserted and extracted from the system, how data will travel through the system and where it will finally be stored.

```
┌─────────────┐   Quieries    ┌──────────────────────┐            ┌────┬──────────────────┐
│  Customer   │──────────────▶│          0           │───────────▶│ D0 │ Stock and pricing│
│             │               ├──────────────────────┤            └────┴──────────────────┘
└─────────────┘               │ Request subscription │
                              │      and books       │
                              └──────────────────────┘
                                         │ Customer details
                                         ▼
                              ┌──────────────────────┐
          Client data         │          1           │
      ──────────────────────▶ ├──────────────────────┤
                              │  Submit client details│
                              └──────────────────────┘
                                         │ Credentials
                                         ▼
┌─────────────┐  Authenticate  ┌──────────────────────┐
│  Marketing  │     data       │          2           │
│  Personnel  │──────────────▶ ├──────────────────────┤
└─────────────┘                │    Verify details    │
                               └──────────────────────┘
                                         │ Data validation
                                         ▼
                Delivery       ┌──────────────────────┐          ┌────┬───────────────┐
┌─────────────┐ addresses      │          3           │─────────▶│ D1 │ Client details│
│ Distributors│◀──────────────├──────────────────────┤          └────┴───────────────┘
└─────────────┘                │  Store client details│
                               └──────────────────────┘
                                         │ Document details
                                         ▼
   Choose method of payment     ┌──────────────────────┐
 ───────────────────────────▶  │          4           │
                               ├──────────────────────┤
                               │    Make payment      │
                               └──────────────────────┘
                                         │ Purchase transaction
                                         ▼
   Payment notification         ┌──────────────────────┐
 ◀────────────────────────     │          5           │
                               ├──────────────────────┤
                               │   Confirm payment    │
                               └──────────────────────┘
                                         │ Payment details
                                         ▼
   Distribution details         ┌──────────────────────┐          ┌────┬─────────────┐
 ◀────────────────────────     │          6           │─────────▶│ D2 │ Invoices and│
                               ├──────────────────────┤          │    │  receipts   │
                               │   Record invoices    │          └────┴─────────────┘
                               └──────────────────────┘
                                         │ Capture data
                                         ▼
┌─────────────┐ Report          ┌──────────────────────┐          ┌────┬─────────┐
│Admin manager│ feedback        │          7           │─────────▶│ D3 │ Reports │
│             │──────────────▶ ├──────────────────────┤          └────┴─────────┘
└─────────────┘                │   Report payments    │
                               └──────────────────────┘
```

28

Key:

| Process | Data store | Entity | Data flow → |

Fig 3. 3 Data flow diagram of the current system

3.6 Weaknesses of the current system

This is an analysis that is done to a system so as to identify loopholes that need to be addressed by developing a new system (Sigurdsen, 2015). Identification of these loopholes or flaws will enable the system developer to work on solutions for these weaknesses.

The current system requires clients to be physically present to make payments.

Due to the fact the customers need to be present at the offices, this gives the current system a disadvantage in that not all subscribers find it convenient to travel to the marketing department to make payments. This reduces marketing of subscriptions for clients outside Harare.

The system running at present is not automated, so data is capture manually.

There are no normalized databases in the current system that will allow safe, secure and reliable storage of information from payments to customer details to general records. This disadvantages the system by not providing easy retrieval of information from storages, limiting data manipulating capabilities.

The current system does not fully market the organisations publications.

Books published by the organisation are not marketed adequately as clients just make payments but do not receive a general overview of all authored books offered by The Patriot.

Security of the current system can be compromised.

Problems of a non-automated system are that information can be misused or manipulated. Unauthorised purchase orders can be created within the department by an unknown person who had access to documents.

3.7 Evaluation of alternatives

It has been revealed that it is of great significance to replace the current system with a new system as per user requirements. Analysis of the methods that can be utilized to replace the current system with the new one should be carried out. The different methods used are;

- ❖ Outsourcing
- ❖ In house development
- ❖ Improvement

3.7.1 Outsourcing

It is an agreed contract where one company sources the engineering expertise of another company to develop a system for their organisational use (Michaels, 2012). A firm or individual can be contracted to assist with the development of the proposed system, based on user requirements procured by the organisation. This method or alternative is usually adopted in a business where there is little to no skill in the software engineering or system development field.

3.7.1.1 Advantages

- ❖ By outsourcing, systems developed and implemented are of high quality as they are coded by experts. In this case system users like management can specify their requirements to the experts like the automation of generated reports in the proposed system.
- ❖ Less staff is used in the development and installation process of the system as outside source of labor is used. System users will also be given ample training to familiarize with the new system for example marketing when documenting payments.
- ❖ Work is given to skilled personnel. So it takes less time to install the system as there is no need for trial periods.

3.7.1.2 Disadvantages

- ❖ Lack of complete focus on the organisations system may be an issue in using this method as expert personnel may not be contracted to one business. Poor quality systems may be a result as they try to reach many deadlines.
- ❖ Outsourcing may be a security threat as access to the organisations sensitive information is made available to external contractors, who may misuse that data for unknown reasons.

❖ System administrators in the organisation may find it difficult to manage and perform maintenance duties on the system as expertise are posed by the contracted expertise who have experience in the system they developed.

3.7.2 In-house development

According to Shelly and Rosenblatt (2011), in-house development is when system developments are done within the organisations expertise as an inside job, as compares to contracting externally. The business uses its own resources like time and labor to meet required software's.

3.7.2.1 Advantages

❖ This method makes it easier for user requirements to be met as it promotes participation of all system stakeholders. Marketing and management can familiarizes with the system as it is developed internally, through effective use of the system as a marketing tool and generating reports.

❖ In-house development helps internal software engineers build their development skills. System upgrading and maintenance is easily done as the developers are confident in their own system.

❖ Development that is done in-house allows management to monitor all processes of coming up with the system and aids them with managing resources. That is time and money to come up with the best system.

3.7.2.2 Disadvantages

❖ Software development of this method requires enough resource to be available. That includes skilled personnel and suitable training rooms.

❖ Development of a system in-house stirs fear in users as they fear being redundant do to the system performing their tasks more efficiently. Some users like the marketing team did not fully participate in the development of the system as they felt threatened by the automation of processes.

❖ There is no room for development or skill improvements as there are no expertise or views of an external party contributing to the development of the system.

3.7.3 Improvement of the current system

Improvements can be made to the current system. This can be made possible by automating all manual processes performed in the marketing department. Details of customers is also

sensitive and private, so improvements can be made to provide more secure measures in the system. The system can also improve its marketing tool facilities.

3.7.3.1 Reasons for not improving the system

❖ Improvements to the system involves a lot of training as system users will need to familiarize with the new features of the system.

❖ Costs might tend to be increased by improvements, and bringing little to no benefits. This wastes valuable resources like time, money and skills of expertise.

❖ The new system may prove to be less effective and efficient as the current one being utilized.

3.7.4 Recommended alternative

In-house development has been assessed as the best alternative. It allows development to be based around resources available and expertise of the in-house staff. Skills of the organisations system administrator are strengthened as they are included in the development process. This means that upgrades and maintenance are done internally, protecting sensitive data from getting out. User requirements are easily met as user participation is encouraged by this method. Users such as the marketing team were able to declare how the system could be used as a marketing tool to boost sales.

Table 3. 1 Computation of total costs of implementing the above mentioned alternatives

Method	Cost in $
In-house development	4 200
Improvement	4 800
Outsourcing	7 300

Workings above show that in-house development is the method that is relatively cheap to use. This can be seen by the lower cost that is $ 4 200 and other methods like improving the system is $ 4 800 and outsourcing is $ 7 300.

3.8 Requirement analysis

This analysis comprises of tasks that go into determining the needs or conditions to meet for a new or improved project, taking into account the conflicting system requirements of all the different system users, analyzing, documenting, validating and managing software or system

requirements (Baumeister and Weber, 2013). System requirements are divided into two that is functional and nonfunctional.

3.8.1 Functional Requirements

Required after performing a thorough analysis of the system being used at present is to determine what it is meant to do and the needs of that system (Parad, 2017). These requirements that have been determined will give a brief detail of how the proposed system will perform. It details the inputs, processes and outputs being proposed in the system. The requirements are:

- ❖ Storing, updating and retrieval of subscriber detail
- ❖ Simple, easy to comprehend Graphical User Interfaces (GUI's) that will allow for easy and efficient data input into the system
- ❖ Enable online payments
- ❖ Allow for online marketing of books
- ❖ Process payment confirmations

3.8.1.1 Use Case Diagram

A use case diagram is a visual representation that displays behaviors or actions that a system performs based on the cases of the functional requirements (Parad, 2017). Actors in the system include;

Subscribers

These are the organisations customers who give their client details, make subscriptions of the newspaper and make payments. They will need to receive generated notifications for confirmation of their payments and receive invoices.

Marketing personnel

This user interacts with the customer and receives the client details and payment details for report generation and documenting. They will also be able to make report amendments.

Management

Management will act as analyzers of the system. They will make decisions based on reports received from the system and post their feedback.

Distributers

The distributers are the ones that make delivery of newspapers and books, therefore they will receive client details for distribution
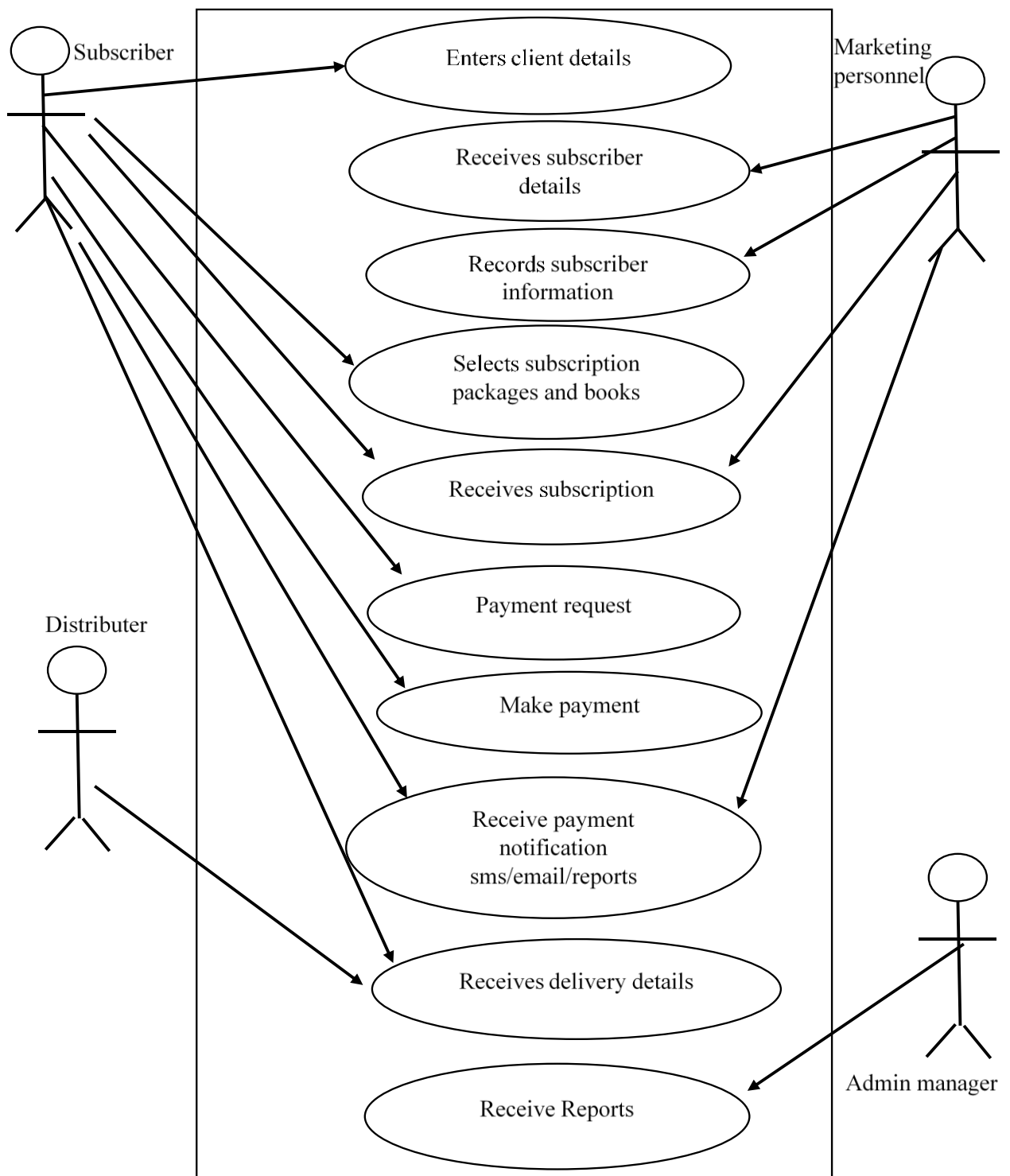
Key:

Fig 3. 4 Use Case diagram of the system

3.8.2 Non-Functional requirements

Baumeister and Weber (2013) define non-functional requirements as system properties and constraints that can affect the developed system. These constraints may be concerned with software hardware requirements. The non-functional requirements or constraints include:

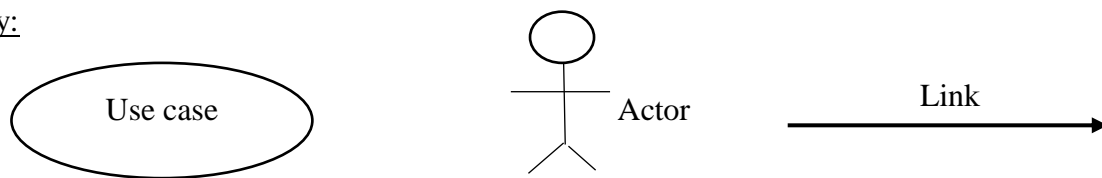- ❖ Validation – the system must provide exceptional error handling and deny any incorrect data input.
- ❖ Security – integrity of data should be upheld by use of passwords to reduce unauthorized access to sensitive organisational and user data.
- ❖ Time constraints – convenience of making online payments will be time saving for both subscribers and the marketing team. This increases efficiency of payment reporting and provide time resources to other tasks for system users.
- ❖ Space utilization – the database is centralized and stores large amounts of data. So enough storage is required to facilitate this by having large storage devices for the system.

3.9 Conclusion

The analysis phase has been thoroughly evaluated and dealt with at this point. All methodologies and visual diagrams examining the current system and requirements of the proposed system have been drafted and analysed. The organisations processes of information flow have also been examined from the input stage to the output stage. The next phase will be the system design stage, where the design of the system will begin.

CHAPTER FOUR: DESIGN PHASE

4.1 Introduction

Targets and goals of the system will be determined by this design stage. Design activities are included in this chapter, which formulate the subscriptions payment platform through the functional requirements identified by the analysis phase. Details of the design will be discussed in depth that is the system architecture, its components, the software itself and activities to achieve objectives of the payment platform. Data input and display output interfaces are the most vital design components that will be analysed. Success of the system is determined by all design elements carried out in this chapter by development of the architecture, databases, interfaces and physical design.

4.2 System Design (how the system will work)

System design is defined as the process of identifying system components like the architecture, modules and components, particular component interfaces and the data that flows in and out of that system (Flynn, 2011). The proposed subscriptions payment platform is mainly aimed at providing a platform for making payments online. This functionality will increase efficiency and makes the purchase of books and subscriptions easier and more convenient. The system being designed will be web based and allow efficient payment confirmations and report generations.

The system will work by firstly allowing clients to apply for subscription to the newspaper to receive deliveries. The client will enter their details which includes physical address, to be used by distributers when making deliveries. The subscriber will then specify their subscription purchase orders. The system will then take them to the PayNow gateway that will allow them to select their payment method and make a transaction. Once the payment has been made, the system must send payment confirmations to both the subscriber and the marketing department. Subscription notifications also need to be sent by the system to clients when new subscriptions are due. The system must also market its books by providing a platform to purchase these publications. Management should be allowed to access reports and make modifications for decision making. The distributers of the newspapers must also be able to retrieve client details for delivery of the subscriptions and books.

4.2.1 Context diagram of the proposed system

Cannon (2015) defines this visual aid as a data flow diagram that is specific to the version of entities and their flow of data. Capturing and communicating the coordination and flow of information between system processes is its functionality.

Key:
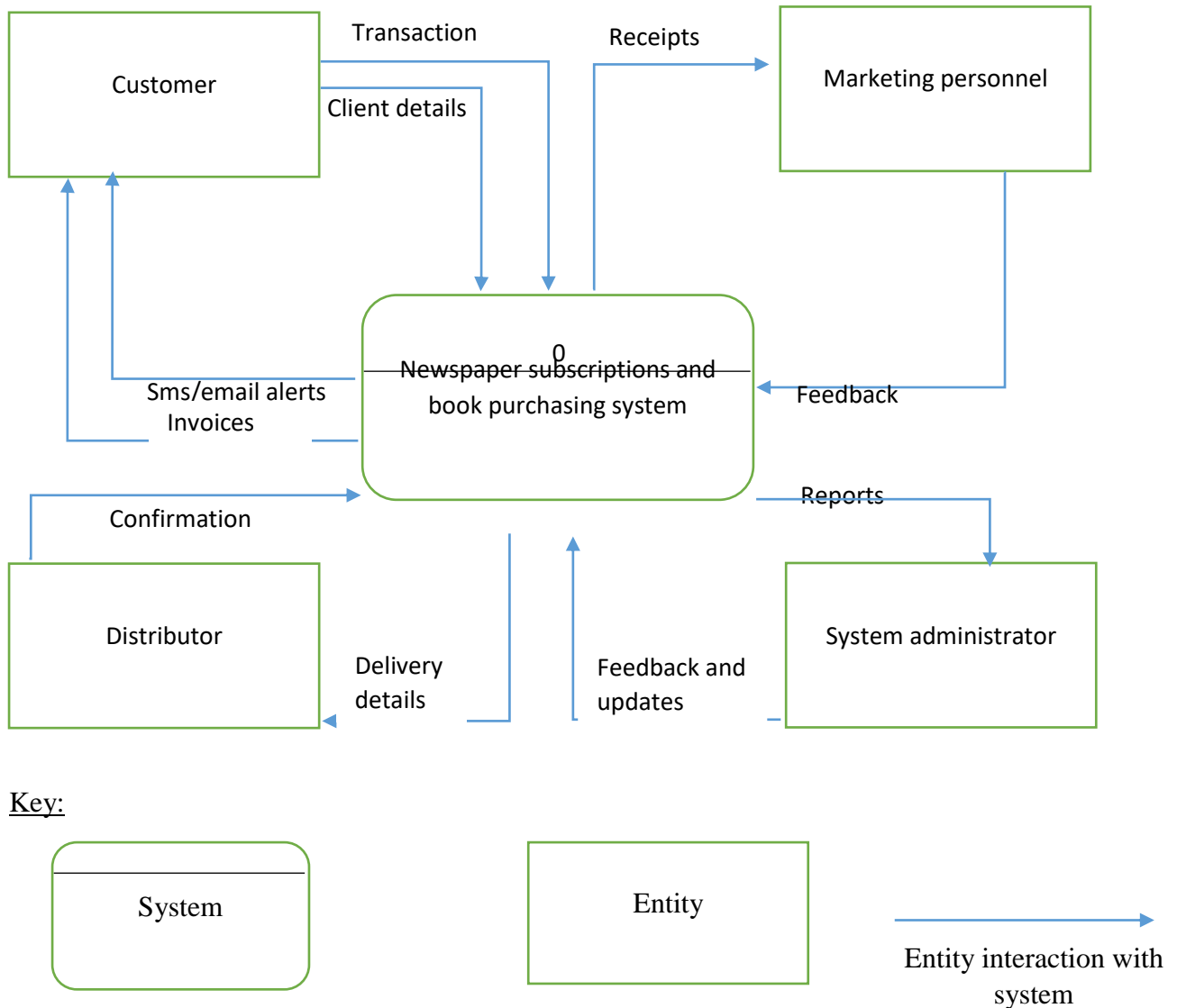
Fig 4. 1 Context diagram for the payment platform

4.2.2 Data flow diagram of the proposed system

This diagram of flowing data in the system is a visual perception that displays information communication direction of data through a structured system (Larman, 2014). It relates processes with their respective input, processes and outputs.

```
                                          0
Customer  ──Client details──▶  ┌──────────────────┐      ┌────┬─────────────────┐
┌──────────┐                   │  Register user   │──────▶│ D0 │  Client details │
│ Customer │                   └──────────────────┘      └────┴─────────────────┘
└──────────┘                            │
    ▲ ▲ │                        Credentials
    │ │ │                                │
    │ │ │                                ▼
    │ │ │                          ┌──────────────────┐      ┌────┬───────────────────┐
    │ │ └──Product selection──────▶│        1         │──────▶│ D1 │ Stock and pricing │
    │ │                            │ Select subscription│     └────┴───────────────────┘
    │ │                            │    and books     │
    │ │                            └──────────────────┘
    │ └──Select method of payment─────────│
    │                              Selection details
    │                                     ▼
    │                              ┌──────────────────┐
    │                              │        2         │
    │                              │  Make payment    │
    │                              └──────────────────┘
    │                                     │
    │     Receive invoice            Purchase
    │                                     │
    │                                     ▼
    └──────────────────────────────┌──────────────────┐
                                    │        3         │
           ┌──Receive client invoice─│    Receive       │
           ▼                        │  confirmations   │
   ┌──────────────┐                 └──────────────────┘
   │  Marketing   │                          │
   │  Personnel   │                   Purchase alert
   └──────────────┘                          │
           │                                 ▼
           │                          ┌──────────────────┐      ┌────┬──────────────┐
           └────Store───────────────▶ │        4         │──────▶│ D2 │ Invoices and │
                                      │  Store invoices  │      │    │   receipts   │
                                      └──────────────────┘      └────┴──────────────┘
                                               │
                                        Payment details
          View reports                         │
           ┌──────────────┐                    ▼
   ┌──────────────┐◀───────│           ┌──────────────────┐      ┌────┬──────────┐
   │   System     │        │           │        5         │──────▶│ D3 │ Reports  │
   │ Administrator│        │           │ Process reports  │      └────┴──────────┘
   └──────────────┘        │           └──────────────────┘
           │                                   │
           │ Subscriber                 Report details
           │ reminders                         │
           │                                   ▼
           └─────────────────────────▶ ┌──────────────────┐
                                       │        6         │
   Sms/email alerts                    │ Send notifications│
                                       └──────────────────┘
                                                │
                                         Via Sms/email
                                                │
                                                ▼
   ┌──────────────┐   Delivery       ┌──────────────────┐
   │  Distributor │◀──addresses──────│        7         │
   └──────────────┘                  │ Send distribution│
                                     │    addresses     │
                                     └──────────────────┘
```
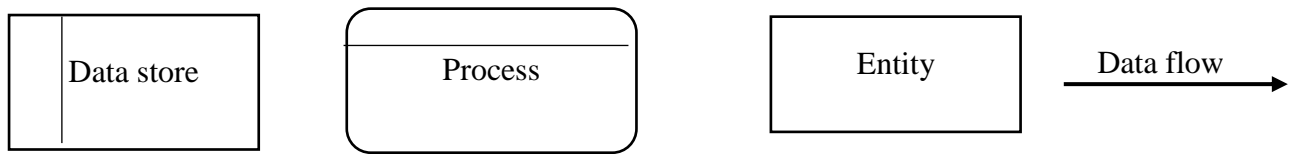
38

Key:

**Fig 4. 2 Data flow diagram for the payment platform**

4.3 Architectural Design

Alexander (2011) defines this type of design as a method that combines all the system components and elements in the goal of achieving the system requirements and objectives. The components and elements are a collection of hardware's, software's and their interfaces.

a) Data server

A data server is a database server comprising of computer software and hardware that delivers services of hosting a system and file storage. Data analysis, storage, data manipulation, archiving, are some of the tasks performed by the data server, using client/server architecture. This is where all client details and system user credentials will be store all together with reports and system mail.
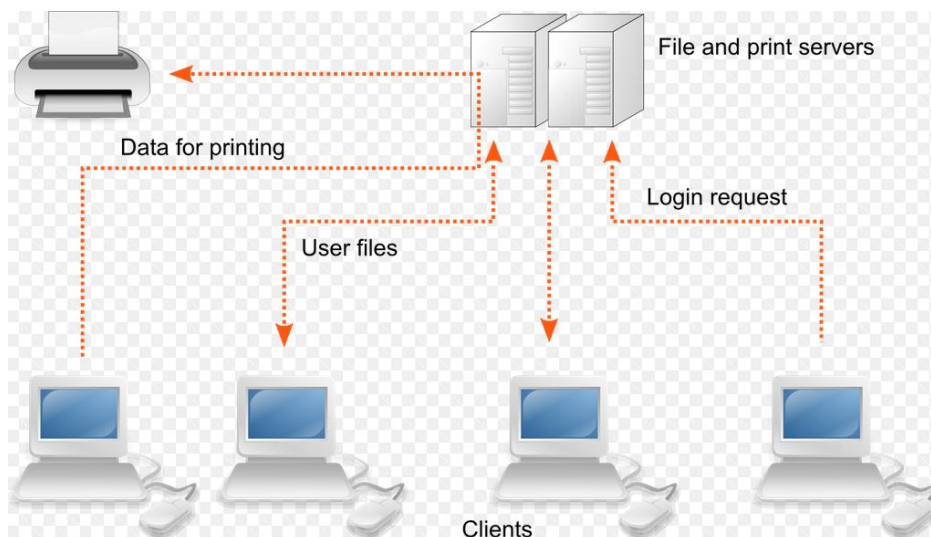
Fig 4. 3 Architectural Design
Source: Alexander (2011)

b) Network connection

The subscriptions payment platform is web based. Therefore a network connection is required for system users to be able to communicate with the system and make use of the online payment facilities. This is found in the network layer of the OSI model and requires internet for this communication of user devices to occur.
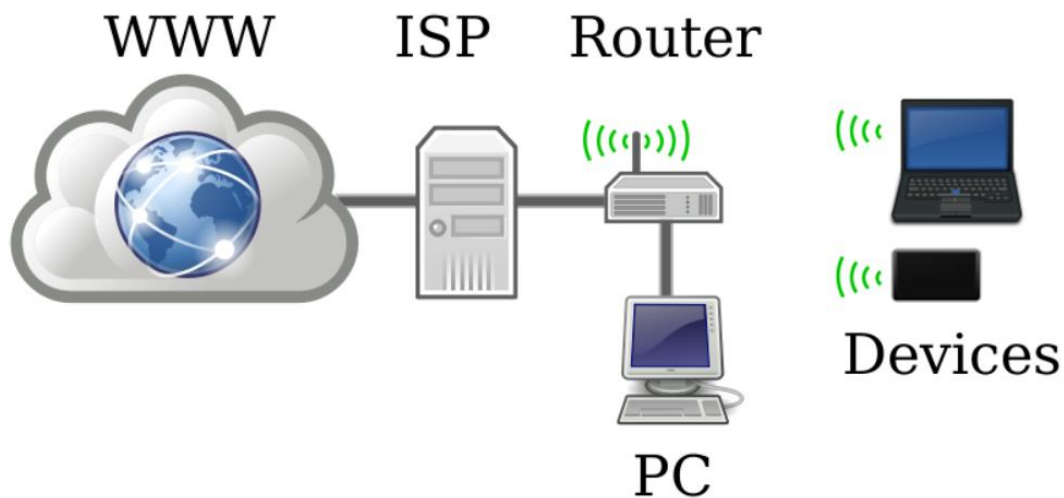
Fig 4. 4 Network Design
Source: Alexander (2011)

4.4 Physical design

Physical design is the processes of turning the system requirements into the actual software, relating to the systems actual input and output processes (Rosenblatt, 2013). It establishes the relationship between all peripheral devices of the users like the networking of servers, computers and printers and how they will be structured. Integration of the system must allow for all and any remote devices with connection to the network and access permission to link with the database server. Networks used include wireless (Wi-Fi) and wired which utilize Ethernet RJ-45 cables with UTP CAT 5 standards that support high network speed connection. Desktop machines and laptops in the marketing department will also be connected to other peripherals in the physical design of the system. The network needs to work in uniform format as a single unit therefore a hub is used to connect network devices. Connection of peripherals will then be confirmed to the server. Another component that will be present is a firewall in the form of software to protect the network from intruders.
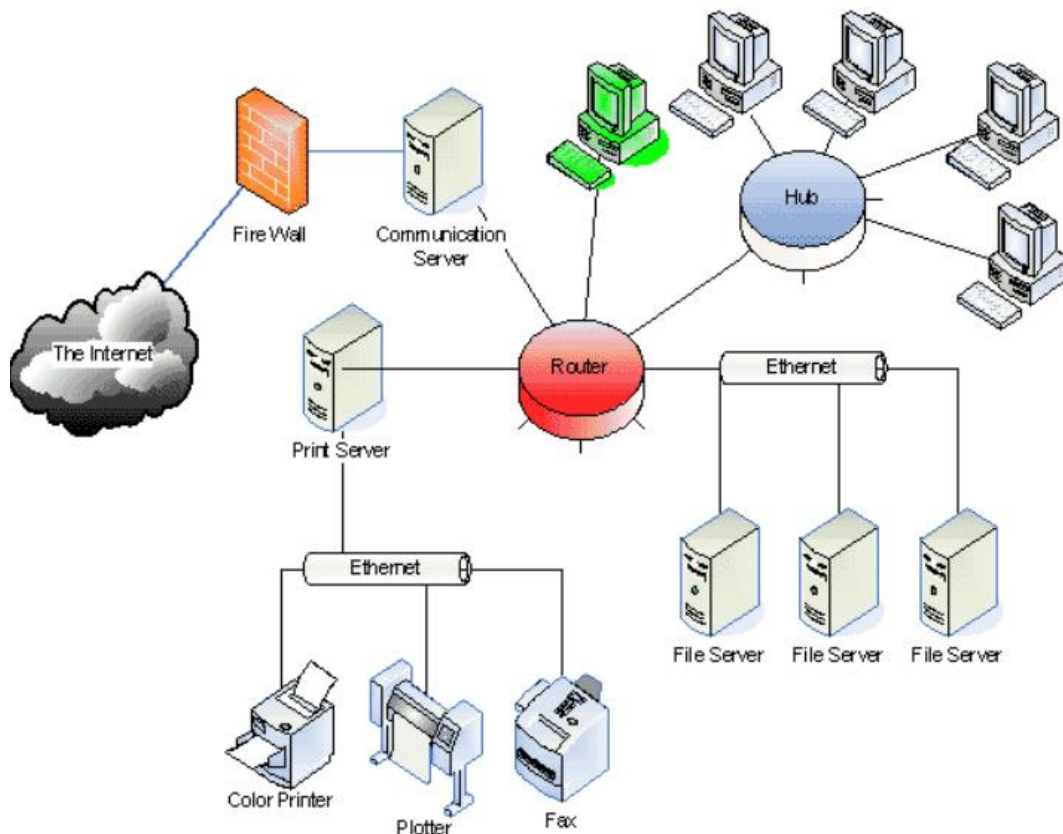
Fig 4. 5 Physical design

Source: Rosenblatt (2013)

4.5 Database design

Alexander (2011) defines the design of database as a procedure of creating a detailed data model of data store. It describes the multiple different elements included in the design of an overall database system. The forms and queries used within the database management system (DBMS) also apply to the overall process design of the database application and not just the base data structures. Therefore identification of information inputted into the data store, mapping of data element connections and displaying a structure that is logical of data is handled by the database design phase. This architecture consists of three levels;

a) External level

This is the client user side of the database. Individual end users access the database through interfaces and manipulate data making changes to stored information. This stored data is manipulated in the form of structures, reports and tables (Morgan, 2010).

b) Conceptual level

This level is also known as the data model and it represents the entire content of the database. Data stores and relationship tables of data within the database are conceptualized here (Morgan, 2010).

c) Internal level

Illustrated in this level is how the database is physically structured on the computer system and how information is actually stored (Silberschatz, 2010).
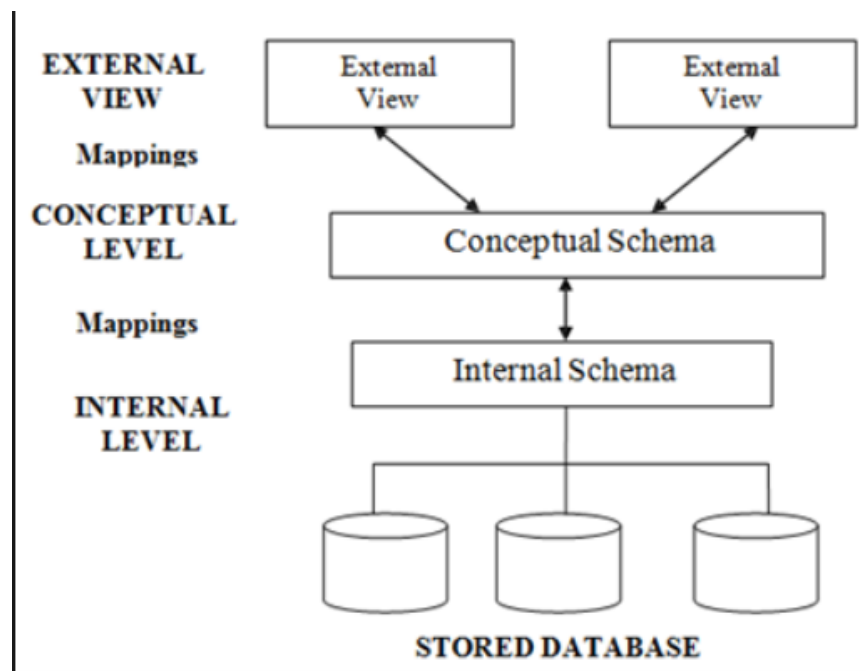
Fig 4. 6 Three level database structure
Source: Morgan (2010)

4.5.1 Data models

Tillmann (2017) defines data models as entities or abstract models that organize data elements and the related links to entity properties. Attributes and cardinality of existing entities are illustrated.

Table 4. 1 Users

Attribute	Datatype(Length)
User_id	Int (10) *Primary Key*
Physical_address	Varchar (30)
Email_address	Varchar (30)
Contact_number	Int (10)
Username	Varchar (30)
Password	Varchar (30)
Access level	Varchar (30)

Table 4. 2 Newspapers

Attribute	**Datatype(Length)**
Newspaper_id	Int(10) *Primary Key*
Newspaper_issue_number	Varchar(100)
Number_of_copies	int(100)
Unit_price	Double(255)

Table 4. 3 Books

Attribute	**Datatype(Length)**
Book_id	Int(10) *Primary Key*
Author	Varchar(30)
Published_date	Date(20)
Book_price	Double(255)

Table 4. 4 Payments

Attribute	Datatype(Length)
Payment_id	Int(10) *Primary Key*
User_id	Int(10) *Foreign Key*
Physical_address	Varchar(30) *Foreign Key*
Email_address	Varchar(30) *Foreign Key*
Contact_number	Int(10) *Foreign Key*
Payment_description	Varchar(255)

Table 4. 5 Subscriptions Alert

Attribute	Datatype(Length)
Alert_id	Int(10) *Primary Key*
Alert_description	Varchar(255)
Date_posted	Date(15)
Unit_price	Double(255) *Foreign Key*

4.5.2 Enhanced Entity Relationship

Singh (2011) defines enhanced entity relationships as models that illustrate high level specifications and complexities of a database. These visual diagrams include super types and sub types which is not the case in general ER diagrams. Relationships present between entities in The Patriots payment platform will be shown by the EER.
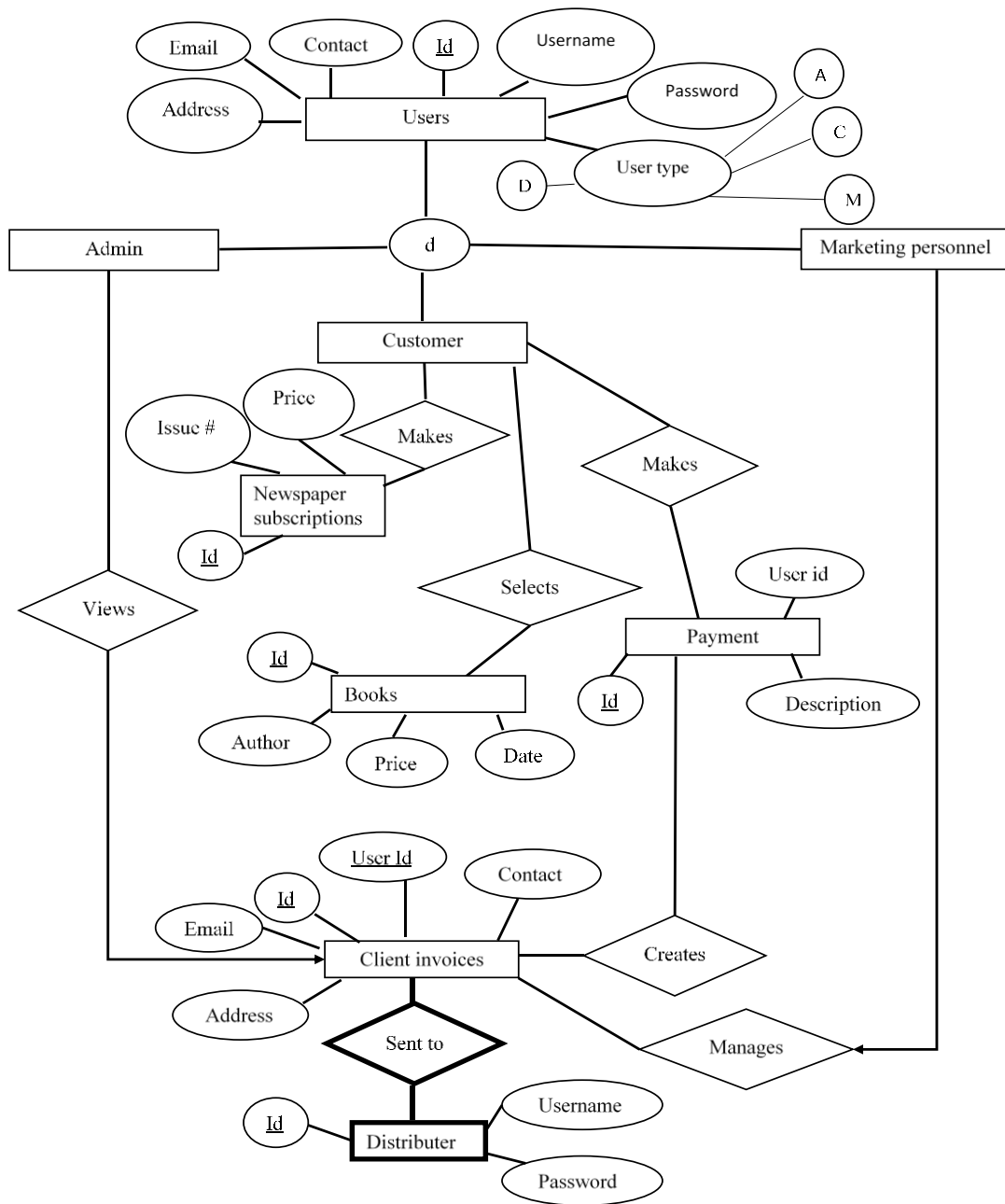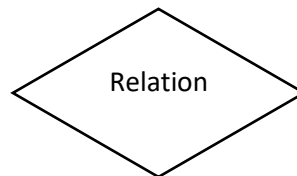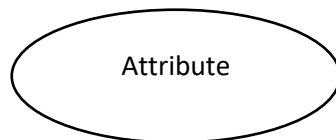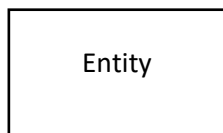
Fig 4. 7 EER of the proposed system

4.6 Program design

Program design is stated by Addison (2012) as design that focuses on developing classes, functions and modules of the system as the main achievement. This mode of design will use visual presentations to express relationships between system modules and entities. These representations include the package, class and sequence diagrams.
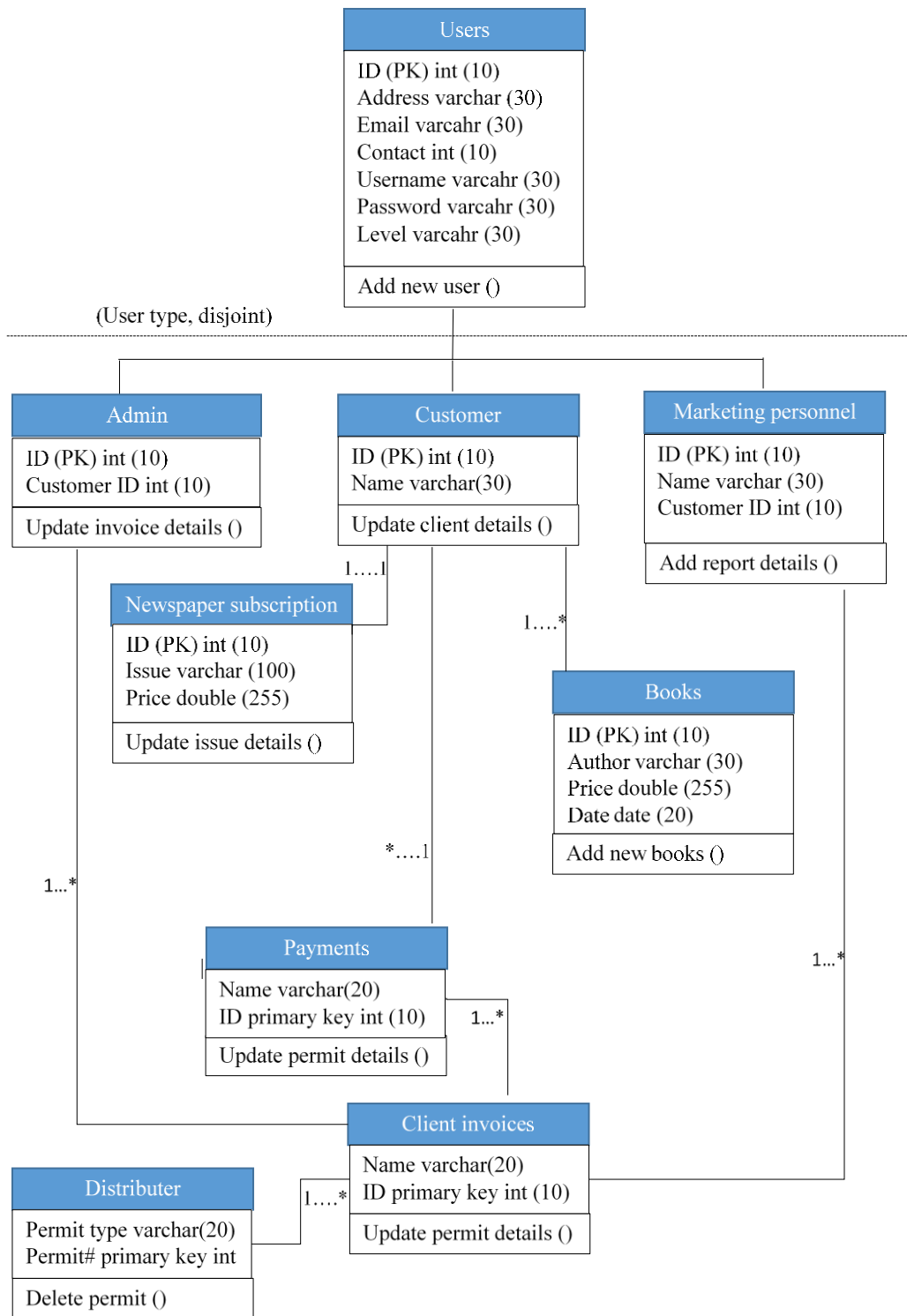
4.6.1 Package diagram

According to Addison (2012), package diagrams are visual illustrations that depict reliance's between packages that make up a model. They use packages that are represented by the different software system layers to represent the software's layered architecture and display collected elements of the unified modeling language (UML).
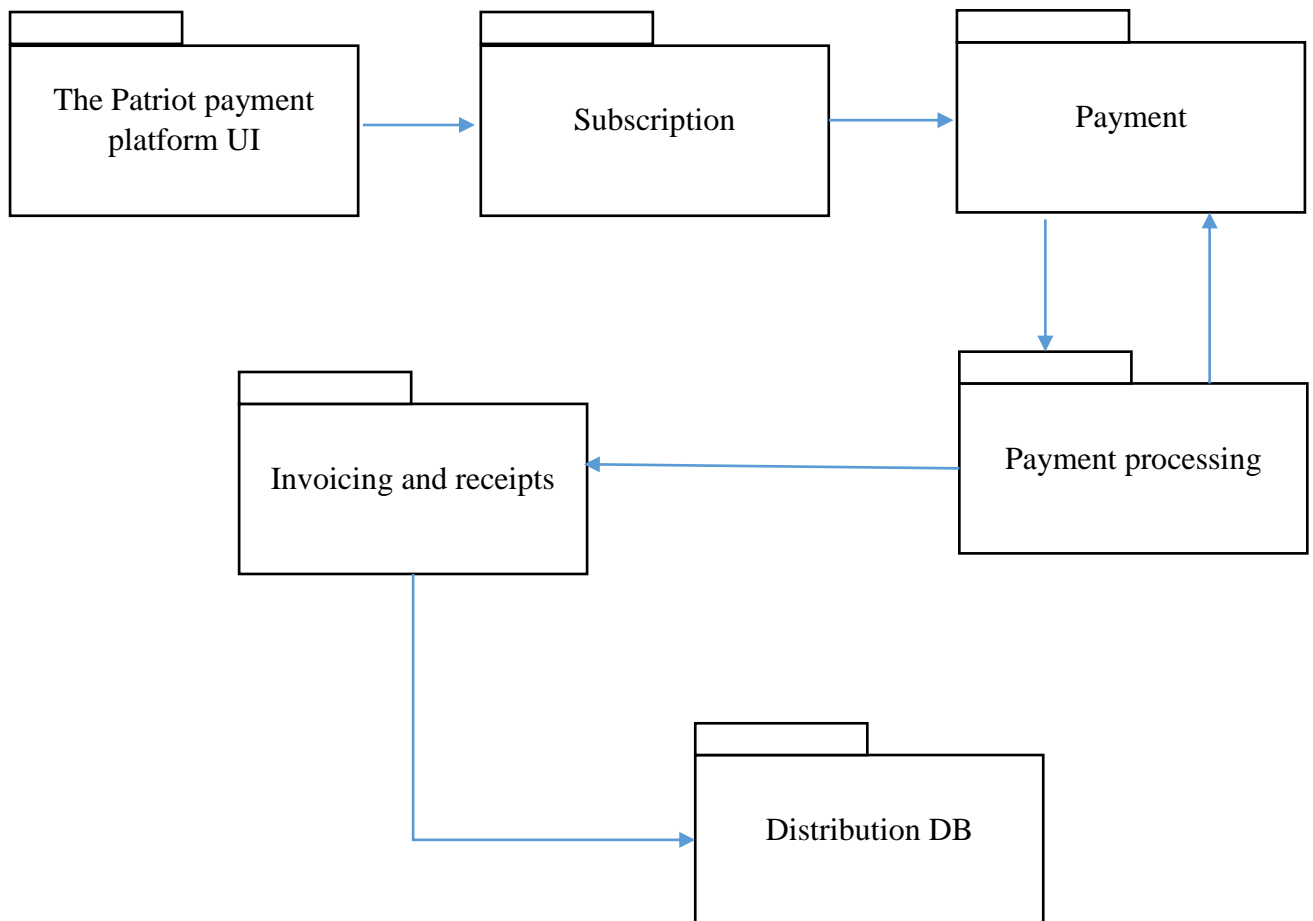
Fig 4. 8 Package Diagram

4.6.2 Class diagram

A class diagram is a form of conceptual diagram that illustrates the systems structure by depicting the attributes, classes, operations and the association between the objects (Bentley and Whiten, 2007). The classes represent the main elements that need to be programmed into the system when data modelling. Subclasses will also be a result of splitting the main classes. An overview of the newspaper subscription and payment processing will be visualized in the class diagram bellow.

Users

ID (PK) int (10)
Address varchar (30)
Email varcahr (30)
Contact int (10)
Username varcahr (30)
Password varcahr (30)
Level varcahr (30)

Add new user ()

(User type, disjoint)

Admin

ID (PK) int (10)
Customer ID int (10)

Update invoice details ()

Customer

ID (PK) int (10)
Name varchar(30)

Update client details ()

1....1

Marketing personnel

ID (PK) int (10)
Name varchar (30)
Customer ID int (10)

Add report details ()

Newspaper subscription

ID (PK) int (10)
Issue varchar (100)
Price double (255)

Update issue details ()

1....*

Books

ID (PK) int (10)
Author varchar (30)
Price double (255)
Date date (20)

Add new books ()

*....1

1...*

Payments

Name varchar(20)
ID primary key int (10)

Update permit details ()

1...*

1...*

Client invoices

Name varchar(20)
ID primary key int (10)

Update permit details ()

Distributer

Permit type varchar(20)
Permit# primary key int

Delete permit ()

1....*

Fig 4. 9 Class diagram for the system

4.6.3 Sequence diagram

Delligatti (2013) defines this diagram as an illustration that depicts the communication between different components of a system with one another. Objects behavior in an existing system and how they interact are some of the features displayed by the sequence diagram.
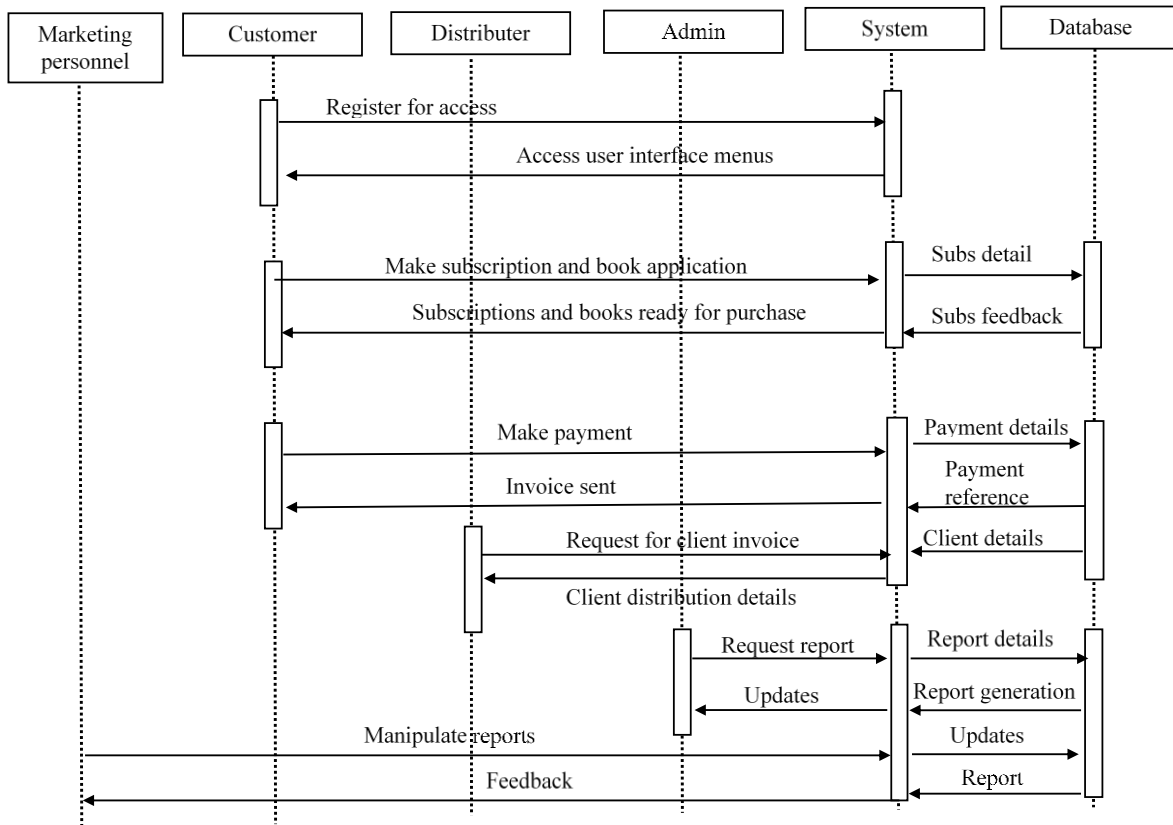
Fig 4. 10 Sequence diagram

4.7 Interface design

Tidwell (2010) defines interface design as the designing and developing of interactive user pages or interfaces for the system users to communicate with the software system through display hardware's of the computer. Experience and usability are to be maximized by the interface design. They work by allowing users to input data into the system in order to engage the system to perform the required functionality and produce the desired output. User friendliness of the interface is a must to enable users to have a clear understanding of the system.

4.7.1 Menu design

Menu design is the graphical user interface of a computer system that the user will view first and it will allow them to navigate through all menus of the system (Puerta, 2012). All elements or functionalities of the system should be provided in this menu to allow easy use or friendliness of the system. The menu will have attributes of the main menu called the sub menus which are contained inside these menus.

4.7.1.1 Main menu

This user interface will display the first form or page that will be viewed by all users of the newspaper subscriptions payment platform.

Fig 4. 11 Main Menu

4.7.1.2 Sub menu's

Fig 4. 12 Sub Menus

4.7.2 Input design

Kendall and Kendall (2013) state that this design allows users to insert information into the system for data capturing and processing. Validation of data upon input allows for integrity of the system and consistency of the database.

Registration input form

This input sub menu form allows customers to register on the system, from the register button on the main menu.

Fig 4. 13 Registration form of the system

Login input form

Users of the system will be prompted to enter their username and password which need to be inputted to match the credentials with those saved in the user's database.

Fig 4. 14 Login form of the system

4.7.3 Output Design

Output design produces processed data obtained initially from data input (Kendall and Kendal, 2013). All systems have input data that is feed into the user interface. So it is only practical that there is output data as well. Output produced by processes of the systems functionality include report generation and all other forms.

Subscription output

Subscriptions processed by the customer need to be viewed in detailed form to allow for transfer confirmation of the subscriber.

Fig 4. 15 Subscriptions output form of the system

Sms alert reports

Users will receive sms's of subscription notifications and payment confirmations that will serve as reports

Patriotic ZImpapers client!

Your subscription is due by the 28/11/2018. Please subscribe to enjoy services.
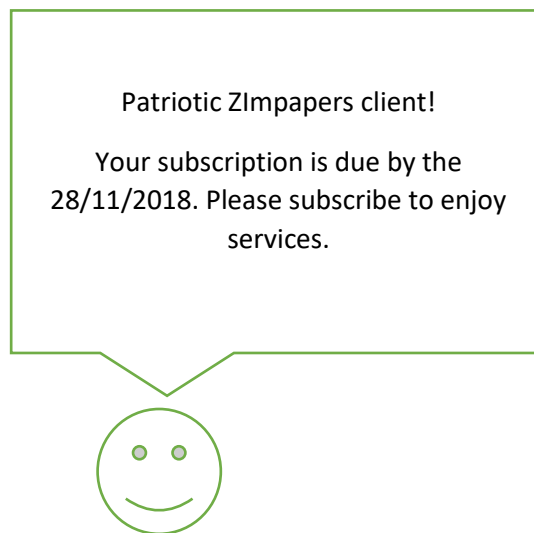
Fig 4. 16 Sms alert report of the system

4.8 Pseudo Code

Pseudo code is the programming code used in a system, explained in simple ordinary language that is readable and easy to understand for all system users (Bard, 2018). Pseudo code for the newspaper subscription payment platform will be written below.

Registration

Enter user details

If credentials are valid THEN

    {

Add user to system database

}

Else invalid user details

}

User Log in

Enter log in details

If username and password are correct THEN

{

Go to system user main page

}
Else invalid login details
}
}

Subscription Payment

Select preferred subscription

Select payment method

If payment is successful

{

Send payment confirmation sms/email to user

}

Else

{

Show transaction failed dialogue

}

Book purchasing process

Select preferred books

If books available in database

{

Add to purchase total amount

}

Else

{

Book is unavailable for purchase

}

4.9 Security Design

According to Krutz (2011), security design is the application of modules like adherence, testing and authentication in the development process of a system to prevent malicious activities or unauthorized access in the system.

4.9.1 Physical security

Fennelly (2012) defines physical security as the design or methods used in protection or shielding of tangible elements of the system from damage or harm. The physical threats faced by hardware and physical elements of the system include natural disasters like earthquakes, floods and fires. Included as threats are thieves or general intruders to the system. Docking stations will be used to secure computers at the patriot from any physical threats, and provision of fire extinguishers near offices.

4.9.2 Network security

Network security involves network administrative tactics to monitor network traffic, network access through IP address tracking and the right use of the system network based on company policies (White, 2014). Software's like firewalls, antivirus and network monitoring tools like wireshark will be used by the networking administrator to manage network security threats.

4.9.3 Operational Security

According to White (2014), this security risk management procedure looks to protect the systems integrity in the long run from occasional system failures and untimely or unexpected lags in the use of the system. Backup file servers will be implemented in the marketing department to ensure that all records of subscriptions and clients are protected from system operational failures.

4.10 Conclusion

All aspects of design have been touched in this design phase chapter. A lot of visual representations have been used to give clear virtual meaning of the system that is to be designed and later implemented in the marketing department of The Patriot. All user interfaces were designed and security design was drafted. This implementation will be explained in the next and final chapter.

CHAPTER FIVE: IMPLEMENTATION

5.1 Introduction

This fifth and final chapter is the implementation phase of the system. Implementation is the phase whereby the completed, functional system is installed into the working environment of the organisation. At this point, all designs of the system have been created and all that is left is to maintain the system so that it keeps running. User education in the form of training will also be focused in the system together with steps of getting the system up and running.

5.2 Coding

Coding is the process of creating the system foundation by designing the internal structures and architecture of the system through a programming language (Stueben, 2018). Development of the system was done through the use of a server-side scripting language called PHP, java script, CSS and html. Databases were also created and designed using a relational database management system called MySQL.

5.3 Testing

According to Anirban (2015), testing is mainly focused around quality of the system intended to be implemented, and how it will perform for stakeholders. The system is evaluated against previously gathered user requirements by a specialist technician to implement a well-developed system for the users. Validity and verification of the system is carried out in this testing process. Objectives of the newspaper payment platform were verified and evaluated against the performance of the designed system to provide information weather the functionality and responsiveness met the requirements.

5.3.1 Unit testing

Engel (2013) defines unit testing as a testing process whereby a system is divided into unit components and each unit is evaluated against its required function in a parallel manner. The main goal of this testing method is to tackle modules of the system one by one and eliminate any problems found in the testing process as each component is evaluated. Unit testing has the advantage of identifying issues in the system and implementing solutions before the system is implemented into the organisation for use. Some of the modules tested for the payment platform include the user registration, user login and subscription application components among other units.
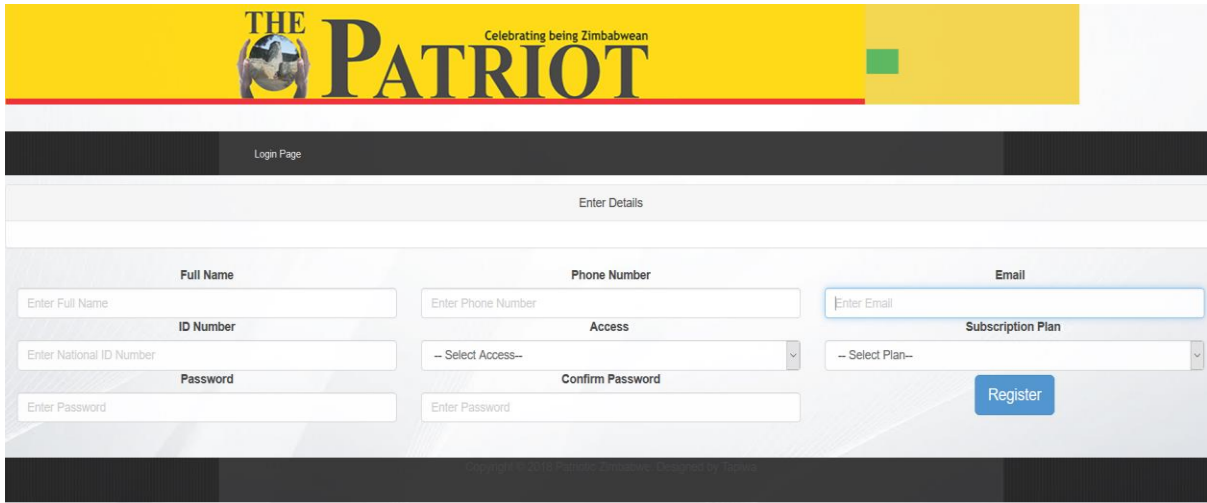
Fig 5. 1 Client registration

Unit testing was used in the client registration form to test if the system would allow clients to enter their details before accessing the system.

5.3.2 White box testing

White box testing is a method used to reveal the internal structures of a code to the analyst or tester before the software can be implemented (Baumeister and Weber, 2013). Tests are thoroughly carried out and analysed to reveal the internal structure of The Patriots payment platform source code by measuring requirements against any errors found.

```php
<?php
        if(isset($_POST["login"]))
        {

            include 'dbcon.php';
            $username=$_POST["username"];
            $password=$_POST["password"];

        $query = $conn->query("SELECT * from users where mail='$username' AND password = '$password' and status='Active'") or die(mysqli_error());
        $rows = $query->num_rows;
        $fetch = $query->fetch_array();

        if ($rows == 0)
                    {
echo("<SCRIPT LANGUAGE='JavaScript'> window.alert('Wrong Credentials Or Your Suspended, Try Again')
        javascript:history.go(-1)
            </SCRIPT>");
                }
```

Fig 5. 2 Login source code test

Code of the login details were tested to analyse if credentials would be retrieved from the database.

5.3.2.1 Advantages

- ❖ White box testing is used to strengthen system security
- ❖ It provides a huge platform for improving design and usability
- ❖ This testing method reveals error codes efficiently

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❖ System source code will be optimized

5.3.2.2 Disadvantages

❖ The tester needs to have high level programming knowledge

❖ Carrying out tests is expensive as code experts need to be obtained

5.3.3 Black box testing

According to Baumeister and Weber (2013), unlike white box testing this method focuses on optimizing the systems front end functionalities without knowledge of the internal structure of code. User interfaces will be used by the tester to input data, observe functionality and view output reports to be compared against requirements in a parallel manner. No source code or knowledge of code is required.
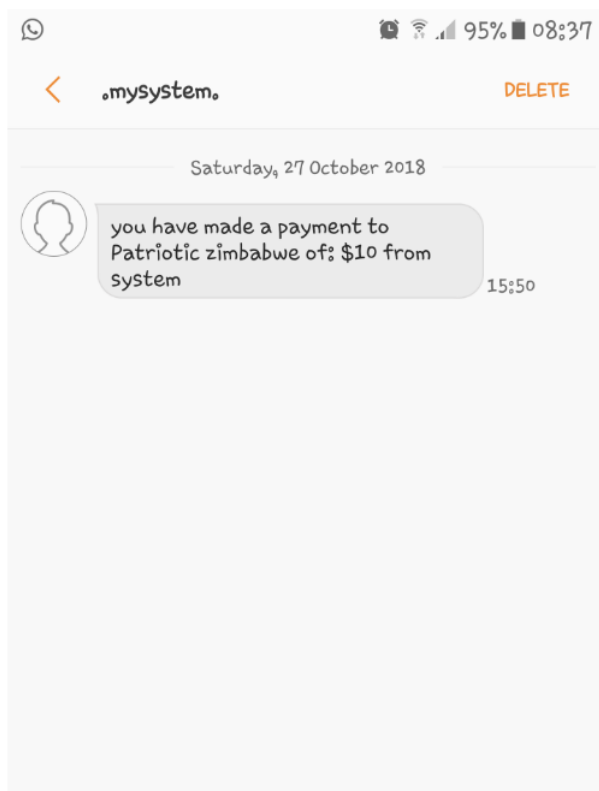
Fig 5. 3 Payment confirmation sms

Testing of automatic notification of payments was done via sms.

5.3.3.1 Advantages

❖ Programming knowledge is not a requirement in this testing method

❖ Black box testing is less expensive as coding experts are not needed

❖ This method is time efficient for systems with broad modules

5.3.3.2 Disadvantages

❖ Internal errors of the system code cannot be revealed in the black box testing

❖ Lack of knowledge of internal structure coding leaves the system with untested module areas

5.3.4 Acceptance testing

Amirian (2015) states that acceptance testing is done by system users to determine if the designed system is ready to be implemented into the organisations working environment. The testing can only be carried out and given to the intended users after all flaws and errors have been identified and dealt with. In the acceptance testing process the payment platform admin, marketing personnel's and selected subscribers will be given access to the system to test their documented requirements against functionality and see if the system passes the test. If the test is successful, the system will be deployed to the rest of the users. If not, more designing and testing is done before implementation. Below are the different acceptance testing forms;

a) Alpha testing

Alpha testing is the technical testing field of the system that is done to identify and fix bugs and errors found (Kumar, 2016). This form of acceptance testing is done by programming experts within the organisation and not the system users. The method uses test cycles based on system crashes, errors found and additions to functionality modules of the system. It is a form of accepting software internally before it is sent to beta testing.

```php
$url = "https://www.paynow.co.zw/interface/initiatetransaction";
$values = array('id'=>'6276',
            'reference'=>''.$ref,
            'amount'=>''.$number,
            'additionalinfo'=>''.$info,
            'returnurl'=>'http://localhost:82/PatrioticZimbabwe/update.php?ref='.$ref,
            'resulturl'=>'http://localhost:82/PatrioticZimbabwe/update.php?ref='.$ref,
            'authemail'=>''.$email,
            'status'=>'testing'
        );
```
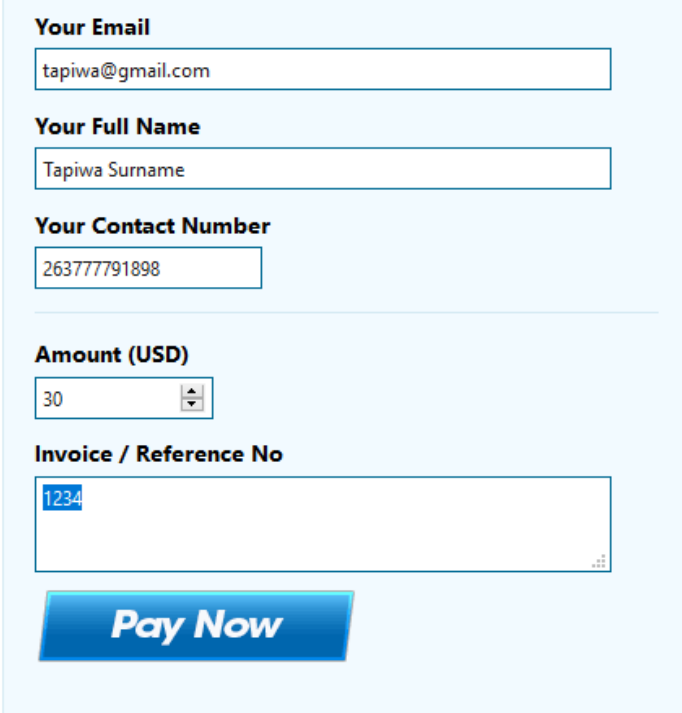
Fig 5. 4 Paynow integration test

Testing of source code was done for payment integration to paynow to check for errors and bugs.

b) Beta testing

Engel (2013) defines beta testing as a form of acceptance testing done externally after performing alpha testing. Since the system that has been designed and developed is intended

for the end users to make use of its functionality, participation of the system users is required to complete the acceptance testing process. Testers will have the task of identifying and selecting a minimal but standard number of users. The selected users will give their feedback on the system according to their requirements. The result of using beta testing is a satisfactory system that pleases its end users in the organisations business environment. Testing is easy as users don't need to have any idea of source code. It is just testing their everyday use.

Fig 5. 5 Paynow detail validation test

Functionality of the systems payment was tested by allowing users to enter their payment details in the paynow interface.

c) Validation

Kumar (2016) views validation as a testing method that puts its focal point on integrity and security of the system. This form of acceptance testing checks the input of the user to make sure that it is accepted by the system legally. Data input needs to be validated to ensure that correct information and its regulated data format is constant to protect integrity of the entire system. An example in the subscriptions payment platform is on the contact details field. Users validation needs to be implemented to ensure that data input of that field correspond with the required description.
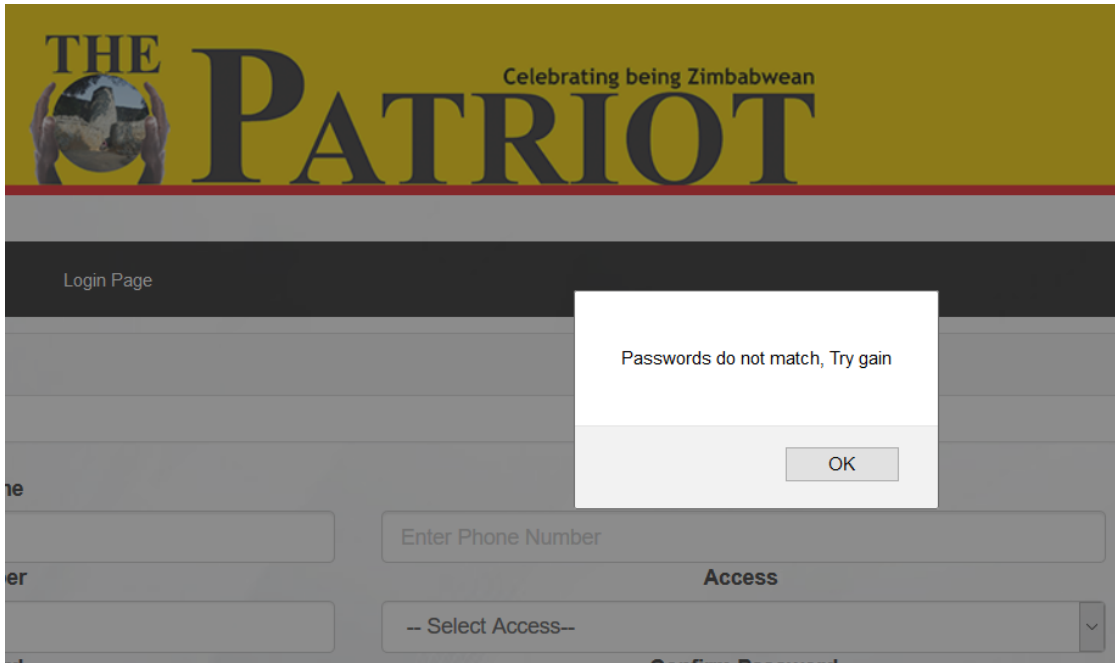
Fig 5. 6 Password validation on the registration form

Password validation was tested to analyse if credentials entered matched those store in the database.

d) Verification

Verification is a test done to inspect the functionality of the system against its stated rules or standards (Engel, 2013). The system is verified to analyze if syntax was followed in the development process. Verification can be tested in the case of all input in the proposed system. Sensitive information is entered into the system like credentials and payment processing. So verification is a required form of test to authenticate user data.
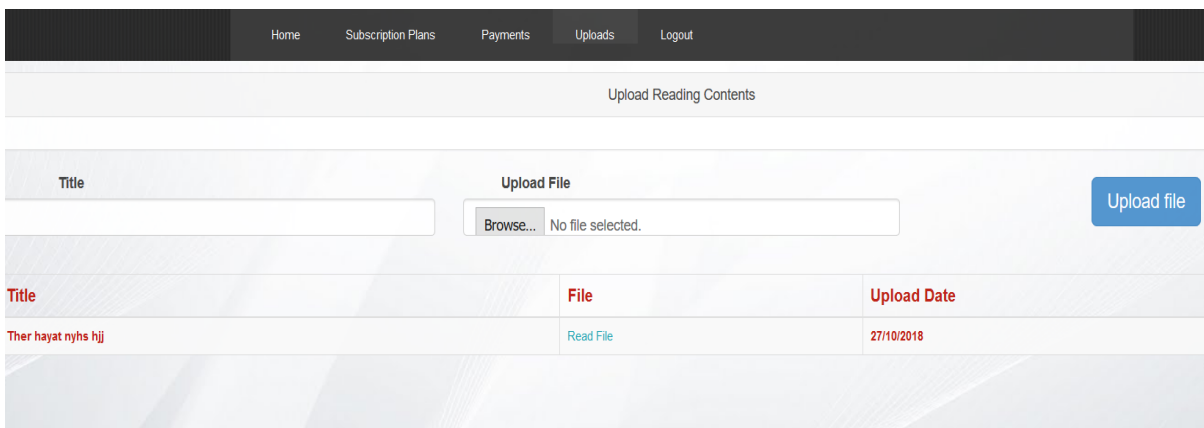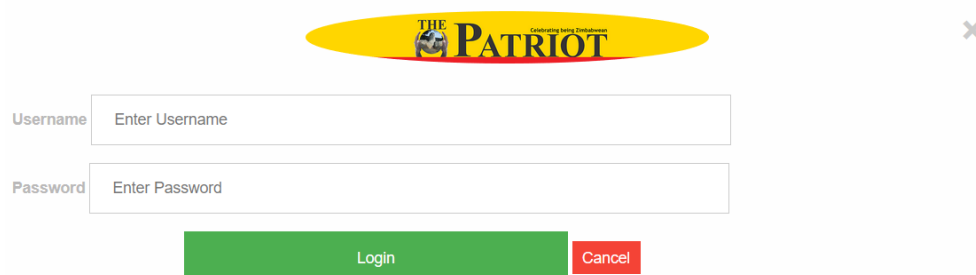

Fig 5. 7 Upload book content on the marketing platform

Uploads of reading content was tested to verify marketed books and content in the system.

5.3.5 Security testing

According to Kostelac (2013), security testing is an analysis of the system to keep integrity and vulnerability issues in check. Security levels of the system are trialed and tested to limit privacy and access of the organisations databases and stores to those with access to view or make changes to the system only. A major functionality of all systems is security. Therefore this test is vital to deem the payment platform fit to be deployed into The Patriots work space.

Testing was done for The Patriots subscriptions payment platform to prompt users to enter credentials into the login page. When details entered were a match to those save in the database store of the system, then and only then were users able to access the system based on their user accounts or access levels. Incorrect credentials entered refused users any access and locked them out, passing the security test. Wrong details entered in the provided fields would prompt the system to regard the user as an intruder, promoting integrity of the system.


Fig 5. 8 Login form

Security tests were done on the login form to give access only to users with authority to do so.

a) Confidentiality

Information is only made a priority to users with the right credentials to gain access to the system, enhancing confidentiality of data (Pries and Quigly, 2016). Use of credentials such as email addresses, usernames and passwords has been utilised by the payment platform to maintain information flowing in the system from being accessed by the wrong users. System functionality was developed to allow users to first register and create their customer subscription accounts before they gain access to the system. Each user is confined to their own account. Therefore no other subscriber can view details and payments of another.
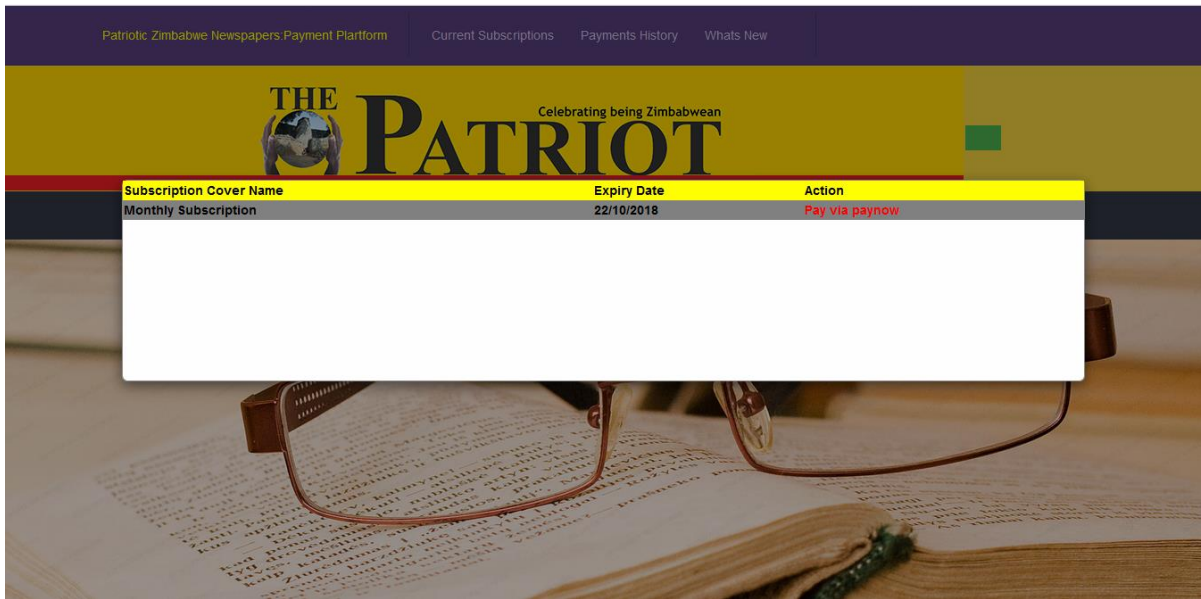
Fig 5. 9 Client account display

Confidentiality testing of individual accounts was done for customers to allow them to be the only ones to view their payment details.

b) Integrity

Integrity focuses around data stores or database design. It is the ability of the system to test entered data and validate it against that in the data store. Retrieval and processing of data was tested to prove the consistency of the subscription payment platform in its system life-cycle.

c) Authentication

Authentication is defined as the provision of user credentials to gain access to a systems access level (Pries and Quigly, 2016). Credentials used to gain access to the system are usernames and passwords that are stored in the database and get verified by the system. The system administrator, marketing personnel, subscribers and the marketing manager all have different login details that they use to enter into the user interface and authorize their entrance into the system.
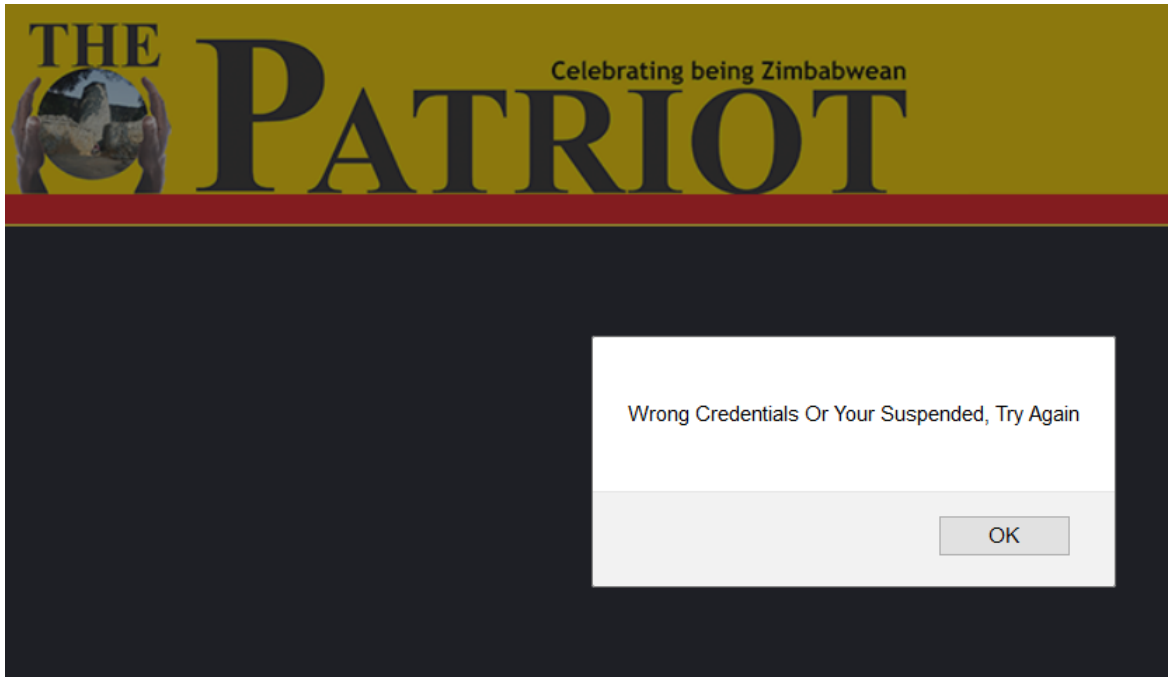
Fig 5. 10 User authentication

Testing on the user authentication as done to block or grant access to verified system users.

d) Availability

Bursi and Wagg (2009) state that a system should perform responsive duties by making data readily available when it is due. Time should not be a factor. When information is requested it should be provided by the payment platform immediately. Customers were able to make their desired subscription and book purchases at their own convenient time. The PayNow payment platform was also available at all times to facilitate purchases.

Reference ID	Amount	Payment Date
29277135X07		27/10/2018
29277135X07		27/10/2018
29277135X07	10	27/10/2018
29277135X07	10	27/10/2018
29277135X07	10	27/10/2018
29277135X07	10	27/10/2018
29277135X07	10	27/10/2018

Fig 5. 11 Client information reports of payments

Testing was done to provide readily available data to verified users with access to that very information. Admin was able to view all payments made.

e) Authorization

Functionality resources of the system are only allocated to users with authorization to those specific functionalities (Engel, 2013). Not all system users will deal with the same data content. Marketing managers will access system reports their end while subscribers will be able to utilize the payments and purchasing functionality of the system.

5.4 Installation

Installation is defined by Somerville (2016) as the step by step procedures taken to implement the tried and tested system into the business atmosphere. Text documented above in this chapter has indicated that coding and testing has been analyzed and completed. Therefore the next step is to install the system into The Patriots marketing department for use. Execution of the payment platform needs to be planned and implemented accordingly in a technically stable manner. The system will need to be set up and embedded into the system server to allow remote access to users with authority to do so. Developer environments must first be introduced to the computer systems at The Patriot to allow certain modules and components in the system to install and run accurately.

5.4.1 Steps for application software installation
- ❖ Macromedia Dreamweaver developer environment and the MySQL server were installed to support the system.
- ❖ The zipped system files were transferred into the server computers in the marketing department using an external HDD storage device.
- ❖ Site of the payment platform system was then configured and web domains created with Webdev.
- ❖ Database of the system was imported into the file server to connect sources of data.
- ❖ Network setup was implemented to connect end user computers to the system by letting the marketing team connect to the telone ADSL connection.
- ❖ A quick test was finally carried out to see if installation was a success.

5.4.2 Operating environment

The working space that the system will be put to use in is the operating environment (Engel, 2013). Functionality of the system is determined by this working environment to provide the best system use out of it. These functionality problems are determined by the system equipment and peripherals surrounding the payment platform in the work space. Efficient machines were made available and sufficient in the marketing department as shown in the planning phase. Standard HP core i5 computers and other peripheral devices were acquired to give the system an excellent environment to work in.

5.4.3 User training

This the technique or process of passing down knowledge of system use to the intended individuals that will make use of the software being implemented (Somerville, 2016). System functionality is introduced to the different users of the payment platform and how they can make use of the specified information made available to them.

5.4.3.1 Training schedule

Cannon (2015) states that training schedules are a necessary planning technique that allows the developer to group different system users and allocate them time resources to familiarize with the system and its aspects. Training is separated into activities that will be allocated a certain time period for marketing, administration and subscribers to get to know the platform being provided.

Table 5. 1 Training schedule

System user	Description	Duration
Customer	Register to the system, make subscriptions and make book purchases.	2
Administrator and marketing personnel	Analysis of user information and management of available subscriptions and books. Conduct generation of reports and access client details.	3
Management	Accessing reports and giving feedback.	1
Distributer	View reports on subscribed clients and their delivery locations.	2

5.4.3.2 Module level training

According to Rosenblatt (2013), this form of training involves different modules that require separate training to be done on all the different users of the system. It is impractical to require users to learn the entire components of a system including the functionalities they do not need. The marketing manager does not need to be trained on how to make subscriptions and payments to the system as their functionalities are based around reports and their client detail base. Client subscribers where the users trained to utilize this module. The administrator will focus on the module of running analysis and maintenance of users in the system.

5.4.3.3 System level training

System level training measures system functionality against development procedures carried out to test if the specified needs of the users are met (Rosenblatt, 2013).

5.4.4 System changeover

System changeover involves amending the old system, which is the one currently being used and overriding it with the new one (McDermid, 2013). The current system being used in the marketing department at The Patriot is manual and needs to be changed immediately with the new computerised payment platform. Implementation of the system must be done in a changeover ready environment. The changeover methods analysed below include the phased, pilot, direct and parallel changeovers.

5.4.5 Direct changeover

McDermid (2013) states that this form of changeover, also known literally as immediate changeover involves replacing the entire system completely with the new one. This is the out with the old, in with the new technique. The essence of the direct changeover approach is to drop the old system functional elements entirely and adopt the updated version of the system. New modules will override the current ones to implement the payment platform in the marketing environment.
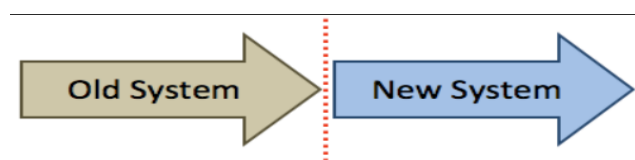
Fig 5. 12 Direct Changeover

Source: McDermid (2013)

5.4.5.1 Advantages

- ❖ Since one system is removed and another is then implemented, there is no duplication of information
- ❖ It is the cheapest form of system implementation
- ❖ The new payment platform can be installed whatever time is convenient for the marketing department

5.4.5.2 Disadvantages

- ❖ In the case that the subscriptions platform fails, there is no architecture to fall back on
- ❖ Management, clients and the marketing team will have limited time to familiarize with the system

5.4.6 Parallel changeover

Both the current and the proposed system are run together at the same time in parallel changeover (Stephens, 2015). This is the side by side technique. The manual system of customers coming down to the office to pay subscriptions and payments will be run together with the computerized system to assess the functionality of both the systems.
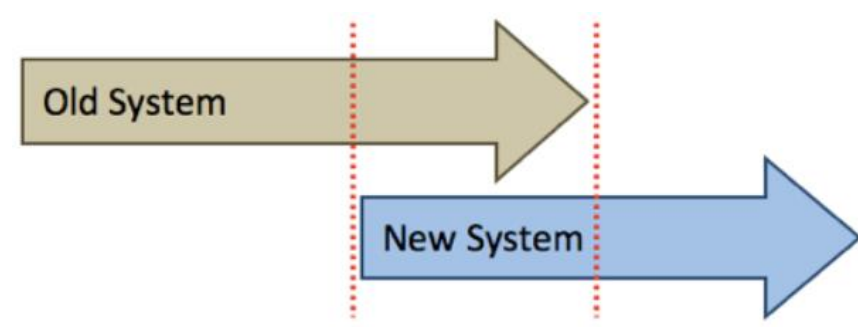
Fig 5. 13 Parallel Changeover

Source: Stephens (2015)

5.4.6.1 Advantages

- ❖ In case of failures or flaws in the new system, The Patriot can revert to the old one
- ❖ Marketing team, management and clients can get used to the payment platform gradually by comparing the old with the new

5.4.6.2 Disadvantages

- ❖ The cost to run both systems is immense
- ❖ Since one system is computerized and the other is more manual, data duplication and recapturing maybe an issue as there is no sync

5.4.7 Pilot changeover

According to Kostelac (2013), this method of pilot changeover is mainly used by branched organisations, by implementing the system in a section or branch of the organization before installing it into the entire company. Installation is done in one section first for testing purposes before it is completely utilized in the full business environment.
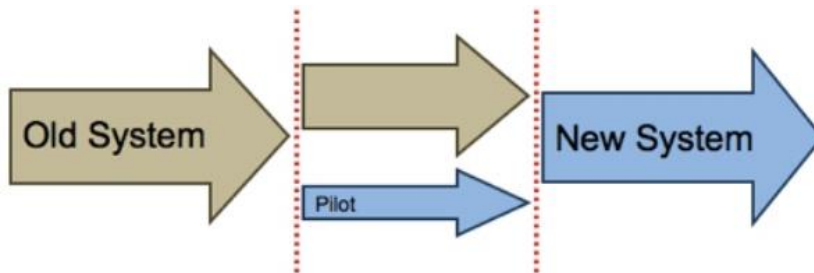
Fig 5. 14 Pilot Changeover

Source: Kostelac (2013)

5.4.7.1 Advantages

- ❖ In the case of system failure, it will only affect a small section or branch of the orgaisation and not entire operations
- ❖ Once implementation at the piloted branch is successful, staff can train others

5.4.7.2 Disadvantages

- ❖ This method is only for large organisations with many branches, of which The Patriot is not
- ❖ Pilot changeover requires a long period of time to eventually implement in the entire organisation
- ❖ If failure happens at the piloted department, data may be lost

5.4.8 Phased changeover

Phased changeover is a module based changeover that divides the system implementation into stages and installs one stage at a time before the whole system is converted from old to new (Rosenblatt, 2013). This method takes an extremely long time to complete implementation and is basically used for large organisations with big data stores they wish to protect in case of failure.
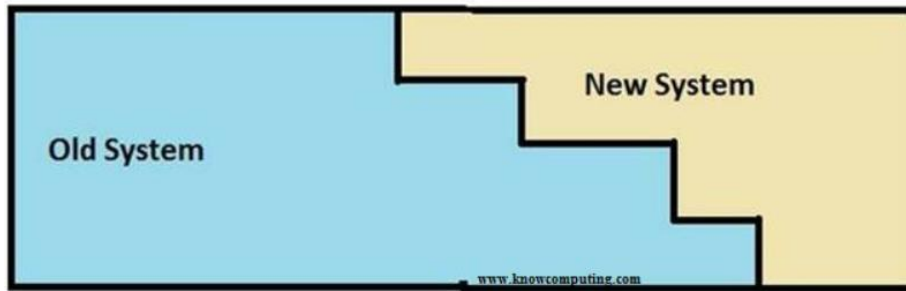
Fig 5. 15 Phased Changeover

Source: Rosenblatt (2013)

5.4.8.1 Advantages

- ❖ Phases ensure that failure of installation will not affect the organisations entire system
- ❖ Knowledge can be collected on the proceedings of the phase implementation results to perfect the following stages and avoid repetition of mistakes
- ❖ System user can be trained of the system stage by stage to perfect their user experience

5.4.8.2 Disadvantages

- ❖ Performance of the system take a great period of time to measure as functionality and modules are introduced stage by stage
- ❖ Phased changeover takes an long time to fully implement the new system into the working environment and do away with the old one

5.4.9 Recommended changeover strategy

All aspects and strategies of system changeover where identified analyzed, contrasted and compared in the research. Parallel changeover was revealed as the best option of changeover to utilize from analysis carried out. The Patriot is a small newspaper company with no branches and limited department segments. So both the phased and pilot changeover did not seem too practical for implementation. Currently used in the organisation is a manual system that is not computerized or data centralised. So running both system parallel side by side would allow to measure which other modules may need to be amended to the system before it is fully installed. Marketing personnel, management and subscribers will also be able to benefit from this changeover through training.

5.5 Maintenance

Maintenance is the continuous analysis and perfections of the system that is done regularly after its implementation in the working environment (Kendall and Kendal, 2013). Integrity and functionality of the system is always continuously at risk over time during the life cycle of a system. So module upgrades and loophole debugging is necessary to keep the users satisfied with their system requirements. Time schedules need to be allocated for maintenance during periods that do not clash with the operation times of the system. So maintenance will be carried out during the weekends when there is no one at the office. Maintenance has four strategies that will be stated below.

5.5.1 Corrective maintenance

O'Brien and Maracas (2012) define corrective maintenance as a fixing and debugging strategy that focuses on identifying and rectifying problem errors found within the systems internal structure. System users are part of the correction process as errors are identified through their functionality analysis and feedback. Objectives of the system are maintained but more improved functions are placed into the system to maintain integrity.

5.5.2 Adaptive maintenance

This strategy is called adaptive because the system adapts to the working environment and requires enhancements or upgrades as time goes by in the system life cycle (Koskela, 2013). Due to ever changing business values and goals, upgrades and amendments will need to be made to the system in the future. As the newspaper at the patriot is still small and on the rise, databases of users and papers must be adjusted when required.

5.5.3 Perfective maintenance

The strategy of perfective maintenance is carried out to rectify identified functionality of the system that was not entirely completed when installed (Somerville, 2016). Though the system may be functioning correctly, there are some modules within the structure of the system that per not perfected. Validation and verification are some of the modules that will need continuous perfective maintenance to protect the payment platform from unauthorized users.

5.5.4 Preventative maintenance

Steps and procedures are performed on the system to prevent future system integrity issues or to prevent the user requirements being met in the future (Somerville, 2016). Analysis of the system is carried out to identify problems or errors that are not an issue now but may cause issues in the near future. So maintenance is done before that happens.

5.5.5 Recommended maintenance strategy

The best recommended strategy of maintenance is the adaptive method. As the working environment in the marketing department of The Patriot adjusts and changes, so should user requirements to meet with objectives of the system. One factor is that of the economy and how it is constantly unstable at the moment. New payment options may also need to be integrated into the system in the future. This will be done through system maintenance.

5.6 Recommendations for future/further development

Research has been carried out throughout and the system has been cleared as a viable project to implement into the working environment of the marketing department at The Patriot. Due to the cashless society that Zimbabweans live in and the business environment the system has been implemented in, more methods of payment may need to be integrated into the system to meet different user need and requirements. The system can also be utilized for promoting more products of the organisation like payments of advertising space in the newspaper and on the website.

5.7 Conclusion

Design of the system led to developers coding the system by manipulating source code to make the functionality of the project feasible. This then lead to the testing of the system which included many forms of verification and system validation. Installation followed testing where the payment platform was implemented using the parallel strategy. This then led to the maintenance of the system to monitor for future errors and problems. Development of the subscriptions payment platform was completed as budgets where made for the project and feasibility studies proved to support the system based on the user requirements researched.

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APPENDICES

APPENDIX A: USER MANUAL

a) Registration

Customers of The Patriot will visit the registration page first to allow the system to capture their data before they can begin to use the system. Correct credentials should be entered in the fields provided.

Fig A 1 Registration form

b) Login

All users of the system will login to access information that is authorised to their specific user needs by verifying their username and password data.

Fig A 2 Login form

c) Make payment

When customers have selected or filled in their purchase details, they will be directed to a Paynow gateway where payment will be facilitated.
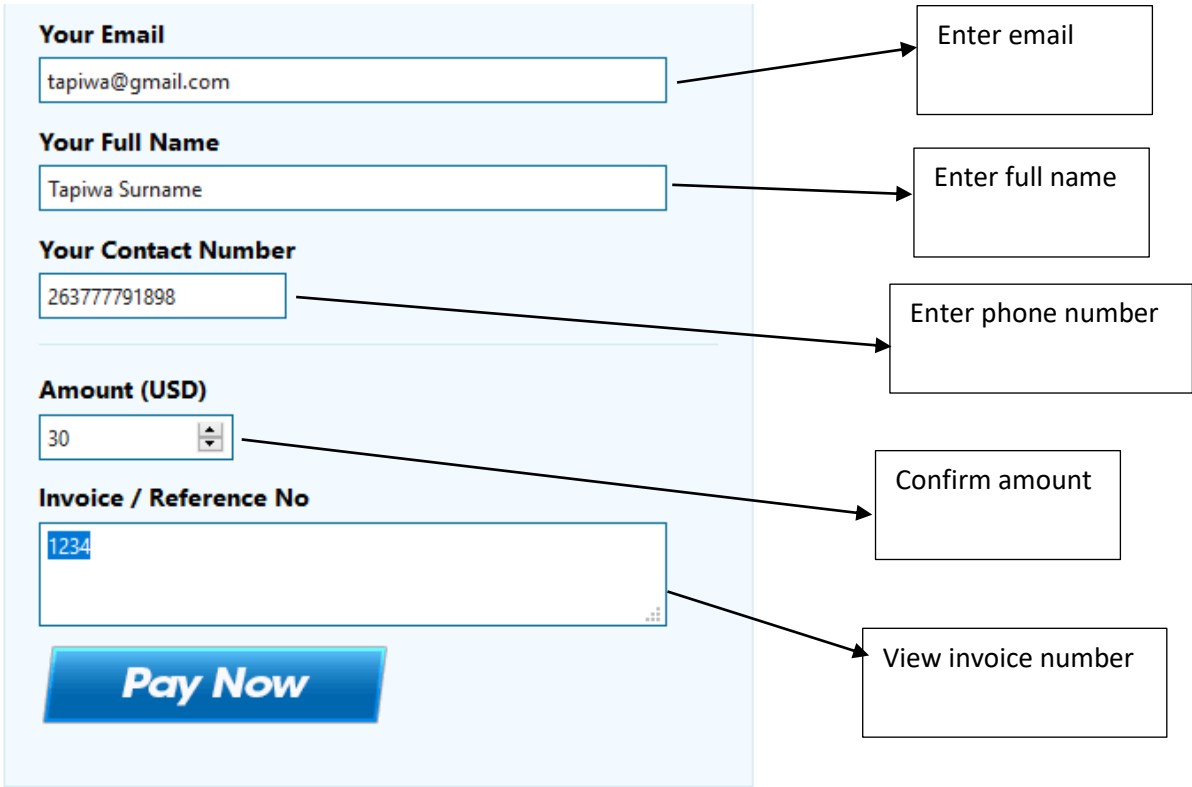
Fig A 3 Paynow

d) Receive sms notification

Clients should wait to receive confirmation of payment via sms with purchase details after making payment on paynow.
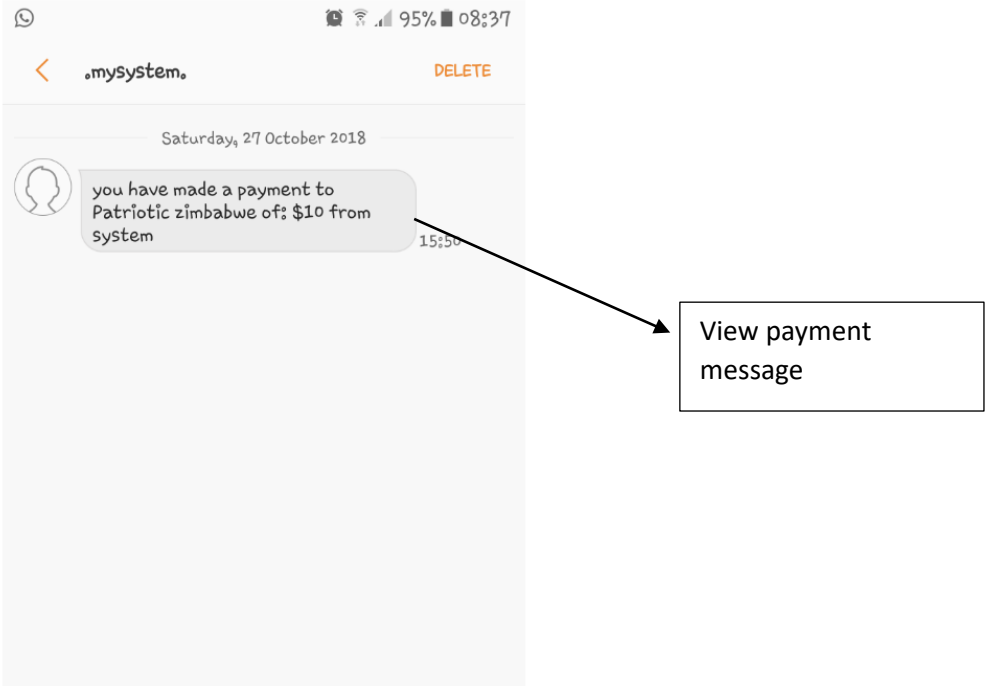
Fig A 4 sms message

e) Receive email notification

Clients should wait to receive confirmation of payment via email with purchase details after making payment on paynow.

to me ▼

you have made a payment to Patriotic zimbabwe of: $10 → View payment email

↩ Reply   ➡ Forward
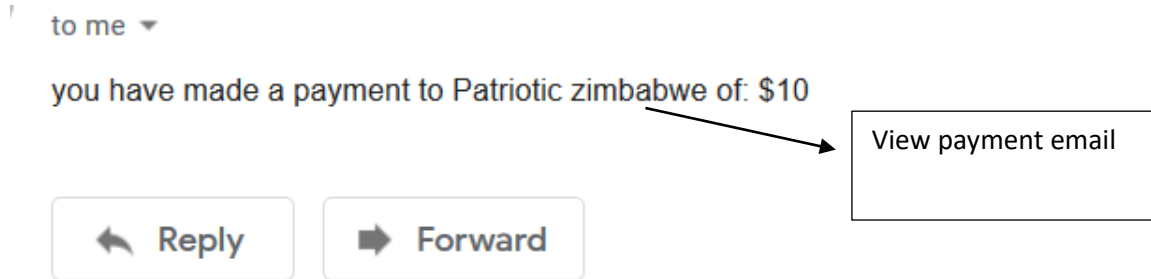
Fig A 5 email

f) Upload reading content

System administration can upload books to the system for clients to view and select for purchase.

| Home | Subscription Plans | Payments | Uploads | Logout |

Upload Reading Contents — Enter book title — Select file media

| Title |
| Browse... No file selected. | Upload file |

Title	File	Upload Date
Ther hayat nyhs hjj	Read File	27/10/2018
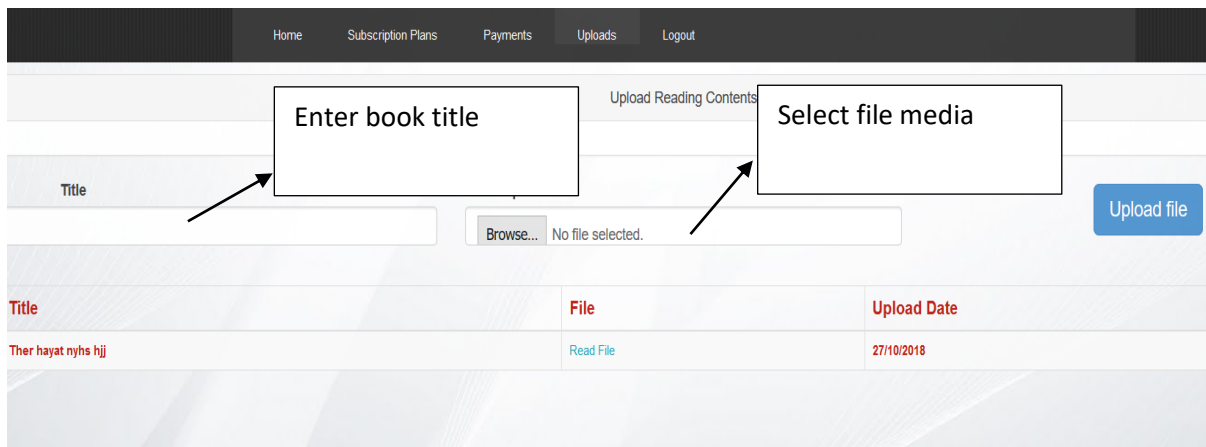
Fig A 6 Upload content

g) Make re-subscriptions

Customers will be able to renew their subscriptions by logging into their accounts and viewing their subscription due dates before they make another payment.

Fig A 7 User re-subscription

h) Admin payment reports

The system administrator can view all payment invoices made and the pricing and date details by customers.

Fig A 8 Payment reports

APPENDIX B: INTERVIEW

PLACE……………………………………

DATE………………………………………….

SUBSCRIPTIONS PLATFORM INTERVIEW

1. What is your view on the current subscriptions system being used?

....

....

....
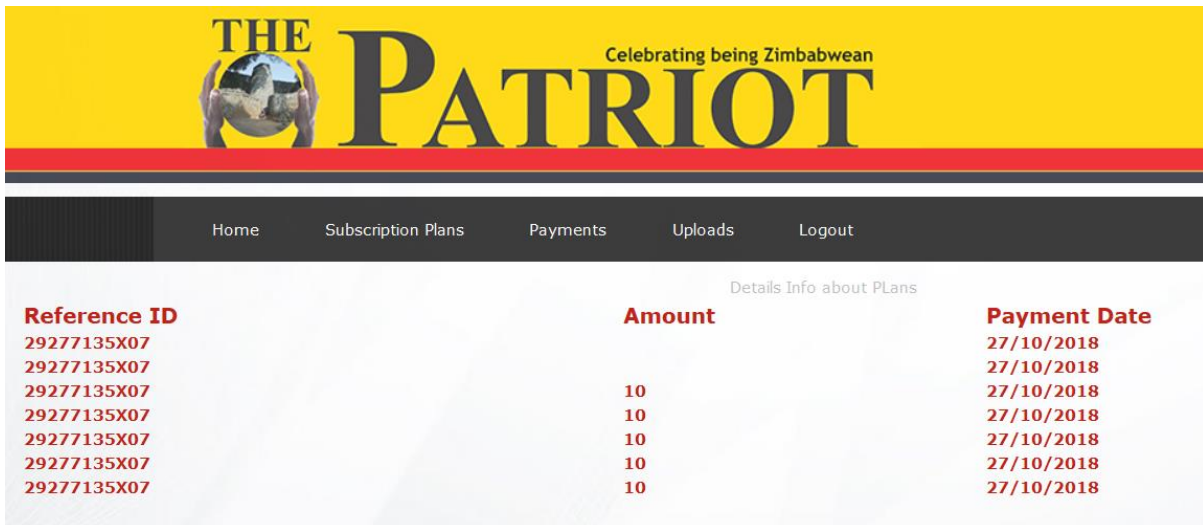
2. What comment can you give on the systems current performance?

………………………………………………………………………………………………

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3. How convenient is the current payment and subscription process?

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………………………………………………………………………

4. Are there any facilities that are currently not being provided by marketing that could be included in the system?

………………………………………………………………………………………………

…………………………………………………………………………………

5. What would you want the new system to incorporate?

………………………………………………………………………………………………

…………………………………………………………………………

6. What would you recommend or suggest that we implement in the development of the new system?

………………………………………………………………………………………………

………………………………………………………………………………………………

…………

APPENDIX C: QUESTIONNAIRE CHECK LIST

PLACE ………………………………….

DATE………………………………….

Please tick where it is applicable

1. Do you think the current system is reliable, efficient and contributing to your organizational objectives and goals effectively?

Excellent system	Fair	Ineffective

2. Do you ever experience inconveniences of making payment at The Patriots marketing department?

Very often	Sometimes	No

3. Is the current system always reliable for making payments with the economic crisis at present?

Very reliable	Reliable	Not reliable

4. Would you appreciate books purchased being delivered together with newspapers?

Yes	No	Maybe

APPENDIX D: OBSERVATION SCORE SHEET

NAME OF THE OBSERVER ………………………………………………….

DATE OF OBSERVATION …………………………………………………..

TIME OF OBSERVATION ...…………………………………………………..

PLACE OF OBSERVATION …………………………………………………..

OBJECT BEING OBSERVED

…………………………………………………..

OBSERVATION……………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

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CONCLUSION

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APPENDIX E: CODE SNIPPET

Paynow code

```php
<?php

 $ref=$_GET["id"];

include 'dbcon.php';

$querin=      mysqli_query($conn,"SELECT       *       FROM        users     where
national_id_or_username='$ref'");

while($ssn = mysqli_fetch_array($querin))

      {

      $number=$ssn["amount"];

      $email=$ssn["mail"];

      }

$info ="Zimbabwe Patriotic Paper subscription";

function CreateHash($values, $IntegrationKey){

      $string = "";

      foreach($values as $key=>$value) {

              if( strtoupper($key) != "HASH" ){

                      $string .= $value;

              }

      }

      $string .= $IntegrationKey;

      $hash = hash("sha512", $string);

      return strtoupper($hash);

 }
```

```php
$url = "https://www.paynow.co.zw/interface/initiatetransaction";

$values = array('id'=>'6276',

                        'reference'=>''.$ref,

                        'amount'=>''.$number,

                        'additionalinfo'=>''.$info,

        'returnurl'=>'http://localhost:82/PatrioticZimbabwe/update.php?ref='.$ref,


        'resulturl'=>'http://localhost:82/PatrioticZimbabwe/update.php?ref='.$ref,

                        'authemail'=>''.$email,

                        'status'=>'testing'

                    );

$values['hash']=CreateHash($values,"6f067ec2-9515-41ea-bb95-96613e110bc8");

$data = http_build_query($values);

$options = array(

   'http' => array(

      'header'  => "Content-type: application/x-www-form-urlencoded",

      'method'  => 'POST',

      'content' => $data,

   ),

);

$context = stream_context_create( $options );

$result = file_get_contents( $url, false, $context );

//echo "hey  ".$result;

header("location: test1.php?'$result'")

 //http://localhost:82/PatrioticZimbabwe/payyv.php?id=29277135C09
```

```php
?>
```

Login code

```php
<?php
                if(isset($_POST["login"]))
                {
                        include 'dbcon.php';
                        $username=$_POST["username"];
                        $password=$_POST["password"];
        $query    =    $conn->query("SELECT    *    from    users    where
national_id_or_username='$username' AND password = '$password' and status='Active'") or
die(mysqli_error());
        $rows = $query->num_rows;
        $fetch = $query->fetch_array();
        if ($rows == 0)
                        {
echo("<SCRIPT LANGUAGE='JavaScript'> window.alert('Wrong Credentials Or Your
Suspended, Try Again')
                 javascript:history.go(-1)
                </SCRIPT>");
                        }
        else if ($rows > 0)
                        {
                        $_SESSION['username'] = $username;
                        $role=$fetch['access'];
if($role == 'Member')
 {
echo("<script>location.href = 'member.php';</script>");
      header("location: member.php");
      exit;
 }
else if($role== 'Admin')
 {
```

```php
        echo("<script>location.href = 'home.php';</script>");

    header("location: home.php");

    exit;

}

else

{

    echo("<SCRIPT  LANGUAGE='JavaScript'> window.alert('Something  went  wrong,
Try Again')

        javascript:history.go(-1)

            </SCRIPT>");

}

                    }

        }

        ?>
```