UNIVERSITY OF GHANA

SALES AND REVENUE OPTIMIZATION IN PHARMACEUTICAL COMPANIES: THE ROLE OF AN ERP SYSTEM. A CASE STUDY OF AYRTON DRUG MANUFACTURING LIMITED

BY

JOSEPH CURTIS NUNOO

(10418269)

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DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other university. All references used in the work have been fully acknowledged.

I bear sole responsibility for any shortcomings.

…… ……

NUNOO JOSEPH CURTIS DATE

(10418269)

CERTIFICATION

I hereby certify that this thesis was supervised in accordance with the procedure laid down by the university.

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DR. DAMOAH, OBI BERKO DATE

ABSTRACT

"Though ERP has gained some importance in the IS literature over the past few years and is a major phenomenon in practice, through a) historical analysis, b) meta-analysis of representative IS literature, and c) a survey of academic experts, we divulge unorthodox views on the phenomenon. Given this variety of perspectives, it is unlikely that at this stage a generally agreed definition of ERP can be achieved" (Klaus, Helmut et al, 2000).This research seeks to primarily ascertain-

1. What role does an ERP play in the optimization of Sales and Revenue in a pharmaceutical company and its effectiveness?
2. How this feeds into the overall business performance of the company.

Most pharmaceutical companies in Ghana do not use all-encompassing ERPS. Most of them employ standalone systems for the various sections of the business which ultimately increases cost and could bring inefficiencies and defeat the purpose for which it was brought, which is optimize business performance and make business processes effective and efficient.

The study provides results which indicate that proper implementation of ERPS directly influences optimization of sales and revenue in a pharmaceutical company and ultimately provides a boost in business performance.it provides relevant information to top level management which is easy to comprehend and forms a concrete basis on which strategic decisions are made for the improvement of the performance of the business.

DEDICATION

I dedicate this work to the Almighty God. I also dedicate this work to my late mum Madam Sarah Acquaah; she has always been my inspiration to keep up the good fight

ACKNOWLEDGEMENT

Through all the changing scenes of life,
In trouble and in joy,
The praises of my God shall still
My heart and tongue employ.

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First and foremost, all praise and glory to the Most High God for making it possible for me to complete this study with his ever-present grace and mercy upon my life. Knowing Him, He will definitely bring to a successful end what he has started in me.

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Thank you all and God bless us all. It can only get better from here on out!!!!

Contents

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Earlier in history, firms relied on manual methods of bookkeeping and information storage. It was difficult to keep track of all the happenings and processes within the organization. There was the need to introduce technology. A system that could handle all these functions within the organization. In the initial stages there were software that handled the various functions within the firm on individual basis. Despite its improvement upon the initial manually driven system, it was still inefficient within one organization different software handled different processes which actually relied on similar data in their performances. “Many organizations that implement ERP systems strive to decrease redundancy and inconsistency in data through the creation and maintenance of a principal database of corporate information. Errors are reduced and employees have access to current information for decision-making. Data reentry errors and lapses from one business process to the next are eliminated (Rizzi and Zamboni, 1999; Latamore, 2000)”. An ERP system serves as a binder for the organisation. Rather than have multiple systems for the different functions within an organization, which is possible to do, an ERP provides premium over the divided systems and gives the firm one big platform through which all the various sections within the organization can interact and work.

“ERPs started with trials at calculating equipment in the 1940s. In 1960s, ERPs are born from a joint effort between J.I Case and IBM.”

In Ghana, many organizations use ERP systems for various reasons. It is meant to optimize business activities and increase productivity within the various functions within the organization. ERPs provide speed and quick turnaround time with data regarding organizations’ information which allows for decision-making to be quick in order to resolve situations which may be

detrimental to the organization with minimal damage. ERP, when properly administered remove duplication of information throughout the organization and reduce redundancy. Pharmaceutical companies in Ghana have ERPs available to them to help optimize the business performance. ERPs allow for top level management to monitor the activities of the organization on a granular level. The concept of sales and revenue optimization requires a steady and efficient and effective sales process. For sales productivity to be successfully addressed, sales managers require adequate technological help. Usually they need effective Customer Relationship Management software. Some ERPs come with an already incorporated CRM. This allows for management to run detailed reports with real time information across the organization.

ERP systems provide these services. ERP systems allow organizations' to track sales performance and revenue generation rates. Various reports which indicate overall business performance as well as performances of the various functional areas within the firm. It is essential to understand the patterns of sales and revenue with regards to trends, seasons and other factors. Sales and revenue is not solely based on the quality of a product or a service or its regular availability. It's actually very dependent on how it is marketed and sold. These functions and answers lie within ERPs. Effective and resourceful use of these systems have the capability to move a firm from a mid-level revenue generator to a perennial profit generating firm. Most firms in Ghana are unable to exploit the core advantages of ERPs with relations to sales and revenue optimization. Most of the pharmaceutical companies in Ghana limit the role of ERPs in their organizations to inventory management, finance management and data entry primarily. They are unable to exploit ERPs to their full potential which largely influences decision making for sales and revenue optimization. The reports generated from ERPs are able to determine customer trends, product performance based on locations, product performance based on sales reps, sales performance over a specified period of time among other relevant reports which facilitate decision making to improve sales and revenue. Information from these reports and

analysis generated from ERPs is essential to the overall performance of the business and growth of its bottom line.

This research seeks provide further insight on the various other uses of ERPs aside the usual data entry and inventory management. It will provide further understanding on what part the ERP plays in optimizing Sales and Revenue for companies in Ghana, primarily a pharmaceutical one. There is a lot to be gained from implementing the right ERP for an organization and using its tools to create an environment which gives the firm competitive advantage in the market or helps the firm to stay relevant.

1.2 Rational for the Study

For the industry of pharmaceutical drug manufacturing and distribution, this research will provide information on methods to help improve sales and revenue using tools within their existing ERPs or propel the organization to purchase a new ERP system with relatively more data analytical tools which will help the firms propound strategies to optimize their sales and revenue. For academic purposes, a further study can be carried out to explore the role of ERPs in other functional areas of an organization or further research into this area as this research will provide a basis for further exploration. Other pharmaceutical companies will benefit immensely from this research as findings will serve as a basis to delve into the extensive use of ERPs to optimize overall business performance and specifically sales and revenue. The organization under review - Ayrton Drug Manufacturing Limited; will also benefit greatly from this research as they can implement findings and recommendations to further improve upon its strategies to optimize business performance using an ERP.

1.3 Objectives of the Study

The paramount goal of the research is to ascertain sales and revenue optimization in pharmaceutical companies: the role of an ERP system. A case study of Ayrton Drug Manufacturing Limited.

1.3.1 Specific Objectives

1. To ascertain the role of ERPs in the optimization of sales and revenue in a pharmaceutical company.
2. To assess the effectiveness of the role of ERPs in improving the performance of a business.

1.4 Research Questions

The ensuing research questions would be answered in meeting the objectives of the study;

1. In what ways can ERP systems help optimize Sales and Revenue in pharmaceutical companies?
2. How effective is the role of an ERP system in the improving the performance of an organization?

1.5 Scope of the Study

This research was conducted using Ayrton Drug Manufacturing Limited as the main case study. This study focused on sales and revenue optimization in pharmaceutical companies: the role of an ERP system. The study was limited to Ayrton Drug Manufacturing Limited in Accra Metropolis. "The motive behind the choice of this location was due to the fact that the headquarters of the company was the place in which the most of the decision making in relation sales and revenue were made."

"In this regard, the choice of headquarters of Ayrton Drug Manufacturing Ltd as the case study was prudent. The study also connected to the various professionals who interact with the ERP. Primary sources of data were used to collect data as a form of first-hand information from the staff using self-administered questionnaires".

1.6 Limitation of the Study

The study major limitation was based on identifying a situation where by the researcher found it difficult in collecting the study primary data from the organization respondents. This implies that most of the staff of the organization were unwilling to provide the required information that the researcher needed to complete the study as result of staff fear of been ill-treated.

The researcher anticipated limitations as per the projection of the financial resources required in completing the research. This implies that, conducting the academic research was expensive. Therefore, the academic research does not attract investors. In this regard, the researcher might find it difficult and unmotivated to produce a research that has to be beneficial to the society and the nation at large.

Lastly, it might be difficult on the part of other similar organizations that are not into the same industry to rely on the outcome of the study that will serve as a reference point since the structure of the organization is different from other organizations.

1.7 Organization of the study

The study has been categorized into five main chapters as per academic rules. Hence, the first chapter looks at the introduction of the study that takes into consideration the background and the problem of the study. Furthermore, chapter two looks at the various literature that relates to the study topic and chapter three focused on the study methods and tools that were used in conduction the study. Lastly, chapter four and five cover results and discussions as well as

conclusion and recommendations respectively. All chapters were preceded with a brief introduction.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter was organized to look at different concepts, ideas and assumptions relating to the study. This section of the study encompasses theoretical and experimental review studies. The theories were reviewed basically from journals, articles, books and research papers while the empirical examination reviewed the study that has been done by other researchers concerning the topic of study. The literature review was structured to match the study objectives.

2.2 Evolution and Definitions of ERP

"Enterprise Resource Planning (ERP) was developed from the evolution and expansion of Material Requirements Planning (MRP) and Manufacturing Resource Planning (MRP II) to include more business functions and processes"(Elmes, Strong & Olga, 2005). MRP expanded from a material planning and control system to a firm-wide system with the abilities for the planning and regulation of most of the firm's resources in 1980 (Chen, 2001; Soja, 2008; Yusuf, Gunasekaran & Abthorpe, 2004). MRP further evolved into ERP in 1990, a term created by the Gartner Group (Akkermans, Bogerd, Yucesan, & Van Wassenhove 2003; Chen, 2001). Following this development, various descriptions have been provided for the term (Nazemi, Tarokh, & Djavanshir, 2012). "Variances in classifications have arisen because ERP studies have emerged from varied areas of studies, which has led to varying uses by practitioners and academics"(Jacobs and Bendoly, 2003).

"Theoretically, ERP is the amalgamation of several business procedures in an organization leading to an improved order of management and control, precise inventory management information, improved workflow and supply chain management and upgraded industry best

practices". "As a system, ERP is seen as a technological tool with the requisite functional capabilities to convert the concept into reality" (Jacobs and Bendoly, 2003). Gore (2008) stated that "ERPs incorporate interrelated applications in most large and medium-sized establishments across the world and are also used in the recovery and handling of data obtained from the various sections across the business. ERP is referred to as a multifunctional system in that, it brings together the different business processes of various departments in an organization, thereby stimulating prudent decision making".

Deloitte Consulting (1998) provides an extensive definition that uses functionality to identify ERP systems. "An ERP system is an all-encompassing business software that allows a company to: automate and integrate the most of its business functions, share data and practices across the entire enterprise and also to produce and access information in a real-time environment"(Deloitte Consulting, 1998).

Davenport (1998), defines an ERP as "any comprehensive system that integrates and automates many of the business practices in the various departments of the organization". This school of thought served as a basis for Botta-Genoulaza and Millet (2006) who defined ERP system as an integrated software package, which combines a set of standard functional modules, developed by an organization, and which could be used for the specific needs of each consumer.

One of the widely used definition by Akkermans et al. (2003) describes ERP as a compound transactional information system that combines several forms of information processing capabilities and puts data into one database to guarantee the effective management of the organization's activities. Gulla (2004) provides his definition of ERP as large advanced information system that harmonizes the organization's business processes within and across the organization. Davenport (1998) "goes on to define an ERP system as a packaged software

product that can be bought regularly by an organization in order to incorporate and share its information and interrelated business processes within and across functional areas".

"Others described ERP as a packaged business software system that helps organizations to manage their resources (materials, human resources, finance, etc.) efficiently and effectively by offering a complete integrated solution for the firm's information-processing needs, via a process-oriented view standardized across the firm" (Kumar and Hillegersberg, 2000; Nah, Lau & Kuang 2001). "The integration and coordination also forms new visibility and also improves current visibility across and beyond the structures and processes of the firm" (Ignatiadis and Nandhakumar, 2007). This capability of ERP was initially cited in Slater's (1999) definition, where ERP is described as an integrated system that offers management with an unrestricted complete view of what goes on in the firm. Umble, Haft, & Umble (2003) also described ERP as a holistic view of the firm and a common database in which business dealings are documented and kept.

"It is a belief by some authors that ERP is not only a software solution customized to suit a firm but it is a firm's business blueprint that influences how employees work by implementing its own way of reasoning on an organization's strategy and culture" (Lee and Lee, 2002; Davenport, 1998). "This is due to the fact that ERPs are pre-programmed with best practices, which are purportedly established effective ways of doing business (Arif, Kulonda, Jones & Proctor 2005; Boersma and Kingma, 2005; Soh, Kien & Tay-Yap, 2000; Soh and Sia, 2004)". "A lot of ERP systems, are pre-automated with suitable practices such as complete integration and common methods. This might generate issues of incompatibility when an organization observes tailor-made processes and faintly varied tasks or independent business sections as a source of competitive advantage" (Davenport, 1998). "So while ERP dealers try to program their systems to reflect best practices, the dealer and not the buyer is the one who defines what is best" (Lee

and Lee, 2002). "Therefore, subscribing to an ERP system is not only agreeing to use the system but agreeing with the programmer's ideology on management and best ways of how to carry out transactions" (Umble et al., 2003). Kosalge (2005) has been of the view that there is no one best way of doing business and that the framework of the firm plays a significant part in the way business is to be done.

2.3 Impact of ERP Systems Implementation

"The relation between IT and firm performance can be classified into three parts; the first part is a direct relationship between IT and Overall firm performance; the second path focuses on the relationship between IT and business process performance and the third path looks at how the processes interact to influence the overall firm performance. They suggested that a fourth path, which looked at the other contextual factors that influence the relationship between business process and overall firm performance (size, IT intensity, financial health, industry) could be considered" (Dehning and Richardson, 2002). Gelderman (1998) carried out further analysis on these views and tested the legitimacy of two generally accepted determinants of success of software programs. Based on his investigations, he surmised that subscriber approval is primarily based on performance but the correlation between usage and performance was negligible.

Though existing evidence suggests that organizations perceived ERP projects as risky, those who adopted the system wholly gathered that the anticipated advantages surpassed the threats from implementation. Singla (2005) showed that "ERP application offers enormous diverse benefits to its users in their dealings which are not available to non-users". Furthermore, Carton and Adam (2003b) stated that ERP systems improve the prominence and system management for the support functions of the organization, that is Finance, Quality and IS by homogenizing their transaction processes. Furthermore, there is an ultimate level of functional amalgamation, using ERPs, after which profits begin to drop. Poston and Grabski (2001) also stated "that for each of

the three years after an ERP operation, there was no major growth linked to the lasting income or the percentage of selling, and administrative expenses". Loukis, Sapounas and Milionis (2009) conducted studies and arrived at the conclusion "that investments in ICT in Greece offered encouraging and statistically significant contributions to both organizational output and employee output. Further studies revealed that organizations with a great level of correlation among their IT plan, the foundation of ERP policy and the overall business strategy experienced even greater benefits from their investments.

2.4 ERP and Performance

Bakos and Treacy's (1986) description of opportunities arising from IT, suggest that the business value of ERP systems, can be defined and operationalized not only as performance at business process level, but also at organizational level. "Business process performance includes the operational efficiency improvement in various business processes that are facilitated by ERP systems such as cost reduction and productivity improvement. Business process performance also includes operational efficiency which relates to the benefits gained as a result of the use of ERP systems to support various value chain activities" (Porter, 1985)

"Business process benefits are expected to translate into organizational performance" (Melville, Kraemer & Gurbaxani, 2004). "Organizational performance sums up the ERP-enabled performance across the firm"(Melville et al., 2004; Tallon, Kraemer & Gurbaxani, 2000). "Metrics used to capture organizational performance (such as ROI, sales growth) represent organizational objectives and competitive advantage that strengthen the organization in relation to its competitors" (Mahmood and Soon, 1991; Tallon et al., 2000; Melville et al., 2004; Porter, 1985; Sethi and King, 1994).

"ERP benefits should be influential to the firm's total performance. In principle, ERP usage should result in enhancement in individual productivity" (Loukis et al., 2009). Business process

gains must impact on the actual business performance measures such as growth in returns, and improved output.

2.5 ERP Benefits

Ranganathan and Samarah (2001) conducted studies on the business value of ERPs in relation to market value, stock market response with regard to production, and service attained by firms through the broadcast of ERP systems implementation. The studies established the positive effect ERPs have on businesses and stated that production companies were found to experience more progressive returns than the service organization. The gains ERPs offer are huge- irrespective of industry, culture, or the socio-economic status within which they are employed". According to Chou and Chang (2008) the ERPs improve output of organizations when they studied the developments of the organizations after the implementation of ERPs from the managerial perspective in Taiwan, a developing country. Their outcomes supported their initial hypotheses that customization and organizational machinery impact the transitional benefits which in turn influence the overall benefits with the customization effect yielding larger benefits than the organizational recognition. Conduction further "studies in Taiwan, Yang and Su (2009) focused on the connection between the benefits of ERP systems application and the impacts on organizational performance of supply chain management (SCM)". Outcomes showed that the operational, premeditated, and strategic benefits of ERP for the organization, affect the performance of SCM in the internal and external business processes, customer service, and cost management. Nonetheless, the calculated benefits of ERP were not major predictors of SCM performance in the external business process. The research further indicated that ERP implementations in these Taiwanese firms have a major impact on other SME companies within the international supply chain. Furthermore, Kamhawi (2008) "studied the ERP implementation and non-implementation practices in Bahrain and established that ERP usage in Bahrain has

produced different benefits (Strategic, transactional, technical and decision making) to the organizations."

A lot of effort has been put into gaining a broader understanding into the adoption and post adoption stages of ERP implementation. "Davenport, Harris & Cantrell (2004) after assessing organization's post-implementation transactions with business process alteration stated three factors regulating the awareness of the supposed worth of ERPs to businesses. Namely; Integration, Optimization and Information". Further research into the implication of benefits obtained from introduction of IS by Ragowsky, Stern & Adams (2000) determined that "a significant link existed between organization's operating features and the benefit the organization obtains from using individual IS programs". Matolcsya, Booth & Wiedera (2005) found some backing for improved profitability two years after the introduction of ERP and for enhancements in accounts control. Additionally, Seddon, Calvert & Yang (2010), stated in their hypothesis that, temporarily, only two factors which are functional fit and overcoming organizational inertia drive organizational benefits resulting from ERP systems implementation. On the other hand, over time, it is assumed that other four factors which are integration, process optimization, improved access to information, and on-going major ES business improvement projects further facilitate organizational benefits. The results backed the hypotheses that from top level management perspective, all six factors were crucial to the explanation of variance in organizational benefits from ES usage.

Other writers have added further evolving research on the scope of ERP implementations. "Wu (2011) used Herzberg's Motivation-Hygiene theory to categorize the various ERP users' supposed benefits, and explored the supposed benefits using the Rough Set Theory. ERP users were put into two groups in an effort to better understand strategic effects of ERP choices for both ERP system implementers and programmers". "Elbashir et al. (2008) formed an assessment

of an organization's performance directly linked to Business Intelligence (BI) and studied the connection between the benefits of using BI systems and business performance. Results indicated a crucial relationship between Business Process Performance (BPP) and organizational performance for both service and non-service sectors. Conversely, there is a significant disconnect in the strength of the relationship between the different divisions. They also propose that businesses are now able to generate a wide array of operational benefits along their value chain transactions".

2.6 ERP Systems and Sales Improvement in the Pharmaceutical Industry

Advantages provided by the ERP system include regularization of business processes and amalgamation of financial data. Based on research conducted by (Vuksic & Spremic, 2014) "in PLIVA Pharmaceutical Company, the implementation of ERP system brought about many more tangible and intangible advantages". The basic tangible benefits stemming from the use of the ERP system were: "decrease in total inventory by at least 30%, thus increasing the coefficient of turnover, decrease in product delivery time to the customer from 4 days to 24 hours, decrease in the number of workers by 20-30% in divisions where the new system was introduced; redistribution of work meant savings, decrease in the number of complaints due to mistakes in delivery complaints decreased to a minimum reduction of time of payment by 30% with the implementation of the buyer's credit limit". Generally, some intangible advantages included the improved image of a company as a whole, an increased market share, better relationships with business partners, increased customer satisfaction, better data quality for business decision making and better relationships with suppliers. Specifically, the intangible benefits from the implementation of the new ERP system in PLIVA were: improved transparency of the "workflow systems" and their coordination, secured forecasts of money flows and planning of available financial resources for a more rapid execution of all business processes, compacted

supply 6-7 employees for the entire company_ as a result of the project, better monthly_ production planning based on market needs and standing inventory_, better flexibility of the system with regard to business decisions, automated warehouse implementation of real warehouse with optimized selection and delivery of products_, well-informed decision making. The benefits derived from the introduction of the ERP system leads to better sales and revenue optimization in the long-run.

2.7 Effectiveness of ERPs

By evaluating interviewed cases, deliberating with ERP professionals, and learning from the literature, this work measures ERP system effectiveness based on realism of user pre-implementation expectations(Mirchandani and Motwani, 2001; Soliman et al., 2001), performance in improving organization competitiveness(Mirchandani and Motwani, 2001; Umbel and Umbel, 2002; Al-Mashari et al., 2003), data accuracy (Umbel and Umbel, 2002; Xu et al. 2002), system stability (Soliman et al., 2001), and user friendliness (Soliman et al., 2001; Mirchandani and Motwani, 2001). How effective an Enterprise Resource Planning system is, is solely determined by its ability to provide remedies to the solution which caused its implementation. How fast it is able to generate information, how accurate the information it generates is, how readily useful the information it generates is, how quickly it allows business processes to be carried out.

2.8 How ERPs Improve Sales and Optimize Revenue in the Pharmaceutical Industry

2.8.1 Deliver Accurate Product Costing

The Company-Driven Company (2011) “state that accounting for all material and operational costs in the manufacturing process is one of the biggest challenges facing many manufacturers. Without accurate and up-to-date cost information, they cannot make informed decisions on key

business issues, such as new product pricing strategies. A manufacturer needs to be able to link finished products to research and development costs, insurance contracts and chargebacks, cost of raw materials, and customer incentives and rebates to determine profitability. The ERPs used by pharmaceutical companies include multiple costing models supporting a variety of valuation methods. All product/process costs related to ingredients, work in process, packaging, labour, overhead, quality tests, and waste streams are captured electronically and assigned to the appropriate product. Typically, there are no by-products or co-products produced in pharmaceutical manufacturing, but for those that do produce such finished products, the ERP application captures, assigns and compares actual and standard costs to these products as well. Access to this information gives companies an accurate picture of the effect their manufacturing processes have on margins and profitability."

2.8.2 Improve Business Processes and Information Reporting

Of these, corporate growth is the most compelling driver. The study concluded that CEOs and other top management personnel have realized that if the organization is to survive and grow, then ERP is an effective tool that can provide better and faster information and cut costs to increase efficiency. However, SMEs' perspective on ERP is somewhat different. Among the main benefits pointed out in the business literature that SMEs are beginning to see are significant improvements in financial processes and management, enabling a more effective management of operations and the optimal management of resources.

The process of achieving additional benefits from an ERP implementation is referred to as "second wave" implementation (Deloitte, 1999). Deloitte (1999) believed that there are a number of phases that occur post-implementation (Table I). In the "stabilise" phase, companies familiarize themselves with the implementation and master the changes which have occurred.

The "synthesize" phase is where companies seek improvements by implementing improved business processes, adding complimentary solutions, and motivating people to support the changes. The final stage, "synergies", is where process optimization is achieved, resulting in business transformation. Optimal business processes reduces operational costs and improve synergy within the various business functions and processes which makes information generation quick and more often than not accurate. Also, information within the ERP software can be accessed by all which reduces the turnaround time for work to be done. This creates an avenue for more work to be done within the shortest possible time. Information is used efficiently and effectively for quicker decision making and improvement in revenue and sales and ultimately the bottom line of the company.

2.8.3 ERPS and Customer Relations Management

"The importance of effective customer relationships as a key to customer value and hence shareholder value is widely emphasized. In order to enhance these relationships, the application of IT to marketing through customer relationship management (CRM) software, e-commerce and other initiatives is growing rapidly" (Wilson et al, 2010). Customers are the base for the profitability of every business. The success of a business depends on the patronage of the product or service it provides. Effective management of the relationship with customers is essential to providing the exact requirements of the products that the customers want, therefore translating into huge patronage of the product and excessive growth of revenue and the business' profitability.

2.9 Conceptual Framework

ERPs over the years have become integral to the growth of businesses across the world. It has become a requirement if a business is to thrive in the modern days of business. Its ability to perform various duties and simplify business processes makes it essential to business growth. Theoretically, ERP is the "integration of various business processes in an organization leading to

a better order of management and control, accurate inventory management information, better workflow and supply chain management and improved industry best practices. As a system, ERP is seen as a technological tool with the requisite functional capabilities to convert the concept into reality" (Jacobs and Bendoly, 2003).

Sales and Revenue are the backbone of a business. Growth in these very important aspects of a business ensures sustainability and continuous existence over the long term. Revenue optimization is the strategic management of pricing, inventory, customers to grow revenue over the long term.

Optimizing a business' revenue and ensuring sustainability is the primary objective of every business, including pharmaceutical companies in Ghana. It is now essential to combine information technology and the management of the key factors which influence largely the growth of revenue and ensures its continuous existence into the foreseeable future. This phenomenon gives rise to ERPs. This research aims to find out how and what roles an ERP plays in the process of ensuring the optimization of sales and revenue in businesses particularly pharmaceutical companies in Ghana.

CONCEPTUAL FRAMEWORK

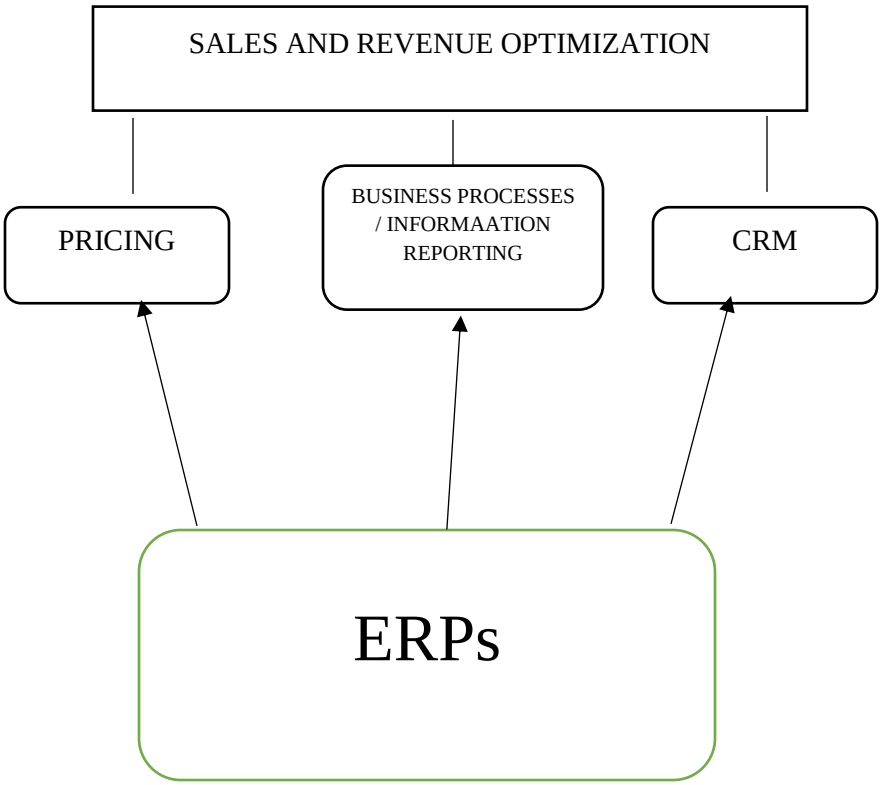

Figure 2.1: Proposed theoretical framework
Source: Researcher's own construct (2019)

CHAPTER THREE

METHODOLOGY AND ORGANISATIONAL PROFILE

3.0 Introduction

"This chapter comprised of methods and procedures that is been used in conducting the research. This section shows the various gathered data and methods that were used in analyzing the study. The study shows the overview of the procedures adopted as well as the instruments used for data collection."

3.1 Research Philosophy

Singh (2006), "addressed research idea to concern with an investigation which starts from known knowledge of facts to clear situation of its likelihood". "Two types of research philosophy exist in research. They are quantitative and qualitative analysis. The significance of using research philosophy is to help in acceptance of realities as well as giving the researcher the means of gathering and analyzing the study statistics and create enough explanation for enhanced understanding (Saunders et al., 2009)".

In spite of various arguments in relation to the suitability of positivist approach, the study researcher adopted this approach. In support of this idea, recent studies reviewed in relation to sales and revenue optimization: the role of an ERP system have greatly based their method in line with positivist stance. In relation to the nature of this study and related obtainable experimental studies, a positivist view was used to help the researcher impartially gather information, analyze, and account the result in line with the avowed propositions of existing results.

3.2 Research Purpose

The idea of the work was to determine sales and revenue optimization in pharmaceutical companies: the role of an ERP system. A case study of Ayrton Drug Manufacturing Ltd. The study was full of descriptive and explanatory research. " Descriptive research was selected to allow the researcher explain what actually pertains to the study as well as helping the investigator seek a precise summary of respondents issues of the difficulties (Robson 2002)".

"The adoption of the explanatory research approach helps the researcher to find out and seek new insight by asking different form of questions in order to properly assess the study problem and make inferential report (Saunders *et al.,* 2009)". "It also helps the researcher to clearly understand of the problem of the study by way of seeking a review of the literature in the subject area (Saunders *et al.,* 2009)". Based on the researcher positivist stance on the subject matter as discussed on the study, the researcher also adopted a deductive approach that helps the research moves from a general idea to a particular situation.

3.3 Research Design

"The process through which researcher designs its study that entails a specific plan that serves as a guide in conducting the study is termed as research design (Panneerselvam, 2009)". A case study approach was adopted. "Based on this, case study is explain as a strategy that is mostly adopted by researchers that involves an empirical investigation of a particular contemporary situation within its real life context with the usage of numerous sources of evidence" (Robson, 2002). The researcher adoption of the case study approach helps the researcher to probe, collect and as well as explain in detail the associated problem more deeply and exhaustively.

Also, the study adopted a quantitative research method. The "quantitative research is explain as research method that tries to emphasize more on the objectives measurements and as well as statistical means of analyzing the collected data through various polls, survey and questionnaires" (Robson, 2002). The justification for the researcher adoption of quantitative

method was based on the idea of the method helping to gain precise understanding of underlying reasons concerning the topic under study. It helps provide insights into the problem of the study or helps to develop ideas for potential quantitative research.

3.4 Sampling Procedure

3.4.1 Population

The study targeted population comprised of workers at Ayrton Drug Manufacturing Ltd in Accra Metropolis. The study target population consisted of a total of ninety-two (92) administrative workers. This category was used to structure the population based on the investigator thought of having respondents of high skills and knowledge in ERP.

3.4.2 Sample Procedure

The total sample size of the study was drawn from the workers at Ayrton Drug Manufacturing Ltd in Accra Metropolis. The total sample size of was made up of selected number of categories from the various forms at ADM.

$$n = \frac{N}{(1 + N(e)^2}$$

Where **n** is the sample size, **N** is the population size, and **e** is the level of precision. With regards to the social sciences, the study used 95per cent confidence level and 5per cent level of precision; this was obtained as follows;

$$\boldsymbol{n = \frac{92}{1 + 92(0.05)^2}\ n = 75}$$

The total sampling size of the study was seventy-five (75) workers at ADM in Accra Metropolis

3.4.3 Sampling Technique

The study used convenience sampling technique in sampling respondents. Convenience sampling was used because of restricted time and the technicalities of the study. The choice of convenience sampling method is motivated by the fact that it is relatively easier in reaching

respondents due to proximity and time constraints. Also, another justification was based on reason of having workers that were ready to provide the needed information or data relating to sales and revenue optimization in pharmaceutical companies: the role of an ERP system. Also, the researcher was able to obtained better accuracy in terms of confidence level of the interference of the study.

3.5 Data Collection Methods

3.5.1 Sources and Types of Data

The sources of data were from first-hand source of information; thus, primary source of information through the use of questionnaire. The secondary data was collected from the study of in terms of the profile of the organization and as well as information that was obtained from the website.

3.5.2 Data Collection Tools

The study made used of questionnaires for the quantitative approach of the study. The study made used of a self-completion questionnaire. The questionnaires were designed for based on the sales and revenue optimization in pharmaceutical companies: the role of an ERP system. The questionnaire were deigned to coincide with the study objectives. “The questionnaire was used for the quantitative approach of the study. Hence, it enabled the respondents work at their own pace and convenience, besides it providing a great deal of anonymity to respondents in terms of soliciting for open and honest responses” (Panneerselvam, 2009). The study made used of questionnaires in which the study researcher designed and divided into three parts. The first part of the questionnaires explain questions relation to the characteristics of the respondents. Also, the second and third were based on the specific objectives of the study. The questionnaire was design on Likert scale and ordinal scaling method using closed-ended questions and thus, from strongly agree to strongly disagree.

3.5.3 Validity and Reliability

"The study ensured that the main instrument meet the criteria of internal consistency. The Cronbach Alpha Coefficient of 0.50 and above is considered appropriate and acceptable for a research" (Ali & Raza, 2015). "Therefore, the Cronbach Alpha for all the objectives under the study must pass the test to fulfill the threshold 0.50 recommended by"(Ali & Raza, 2015). This shows that the study constructs reasonably satisfies the assumption of reliability. Therefore, the study used pre-testing of the questionnaires to help improve upon the clarity and understanding of the questionnaires. The study participants that were piloted for the research were made up of ten respondents upon which suggestions and recommendations were factored in the final questionnaires distributed.

3.5.4 Data Collection Methods

The study administered its questionnaires through the use of face-to face or one and one survey (Panneerselvam, 2009). Hence, the face-to face survey involves the process in which the researcher moved straight to the respondents to seek the concern of the respondents to answer the questionnaires (Panneerselvam, 2009). In using this method, the researcher selected the required number of potential respondents of the study and started moving from one respondent to other based on the subject matter. Then the researcher carefully distributed the questionnaires to each of the potential respondents for the questionnaires to be answered instantly. The rationale behind the researcher choice of face-to face survey was that it gives less cost and time of data collection and also helped the respondents to seek clarity in terms of difficult because of the presence of the researcher (Panneerselvam, 2009).

3.6 Data Analysis

The study's quantitative data analysis was presented in a descriptive statistics. Its collected data was properly classified and analyzed. The method of classification was done in the form of frequency, mean and standard deviation. Hence, the study made inferential reports from the descriptive statistics in the form of tables depicting the various results from the study

participant's. This was done for easy reading, understanding and clarity of presentation of the study findings. "The information that was gathered and analyzed was done using SPSS version 20". This was done and presented in the form of tables and reducing large data size to manageable summaries and gave a visual impression and interpretation.

3.7 Research Ethics

Southerland (2014) suggested that "in research, critical reflection on ethical behaviour should start from the beginning of the study to the end of the study. All ethical issues under the conduct of a research study have been strictly adhered. Participants were assured of strict confidentiality and anonymity; This is therefore to state that, person's identity were not linked to their respective responses and participants were not coerced or forced into providing responses to the questions asked: all answers provided were done willingly. Questions asked were done in simple and understandable languages without any ambiguity".

3.8 Brief Profile of Ayrton Drug Manufacturing Limited.

"Ayrton Drugs is a pharmaceutical company that is committed to manufacture high quality medicines at affordable prices. It also deals with exportation and importation. Ayrton Drugs, a manufacturer of pharmaceuticals (Tablets, Syrups, Capsules, Creams/ointment), was incorporated as a limited liability company in 1965 (Ayrton Drug Ltd, 2018)"

"Ayrton has seen rapid and sustainable growth over the last decade, culminating in Ayrton Drug being listed on the Ghana Stock Exchange in 2006. Ayrton currently manufactures over seventy (70) products and has installed three fully automated syrup liquid lines. Ayrton Drug is also the first pharmaceutical manufacturer in Ghana to introduce pharmaceutical creams/ointments in Aluminum tubes. Ayrton is committed to manufacturing high quality medicines at affordable prices with a view to extending and enhancing human life" (Ayrton Drug Ltd, 2018).

CHAPTER FOUR

PRESENTATION OF DATA, ANALYSIS AND FINDINGS

4.0 Introduction

This part of the study comprises of the study results and discussion that was written to coincide with the study objectives. The researcher made inference from the study findings and compare the results with the literature to indent any gap. The study represented the descriptive statistics upon which answers were given to the aforementioned objectives that the study.

4.1 Demographic Profile of the Respondents

The study describes the various characteristics profile in relations to the response from the study questionnaire. This information presents the characteristics of the respondents in the tables and figures below.

4.1.1 Gender of Respondents

In Figure 4.1, the gender data was captured. The findings showed that 56 of the respondents representing 75% of the respondents sampled were males, while 19 of the respondents, representing 25% of the remaining were females. This showed that male were more connected to the organization ERP.

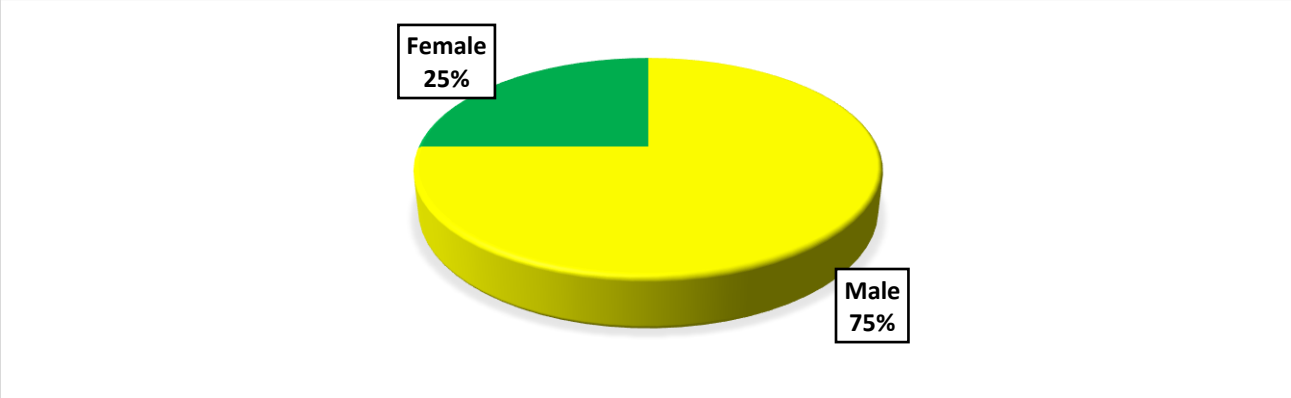

Figure 4.1: Gender Classification
Source: Researcher field work, 2019

4.1.2 Ages Range of Respondents

In relation to the age distribution of the respondents; summary of the responses show that the majority (n=34, 45%) of the respondents were aged between 31 to 39 years at the time of the

study. Additionally, 26 representing 35% of the respondents indicated that they were aged between 20 to 30 years whereas 8 (11%) and 7 (9%) of the respondents were between 41 to 50 and 51 to 0 respectively at the time of the study.

Table 4.1 Age Range if respondents

		N	%
Age (in years) of respondent	20 to 30	26	35
	31 to 40	34	45
	41 to 50	8	11
	51 to 60	7	9
	60+	Nil	100

Source: Fieldwork 2019

4.1.3 Respondents Years Spent in Organization

In Table 4.2, 31% of the sampled population have been engaged in their position within the organization for the period for 1 to 3 years, 44% of the respondents had experience for 4 to 7 years. However, only 25% out of the total respondents had experienced for 8 years above. The respondents are very experience in terms of the positions and the number years spent with the organization for a long time. The implication of this finding was that respondents were better informed regarding the sales and revenue optimization in pharmaceutical companies: the role of an ERP system. This shows that the study had expert judgement on the subject matter and with much credible respondents been used for the conduct of the study.

Table 4.2 Years Spent in Organization

		N	%
Years Spent in Organization	1 to 3 years	23	31
	4 to 7 years	33	44
	8 years and above	19	25

Source: Fieldwork 2019

4.1.4 Educational Level of Respondent

Figure 4.2 shows that 48% attained first degree holders; 31% were master's degree holders; 15% attained HND certificate as part of their highest education and 6 percent had other certificates. The study revealed that most of the respondents were highly educated. This implies that the study participants were in the position to read and understand all questions asked and understood the study topic. The finding was supported by the work of Mohammed (2016) that indicated that significant portion of the response rate were obtained from experienced and well educated people from the pharmaceutical companies.

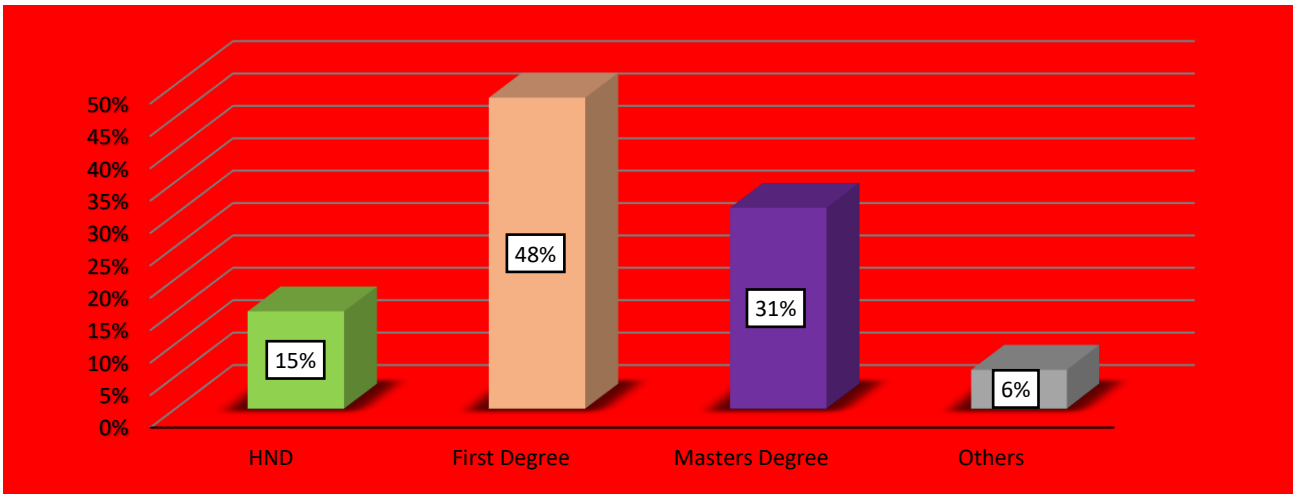

Figure 4.2: Education level of Respondents
Source: Fieldwork 2019

4.1.5 Job Title of Respondents

Relating to the job tittle of the respondents in their respective departments, the results show that the majority (n=32, 43%) of the respondents for each pointed out they were accounts and finance

personnel. Additionally, 33% of the respondents were sales personnel. The study showed that 11% and 6% represented credit control and risk position as well as data analysis respectively.

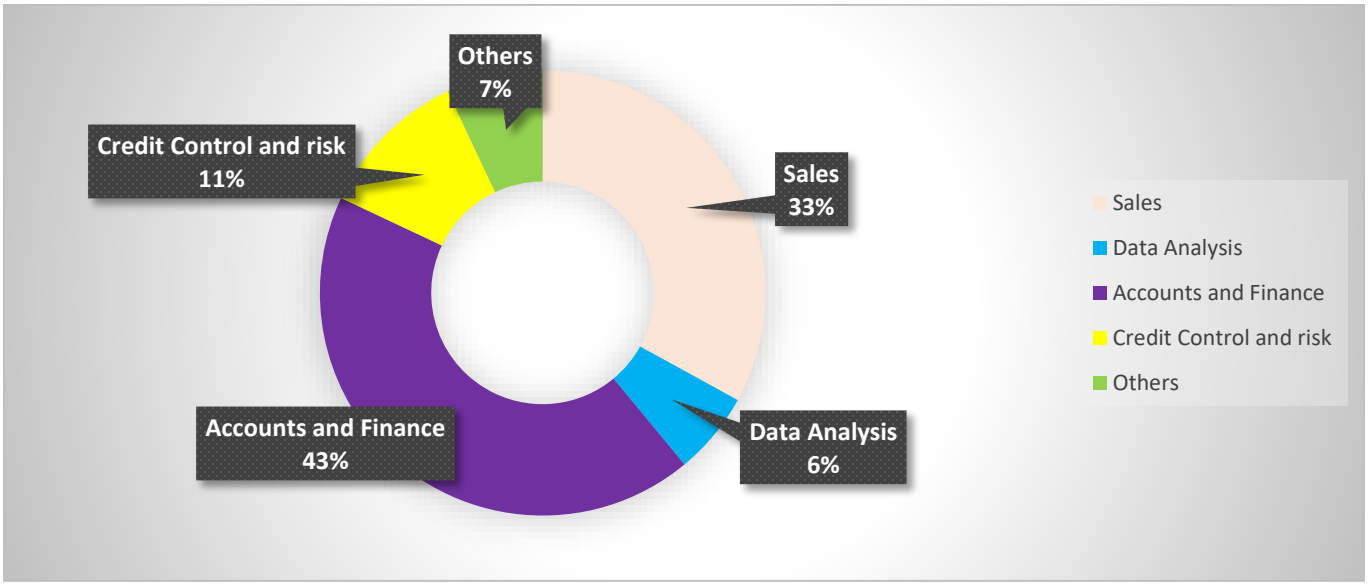

Figure 4.3: Job tittle of Respondents
Source: Fieldwork 2019

4.1.6 Employment Contract

The study depict the respondent's employment contract with the study organization. The results revealed that majority of the respondents 70% did had permanent full time job contract with the organization. Also, 28% had their job as contract basis while 2% were part time and temporal. The significance of this findings proved that most of the respondents were working actively with the organization that signified that the respondents made used of the ERP system for the organization sales and revenue.

Table 4.3: Employment Contract

Positions	Frequency	Percentage
Permanent Full Time	52	70%
Part Time	1	1%
Contract	21	28%
Temporal	1	1%
Total	75	100%

Source: Field Study, 2019

4.3 The Role of Enterprise Resource Planning Systems in the Optimization of Sales and Revenue in a Pharmaceutical Company

Table 4.4 depicts that most of the respondents on the measurement of the statement the system allows to determine the top performing customers and the system provides aging analysis to track debtor's performance records an average score of 4.60 and hence, this implies strongly agreement to the statement. The study findings support the work Vuksic & Spremic (2014) that suggested that modern business organization now considered ERP system as that is flexible to keep track of organizational performance as well analyze performance of firms' debtors and creditors.

The measurement of the statement the system allows to determine the top performing products and "monitors customer collections and payment trends" indicated an average score of 4.50.

The measurement of the statement "provides quality information to management to improve decision making indicated an average mean of (m=4.37, SD=0.818). This implies that the respondents were in agreement with the statement.

The measurement of the statement determines sources of shortfalls in sales and revenue and the system helps to structure sales routes to optimize efficiency indicated an average score of

(m=4.20, SD=0.797) and (m=4.00, SD=0.896).This implies agreement with the statement. The findings also show that with respect to the overall statement under the role of Enterprise Resource Planning systems in the optimization of sales and revenue in a pharmaceutical company, it revealed an average score of 4.38. This indicates that all the respondents were equally in agreement with the role of ERP systems in the optimization of sales and revenue in a pharmaceutical company.

Table 4.4:
Measurement of the Role of ERP Systems in the Optimization of Sales and Revenue

Statement	Mean Score	Std. Deviation
The system allows to determine the top performing products	4.50	0.571
The system allows to determine the top performing customers	4.60	0.610
The system provides aging analysis to track debtors performance	4.60	0.587
The system helps to structure sales routes to optimize efficiency	4.00	0.896
Provides quality information to management to improve decision making	4.37	0.818
Determines sources of shortfalls in sales and revenue	4.20	0.793
Determines run rate of top performing products	4.30	0.926
Monitors customer collections and payment trends	4.50	0.600

Overall Average Mean	**4.38**	**0.725**

Scale: 1-5: where Strongly Agree = 5 to 4.5; Agree= 4.4 to 3.5; Neutral = 3.4 to 2.5; Disagree= 2.5 to 1.5; and Strongly Disagree = 1.4 to 0.5

Source: Field Study, 2019

4.4 The Effectiveness of the Role of an Enterprise Resource Planning System in Improving the Performance of a Business

4.4.1 Pricing Element

Table 4.5 presents effectiveness of ERP system based pricing. The results show that that ERP allows prices of various products to be set in system which obtained the highest average mean score (m=4.53, ±SD=0.777), able to apply specific discounts per products (m=4.30,±SD 0.749) and allows for periodic changes to product prices (m=4.12, ±SD=0.963). However, provides accurate product cost (conversion, raw and packaging materials) to be factored into final product pricing which obtained the lowest mean score (m=4.10, 0.882).

From the results, it can be concluded that the usage of ERP system in Ayrton Drug Manufacturing Limited was effectively in terms of the system helping the firm to align its prices to its drug products correctly and effectively. Therefore, the ERP made it possible for prices to be allocated to the firm products simultaneously without any difficulty. Hence, the firm ERP system allows the prices to be consistent in the business operations and improved performance.

Table 4.5:
Measurement of Pricing

Statement	Mean Score	Std. Deviation
Allows prices of various products to be set in system	4.53	0.777
Able to apply specific discounts per products	4.30	0.749
Provides accurate product cost (conversion, raw and packaging materials) to be factored into final product pricing	4.10	0.882
Allows for periodic changes to product prices	4.12	0.963
Overall Average Mean	**4.26**	**0.843**

Scale: 1-5: where Strongly Agree = 5 to 4.5; Agree= 4.4 to 3.5; Neutral = 3.4 to 2.5; Disagree= 2.5 to 1.5; and Strongly Disagree = 1.4 to 0.5
Source: Field Study, 2019

4.4.2 Customer Relationship Management Element

Table 4.6 signifies the level of measurement of customer relationship management. The study findings revealed the measurement of the statement "provides avenue to record customer feedback" shows an average score of 3.00 representing a greater portion of the responses on the statement. This implies that the respondents were uncertain with the statement which falls within the researcher's scale of 3.4-2.5.

An average score of 2.67 represent system accepts customer complaints. This however implies that the respondents were also uncertain with the statement which falls within the researcher's scale. Measurement of the statement "monitors response time to customer complaints" had an average mean of 2.55. This implies that the respondents were neutral to the statement. Considering the statement "prompts customer relations officer on customer complaints" an average score of 2.53 was realized.

Table 4.6:
Measurement of Customer Relationship Management

Statement	Mean Score	Std. Deviation
System accepts customer complaints	2.67	0.977
Prompts customer relations officer on customer complaints	2.53	0.905
Monitors response time to customer complaints	2.55	0.904
Provides avenue to record customer feedback	3.00	1.146
Overall Average Mean	**2.69**	**0.983**

Scale: 1-5: where Strongly Agree = 5 to 4.5; Agree= 4.4 to 3.5; Neutral = 3.4 to 2.5; Disagree= 2.5 to 1.5; and Strongly Disagree = 1.4 to 0.5
Source: Field Study, 2019

4.4.3 Information Processing and Reporting Element

Table 4.7 signifies the level of measurement of information processing and reporting element. The study findings revealed the measurement of the statement "it is easy to input primary data from invoices and waybills" shows an average score of 4.61 representing a greater portion of the responses on the statement. This implies that the respondents were strongly in agreement with the statement which falls within the researcher's scale of 5.0-4.5.

An average score of 4.43 represented output generated from system is easy to comprehend. This however implies that the respondents were in agreement with the statement which falls within the researcher's scale. Measurement of the statement "processes information very quickly had an average mean of 4.35. This implies that the respondents agreed to the statement. Considering the statement "reports generated from ERP is accurate" an average score of 4.20 was realized.

Table 4.7:

Measurement of Information Processing and Reporting

Statement	Mean Score	Std. Deviation
It is easy to input primary data from invoices,waybills	4.61	0.566
Processes information very quickly	4.35	0.830
Output generated from system is easy to comprehend	4.43	0.700
Reports generated from ERP is accurate	4.20	0.
Overall Average Mean	**4.40**	**0.729**

Scale: 1-5: where Strongly Agree = 5 to 4.5; Agree= 4.4 to 3.5; Neutral = 3.4 to 2.5; Disagree= 2.5 to 1.5; and Strongly Disagree = 1.4 to 0.5

Source: Field Study, 2019

4.5 Correlation Analysis

Table 4.8

Correlation between ERP and Performance of Business

Variables	**1**	**2**	**3**	**4**	**Mean**
Performance	1				4.38
Pricing	.752	1			4.26
Customer Relationship Mg	.520	.448	1		2.69
Information Processing	.760	.518	.632	1	4.40

Source: Researcher fieldwork data, 2019

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

Correlation analysis was run to determine the relationship between the role ERP systems on business performance. The results find that information processing and reporting correlated positively with performance (r=.760, n=75, p=.05). Additionally, the results showed that there was a positive correlation between pricing and performance (r=.752, n=75, p<.005).

Also, the results showed that there was a positive correlation between customer relationship management and performance (r=.520, n=75, p<.05).The results imply that the firm ERP system had direct impact on business performance.

4.6 ERP Effectiveness and Business Performance

The study was designed to test the following hypothesis.

H_o: ERP does not affect business performance

H_1: ERP affects business performance

To assess the effectiveness of the role of an Enterprise Resource Planning system in improving the performance of a business, a multiple regression was run using pricing, customer relationship management and information processing and reporting. The regression model summary is presented in Table 4.9.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	df1	df2	Sig. F Change
1	.655[a]	.429	.410	.64863	3	4	.000

Source: Fieldwork 2019

From table 4.9, the Adjusted R Square is 0.41 and this is significant at 0.00. This means that the predictors of Pricing, Customer Relationship Management and Information Processing and Reporting accounted for 41% of business performance. To accept the null hypothesis, we must have p value of more than 0.05. Since our p value is 0.000, we reject the null hypothesis and accept the alternative. In other words, ERP affects business performance. In other words, the actions taken by management under each of these predictors positively affected business performance.

Table 4.10 gives the coefficients of the model and further details of fit of the model. The VIF is the Variance Inflation Factor and it is used as a measure of the multicollinearity among the predictor variables. If a predictor is not correlated with other variable, it has VIF value of 1. The maximum acceptable is a value of 10. All the independent variables have VIF values of 1.042 and 1.037. Again, the tolerance for each variable is 0.96 or above, which is higher than the minimum acceptable of 0.20. The implication of the tolerance level and VIF values is that the

variables are not correlated with each other. Furthermore, each of the predictor variables is significant at 0.000, implying that how much they contribute to predicting business performance is not due to chance.

Table 4.10 Coefficient Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-3.108	.692		-4.493	.000		
Pricing	.384	.101	.273	3.807	.000	.964	1.037
CRM	.144	.099	.321	4.470	.000	.960	1.042
Information Processing & Reporting	.444	.096	.270	3.756	.000	.961	1.040

a. Dependent Variable: Business Performance

Source: Fieldwork 2019

From table 4.12, the following regression equation can be written.

$$\mathbf{Y = -3.108 + 0.384X_1 + 0.144X_2 + 0.444X_3 + e}$$

Y is the dependent variable, which is business performance. $\mathbf{X_1}$, $\mathbf{X_2}$, and $\mathbf{X_3}$ denote the predictor variables and represent Pricing, CRM and Information Processing and Reporting respectively.

As can be seen from table 4.10, the coefficients of Pricing, CRM and Information Processing and Reporting are 0.384, 0.144 and 0.444 respectively. All the coefficients of these variables are positive. This implies these variables had a direct impact on business performance. “This finding is not strange given that several scholars including Fosser, *et al.* (2008), Zeng, *et al.*, (2012), Abugabah and Sanzogni (2009) have all argued in favor of a positive link between ERP systems and the performance of various aspects of the firm such as in terms of profitability, competitive advantage and operational costs”.

4.7 Discussion of Results

This section discusses the main research findings in relation to two objectives of the study.

4.7.1 The Role of Enterprise Resource Planning Systems in the Optimization of Sales and Revenue in a Pharmaceutical Company

The study revealed that the usage of enterprise resource planning (ERP) by Ayrton Drug Manufacturing Limited played a role that did help in determining the run rate of top performing drug products. This shows that pharmaceutical companies are found to associate with drug products that expired within the market. Therefore, the ability to manage these drugs effectively through their expiration date tracking was assisted through the operating system of ERP. The implication was that the firm found difficult in managing expiration dates on drugs was became a challenge simply because these drugs tend to lose their potency after expiration. Therefore, the Ayrton Drug Ltd usage of the ERP system helped played role by way of proving a solution that improved the inventory management by offering better shelf-life control. This was done through the ability of the ERP that offered a basic inventory rotation methods; thus, first in, first out (FIFO), last in, first out (LIFO), and first expiration/first out (FEFO)). This was done at the point of selecting the ingredients for production based on the supplier or packer production dates. The study revealed that the firm usage of ERP ensured that the selection criteria was carried forward when selecting product to ship to customers, such as shipping products that will have a certain amount of shelf life left once received by a customer. The implication was that it provided alerts for non-permissible actions, such as shipping certain products or drug strengths to states where prohibited. This ensured that the best rotation methods and quality standards were met. The ERP application provided tools to monitor customer specific distribution days based on the remaining shelf life of Ayrton Drug Ltd current products that significantly reduce customer charge-backs, prevent transactions for expired lots, and automatically write off expired product. This in the end improved product quality, greater customer satisfaction, and less waste from expired inventory.

In addition, the study revealed that Ayrton Drug Ltd adoption of ERP did help structure sales routes of the firm that optimize efficiency. This implies that the firm usage of the ERP did help the firm to integrate its internal processes with the external processes. “Hence, it is suggested that ERP systems adoption is very important for organizations because it employs an integrated database system which enhances the competitive advantage of most organizations in the global market (Hwang, 2013)”. Therefore, the firm was able to monitor real time sales activities of its drugs within the organization and outside the firm. This helped Ayrton Drug Ltd to know the sales revenue performance of their drugs as well as noticing when to replenish stock out drugs or the time to manufacture a new drugs into the market. The implication was that the firm was able to identify real time sales operations of their drug activities that helped improved as well as enhanced the revenue generation of frim. This was as result of the management of the Ayrton Drug abled to keep tracked of the drug sales since ERP provided a single network for no manipulation.

Again, the study revealed that Ayrton Drug Manufacturing Ltd ERP usage helped provided quality information to management that helped improved their decision making. This implies that the ERP helped informed the management on the firm drugs variability which was critical in terms of drugs consistency and quality of the finished products. Therefore, decision making in drug industry is critical to firm performance and survival, therefore, the management decision making is primarily based on the information that was retrieved from the ERP. Hence, the drug industry is very competitive which makes decision making very useful and critical. In this regard, the firm usage of ERP allowed the management of Ayrton Drug Ltd capable of managing product variability that supported unlimited number of product characteristics for both raw material and finished products. It is presumed that formulation and process control are the primary concerns in pharmaceutical manufacturing operations, where variability creates significant challenges for process specifications. However, raw materials are purchased and

finished goods are produced in a variety of quantities, potencies, and qualities. Therefore, the decision making of management through the application of the ERP was able to identify these variability's, in addition to the fluctuating cost of both raw materials and packaging materials that helped management in making decision to adjust production jobs. The effect was that Ayrton Drug as a pharmaceutical manufacture was often required to deliver finished products to customers that meet certain requirements. Hence, the ERP provided solution for full visibility into available raw materials inventory and their product characteristics which informed management decisions that ted to deliver products that meet customer requirements which helped improved sales and revenue for the firm.

Lastly, the study revealed that the firm application of ERP helped management to monitor customer's collection and payment trends. This implies that the firm ERP captures the entire supply chain actor's activities on the ERP system included customer's payment system for their drugs. This allowed the firm management to detect the trend of customer's performance in terms of their payment for the drugs. This allowed to determine top performing customers since Ayrton Drug Ltd management were able to monitor real time customer payment activities which allowed them to track debtors and thus, the ERP did improved the firm revenue.

4.7.2 The Effectiveness of the Role of an Enterprise Resource Planning system in Improving the Performance of a Business

The study revealed that the effectiveness of ERP affects business performance was accepted. This implies that ERP dimensions of pricing, customer relationship management and information processing and reporting had direct impact on business performance. The coefficients of pricing, customer relationship management and information processing and reporting are 0.384, 0.144 and 0.444 respectively. All the coefficients of these variables are positive. This implies that application of ERP system would tend to positively affect business performance and verse versa. This finding is consistent with a related study in which Batada and Rahman (2012) found that

ERP impact directly on business performance. Among their key findings was that an increase in customer satisfaction was realized after the implementation of ERP systems in the surveyed firms.

Moreover, *the constant of the multiple regression equation is negative. This means that if the pharmaceutical firm failed to use ERP that effectively integrate the firm business processes and improved on sales and revenue, the firm would not just have less sales and revenue but it would rather be under-performing in its business performance.* And this further implies that Ayrton Drug Ltd saw ERP as a core feature of modern business operations. A further implication is that the firm would tend to under-performed within the pharmaceutical industry without ERP application.

The study revealed that Ayrton Drugs Ltd usage of ERP ensued that the firm pricing and costing of its drugs were made effective. Abu-Hussein, Hyassat, Sweis, Alawneh, Al-Debei (2016) indicated that ERP system have established that it saves operational time and minimizes operational cost. The study inferred that firms accounting for all material and operational costs in the pharmaceutical manufacturing process is one of the biggest limitation facing many manufacturers. Hence, without accurate and up-to-date cost information, the firm management cannot make informed decisions on key business issues, such as new product pricing strategies. The manufacturer needs to be able to link finished products to research and development costs, insurance contracts and chargebacks, cost of raw materials, and customer incentives and rebates to determine business performance. However, the Ayrton Drug ERP application allowed for multiple costing models that supported variety of valuation methods. Typically there are no by-products or co-products produced in pharmaceutical manufacturing, but for those that do produce such finished products such as Ayrton Drug Ltd, the firm application of the ERP helped captured, assigned and compared actual and standard costs to these products. This allowed the

management of the firm to have full access to this information that provided an accurate picture of the effect their manufacturing processes have on margins, profitability and business performance.

Again, the study revealed that the application of ERP helped improved customers relationship management. Ponorica, *et al.*, (2013), Nawaz and Channakeshavalu (2013) contend that increased customer satisfaction is one of the key benefits of ERP systems. Motwani and Sharma (2013) observe further that "other than improved efficiency in the company's operations, customer satisfaction is the other ultimate outcome of ERP systems implementation within a firm. Based on the idea of the literature, the study showed that customers were paramount key actors of the pharmaceutical industry and therefore, their importance to the success of the industry cannot be overlooked". Hence, the study revealed that the ERP provided the firm an avenue to monitor the activities of their customers and hence customer's feedback and complaints were captured onto the system. This made management of the firm to make decisions concerning the drug products that suit the needs of the customers. Therefore, the firm customers were satisfactorily of the operations, processes and products of the Ayrton Drug Ltd which effectively boosted the patronage and sales of the firm products as well as improved business performance. Velcu (2007) found that "ERP led to greater customer satisfaction as it facilitated that fulfillment of their orders".

Lastly, the study revealed that Ayrton Drug Ltd application of ERP effectively improved the information processing and flow within and outside the firm. This implies the usage of ERP was flexible and system friendly that made it non-difficult for the firm management staff to input various forms of input into the system without any hindrance. This effectively helped improved the information processing and accessibility very easy and quickly. Organization rely on the output of their input in order to make decisions. Therefore, the application of ERP by Ayrton

Drugs Ltd effectively improved information reporting which made management decision making in relation to drugs production effective. The study findings was in line with work of Better et al. 2007; Gordon & Linoff (2010), express that ERP to aid data analysis and interpretation to acquire and assimilate new information that coordinate the various activities and operational efficiency.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter looks at the study summary of the findings that coincide with the study objectives and also made conclusions from the study. Hence, the study made recommendations based on the study findings.

5.1 Summary of the Findings

5.1.1 The Role of Enterprise Resource Planning Systems in the Optimization of Sales and Revenue in a Pharmaceutical Company

Enterprise resource planning (ERP) by Ayrton Drug Manufacturing Ltd played a role that did helped in determine the run rate of top performing drug products. The usage of the ERP system helped played role by way of providing a solution that improved the inventory management by offering better shelf-life control. This was done through the ability of the ERP that offered a basic inventory rotation methods; thus, first in, first out (FIFO), last in, first out (LIFO), and first expiration/first out (FEFO)). This was done at the point of selecting the ingredients for production based on the supplier or packer production dates. The ERP application provided tools to monitor customer specific distribution days based on the remaining shelf life of Ayrton Drug Ltd current products that significantly reduce customer charge-backs, prevent transactions for expired lots, and automatically write off expired product.

The firm was able to monitor real time sales activities of its drugs within the organization and outside the firm. This helped Ayrton Drug Ltd to know the sales revenue performance of their drugs as well as noticing when to replenish stock out drugs or the time to manufacture a new drugs onto the market. The implication was that the firm was able to identify real time sales operations of their drug activities that helped improved as well as enhanced the revenue generation of frim.

The ERP usage helped provided quality information to management that helped improved their decision making. This implies that the ERP helped informed the management on the firm drugs variability which was critical in terms of drugs consistency and quality of the finished products. Therefore, decision making in drug industry was critical to firm performance and survival, therefore, the management decision making is primarily based on the information that was retrieved from the ERP. Therefore, the decision making of management through the application of the ERP was able to identify these variability's, in addition to the fluctuating cost of both raw materials and packaging materials that helped management in making decision to adjust production jobs.

The study revealed that the firm application of ERP helped management to monitor customer's collection and payment trends. This implies that the firm ERP captures the entire supply chain actor's activities on the ERP system included customer's payment system for their drugs. This allowed the firm management to detect the trend of customer's performance in terms of their payment for the drugs.

5.1.2 The Effectiveness of the Role of an Enterprise Resource Planning system in Improving the Performance of a Business

The effectiveness of ERP affects business performance was accepted. The ERP dimensions of pricing, customer relationship management and information processing and reporting had direct impact on business performance. The coefficients of pricing, customer relationship management and information processing and reporting are 0.384, 0.144 and 0.444 respectively. All the coefficients of these variables are positive. This implies that application of ERP system would tend to positively affect business performance and verse versa.

Ayrton Drugs Ltd usage of ERP ensued that the firm pricing and costing of its drugs were made effective. However, the Ayrton Drug ERP application allowed for multiple costing models that supported variety of valuation methods. Typically there are no by-products or co-products

produced in pharmaceutical manufacturing, but for those that do produce such finished products such as Ayrton Drug Ltd, the firm application of the ERP helped captured, assigned and compared actual and standard costs to these products. This allowed the management of the firm to have full access to this information that provided an accurate picture of the effect their manufacturing processes have on margins, profitability and business performance.

Ayrton Drug Ltd application of ERP effectively improved the information processing and flow within and outside the firm. The ERP was flexible and system friendly that made it non-difficult for the firm management staff to input various forms of input into the system without any hindrance. This effectively helped improved the information processing and accessibility very easy and quickly.

5.2 Conclusion

From the above findings, the following conclusions are made.

Firstly, Ayrton Drugs Manufacturing Ltd ERP effectiveness have had a positive significant impact on business performance thereby improving sales and revenue.

Secondly, the firm application of ERP played different roles in sales and revenue optimization. This included the way the ERP ensured that the firm sales and revenue shortfalls are mitigated and removed through constant monitoring of customers collections and payment trends. Also, the application of the ERP ensured that the firm was able to keep track of its drugs products in the market in order know the expire products that was removed to ensured customer satisfaction.

Decision making was key to the management of Ayrton Drugs Ltd and therefore, the study indicated that the application of the ERP system improved the quality of decision making in relation to the costing of the drug product which was critical to the firm.

The study concluded that the effectiveness of Ayrton Drug Ltd ERP made it if flexible to adjust price changes to the firm drug product and as well as improved the customer relationship.

5.3 Recommendations

The study recommends that since ERP was considered effective directly in improving business performance of the firm. Therefore, it is important that top management support is needed to help improve upon the ERP system within and outside the firm which is critical to success of the firm.

This study recommends that the firm needs to have adequate technology infrastructures (both hardware, software and internet facilities) that support good data management system, a reasonable level of communication with strong organizational structures in order to ensure the performance of the firm through application of ERP.

The study recommend that the effectiveness of ERP in Ayrton Drug Ltd is based on the quality of information (input) that is inputted on the system. Therefore, to make information processing and information flow through the firm and ensured effectiveness in business decision making. The study recommends that the firm organize an in-house training in relation to ERP to help the management staff to abreast with the ERP system.

The study recommends that the adopting firms of ERP should adopt the system strategically and gradually to ensure that they add only to efficiency and performance and do not generate additional operational costs. In other words, firms adopting the ERP systems must ensure that the adoption is undertaken in areas that are essential as far as organizational performance is concerned.

5.4 Recommendations for Future Studies

The study suggest that future research should be focused on sector public sector in relation to the role of ERP and business performance.

The study suggest that future research should geared towards all the pharmaceutical companies in Ghana. Thus, making use of the entire industry will help give larger sample size upon generalization can be made to represent the industry.

The study suggest that future research can be conducted on the effect of ERP implementation system on business performance: An Exploratory Case-Study.

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APPENDIX A
UNIVERSITY OF GHANA BUSINESS SCHOOL

QUESTIONNAIRE ON THE ROLE OF ERPs IN OPTIMIZING SALES AND REVENUE IN A PHARMACEUTICAL COMPANIES AND ITS EFFECTIVENESS

This survey is meant to collect relevant information from selected staff to aid in the assessment of the effectiveness of ERPs and the role of ERPs in the optimization of Sales and Revenue in a pharmaceutical company. The information required is strictly for academic purpose and any information provided would be treated with the utmost confidentiality and shall be used only for the intended purpose. Your candid opinion is highly solicited. It will be much appreciated if you could spare some minutes to complete this questionnaire.

Thank you.

SECTION A

Please respond to the questions below by ticking (√) the right option.

1. Gender: (a) Male [ ] (b) Female [ ]

2. Age (in years). (a) 20 – 30 [ ] (b) 31 – 40 [ ] (c) 41 – 50 [ ] (d) 51 – 60 [ ] (e) 61 and above [ ]

3. Years Spent in Organization (in years): (a) 1 – 3 [ ] (b) 4 – 7 [ ] (c) 8 and above [ ]

4. Highest level of education. Please tick (√)

(a) HND [ ] (b) First Degree [ ] (c) Master's Degree [ ] (d) Others (specify)

5. Job title .....

6. What type of employment contract do you have? Please tick (√)

(a) Permanent Full Time [ ] (b) Part Time [ ] (c) Contract [ ] (d) Temporal [ ]

SECTION B

1	2	3	4	5
Strongly Agree (SA)	**Agree (A)**	**Neutral (N)**	**Disagree (D)**	**Strongly Disagree (SD)**

Using the scale above (**1-5**), please tick (√) the levels of agreement in each of the items below with regards to HRM practices of your organization	**SA**	**A**	**N**	**D**	**SD**
	1	**2**	**3**	**4**	**5**
ROLE OF ERP IN SALES AND REVENUE OPTIMIZATION					
(a) The system allows to determine the top performing products					
(b) The system allows to determine the top performing customers					
(c) The system provides aging analysis to track debtors performance					
(d) The system helps to structure sales routes to optimize efficiency					
(e) Provides quality information to management to improve decision making					
(f) Determines sources of shortfalls in sales and revenue					
(g) Determines run rate of top performing products					
(h) Monitors customer collections and payment trends					

SECTION C

1	**2**	**3**	**4**	**5**
Strongly Agree (SA)	**Agree (A)**	**Neutral (N)**	**Disagree (D)**	**Strongly Disagree (SD)**

Using the scale above (**1-5**), please tick (√) the levels of agreement in each of the items below with regards to HRM practices of your organization	**SA**	**A**	**N**	**D**	**SD**
	1	**2**	**3**	**4**	**5**
EFFECTIVENESS OF THE ERP					
PRICING					
(a) Allows prices of various products to be set in system					
(b) Able to apply specific discounts per products					

(c) Provides accurate product cost (conversion, raw and packaging materials) to be factored into final product pricing					
(d) Allows for periodic changes to product prices					
CUSTOMER RELATIONSHIP MANAGEMENT					
(e) System accepts customer complaints					
(f) Prompts Customer Relations Officer on customer complaints					
(g) Monitors response time to customer complaints					
(h) Provides avenue to record customer feedback					
INFORMATION PROCESSING AND REPORTING					
(i) It is easy to input primary data from invoices, waybills, etc.					
(j) Processes information very quickly					
(k) Output generated from system is easy to comprehend					
(l) Reports generated from ERP is accurate					

Thank you for participating

APPENDIX B

Frequencies

Notes

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Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	56	74.7	74.7	74.7
	Female	19	25.3	25.3	100.0
	Total	75	100.0	100.0	

Statistics

		Gender	Age of Respondents	Years Spent in Organization	Highest Level of Education	Job Tittle	Employment Contract
N	Valid	75	75	75	75	75	75
	Missing	0	0	0	0	0	0

Frequency Table

Age of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30 years	26	34.7	34.7	34.7
	31-40 years	34	45.3	45.3	80.0
	41-50 years	8	10.7	10.7	90.7
	51-60 years	7	9.3	9.3	100.0
	Total	75	100.0	100.0	

Years Spent in Organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-3 years	23	30.7	30.7	30.7
	4-7 years	33	44.0	44.0	74.7
	above 8 years	19	25.3	25.3	100.0
	Total	75	100.0	100.0	

Highest Level of Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HND	11	14.7	14.7	14.7
	First Degree	36	48.0	48.0	62.7
	Second Degree	23	30.7	30.7	93.3
	Others	5	6.7	6.7	100.0
	Total	75	100.0	100.0	

Job Tittle

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Sales	25	33.3	33.3	33.3
	Data Analysis	5	6.7	6.7	40.0
	Accounts and Finance	32	42.7	42.7	82.7
	Credit Control and Risk	8	10.7	10.7	93.3
	Others	5	6.7	6.7	100.0
	Total	75	100.0	100.0	

Employment Contract

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Permanent Full Time	52	69.3	69.3	69.3
	Part Time	1	1.3	1.3	70.7
	Contract	21	28.0	28.0	98.7
	Temporal	1	1.3	1.3	100.0
	Total	75	100.0	100.0	

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Descriptives

Notes

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	Cases Used	All non-missing data are used.

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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
The system allows to determine the top performing products	75	2.00	5.00	4.5867	.57171
The system allows to determine the top performing customers	75	2.00	5.00	4.6267	.61012
The system aprovides aging analysis to track debtors performance	75	3.00	5.00	4.6267	.58756
The system helps to structure sales routes to optimize efficiency	75	2.00	5.00	4.0800	.89684
Provides qulaity information to management to improve decision making	75	2.00	5.00	4.3733	.81826
Determines sources of shortfalls in sales and revenue	75	2.00	5.00	4.2133	.79344

Determines run rate of top performing products	75	2.00	5.00	4.2933	.92668
Monitors customers collections and payment trends	75	3.00	5.00	4.4800	.60090
Valid N (listwise)	75				

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Descriptives

Notes

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	N of Rows in Working Data File	75
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.

Syntax		DESCRIPTIVES VARIABLES=Q15 Q16 Q17 Q18 /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.000
	Elapsed Time	00:00:00.000

[DataSet1] C:\Users\OHENE\Desktop\backup\thesis 2019\CURTIS\CURTIS DATA.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Allows prices of various products to be set in system	75	2.00	5.00	4.5333	.77692
Able to apply specific discount per products	75	2.00	5.00	4.2933	.74929
Provides accurate products cost (conversion, raw and packaging materials) to be factored into final product pricing	75	2.00	5.00	4.0800	.88164
Allows for periodic chnages to product prices	75	1.00	5.00	4.1467	.96833
Valid N (listwise)	75				

DESCRIPTIVES VARIABLES=Q19 Q20 Q21 Q22

/STATISTICS=MEAN STDDEV MIN MAX.

Descriptives

Notes

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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	75
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=Q19 Q20 Q21 Q22 /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.031

Notes

Output Created		02-Jul-2019 16:18:32
Comments		
Input	Data	C:\Users\OHENE\Desktop\backup\thesis 2019\CURTIS\CURTIS DATA.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	75
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=Q19 Q20 Q21 Q22 /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.031
	Elapsed Time	00:00:00.046

[DataSet1] C:\Users\OHENE\Desktop\backup\thesis 2019\CURTIS\CURTIS DATA.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation

It is easy to input primary data from invoices, waybill etc	75	3.00	5.00	4.6133	.56696
Processes information very quickly	75	2.00	5.00	4.3467	.83007
Output generated from system is easy to comprehend	75	2.00	5.00	4.4267	.70084
Reports generated from ERP is accurate	74	2.00	5.00	4.1892	.82222
Valid N (listwise)	74				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
System accepts customer complaints	75	1.00	5.00	2.6667	.97722
Prompts customer relations officer on customer complaints	75	1.00	4.00	2.5333	.90544
Monitors response time to customer complaints	75	1.00	4.00	2.5467	.90484
Provides avenue to record customer feedback	75	1.00	5.00	2.8933	1.14577
Valid N (listwise)	75				

```
DESCRIPTIVES VARIABLES=Q23 Q24 Q25 Q26

 /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

Notes

Output Created	02-Jul-2019 16:19:47

Comments		
Input	Data	C:\Users\OHENE\Desktop\backup\thesis 2019\CURTIS\CURTIS DATA.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	75
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=Q23 Q24 Q25 Q26 /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.000
	Elapsed Time	00:00:00.000

[DataSet1] C:\Users\OHENE\Desktop\backup\thesis 2019\CURTIS\CURTIS DATA.sav