UNIVERSITY OF EDUCATION, WINNEBA

EFFECTIVENESS OF INVENTORY CONTROL SYSTEM IN PUBLIC UNIVERSITIES IN GHANA: UEW AS A CASE STUDY

STELLA ABORSEY

MASTER OF BUSINESS ADMINISTRATION

2023

UNIVERSITY OF EDUCATION, WINNEBA

EFFECTIVENESS OF INVENTORY CONTROL SYSTEM IN PUBLIC UNIVERSITIES IN GHANA: UEW AS A CASE STUDY

STELLA ABORSEY

202114971

A Dissertation in the School of Business, Department of Accounting submitted to the School of Graduate School in partial fulfilment of the requirements for the award of the degree of Master of Business Administration (Accounting) in the University of Education, Winneba

JANUARY, 2023

DECLARATION

Student's Declaration

I, **STELLA ABORSEY**, declare that this project work, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

Signature……..

Date …….……

Supervisor's Declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis/dissertation as laid down by the University of Education, Winneba.

Mr. Michael Amoh Asiedu (Supervisor)

Signature: …….

Date: ……

DEDICATION

This dissertation is dedicated to my family.

ACKNOWLEDGEMENTS

First, I am grateful to the University of Education, Winneba (UEW) for given me the platform to achieve this level of education. Secondly, I am grateful to Mr. Michael Amoh Asiedu for supervising this scholarly work. Moreover, I thank my husband, Mr.Terry Senyo Kpodo and my children: Michael Setiam Kpodo, Terry Mawutor Kpodo and Pricess Selinam Kpodo for being with me in this battle. I thank my colleagues Mr. Benard Arthur and Mr. Isaac Aidoo as well as all my friends who supported me in this project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BICS	Barcode Inventory Control Systems
CICS	Components of Inventory Control System
EICS	Effectiveness of Inventory Control Systems
EOQC	Economic Order Quantity Component
EOQT	Economic Order Quantity Theory
FOPSC	Fixed Order Period System Component
FOQSC	Fixed Order Quantity System Component
FOQSC	Control Systems is the Fixed Order Quantity System Component.
ICS	Inventory Control System
ICSA	Inventory Control System Actors
ICSC	Inventory Control System Challenges
JITT	Just in Time Theory
PeICS	Perpetual Inventory Control System
PICS	Periodic Inventory Control System
RFIICS	Radio Frequency Identification Inventory Control Systems
TICS	Type of Inventory Control System
UEW	University of Education, Winneba

ABSTRACT

This study investigates the effectiveness of inventory control systems in Ghanaian public universities using University of Education, Winneba (UEW) as a case. This is done through critical assessment of inventory control system types, examination of inventory control system effectiveness and inspection of inventory control challenges. The study employed mixed methods research methodology which includes qualitative and quantitative research approaches. Purposive sampling was used to administer 112 questionnaires. 110 filled questionnaires were received for analysis. SPSS version 19 was used for the statistical analysis. The statistical analysis techniques utilised include descriptive analysis and multiple linear regression statistical techniques. The study's findings discovered the usage of perpetual inventory control system in UEW. Additionally, inventory control system type, components and actors influence the effectiveness of inventory control systems in UEW. However, inventory control systems challenges such as excessive manual processes frustrate the inventory operations and effectiveness in UEW. The study recommends that authorities should ensure regular human resource trainings on the new technologies and ways of modern inventory control practices in organisations. They should promote the computerization and digitalization of inventory control systems to prevent exasperating manual processes of inventory operations in organisations.

CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Effective and efficient management of various forms of resources is very crucial in organisations (Luwumba, 2013). Resources in organisations are managed by corporate functional systems like inventory control systems (Ondyeki, 2019). Inventory control system is one of the very vital systems in the operation of corporate entities (Mohamed & Kibet, 2019). It is made up of periodic physical counts, ordering of resources in shortage from supplies and valuations of in-stock resources for closing specific accounting period (Jelagat & Paul, 2020; Mahande & Iravo, 2017; Ondyeki, 2019). Mbugi and Lutego (2022) explained that established inventory control systems consider initial count of resources, monitoring of resources to meet demands and shortages in organisations.

Historically, the inventory control systems began in the Stone Age era (Ondyeki, 2019). In those days, fruits and meat were gathered, transported and preserved in households. Farmers cultivate, harvest and preserved farm produce for future usage (Muhande and Iravo, 2017). In modern days, technology advancement has streamlined supply, storage and usage of products and services (Mwikwabe, 2020). With the aforesaid occurrence, management in various institutions are now focusing on various ways of ensuring better material resources management (Girma, 2016). Yinyeh and Alhassan (2013) expounded that it is very important for stakeholders and authorities to have detailed understanding of storage and movement of materials and services within institutions in developing and developed countries. This is to ensure that effective and efficient working processes are not interrupted or stopped in corporate settings (Ondyeki, 2020). Further, to

attain the above mentioned advantage, quantities and qualities of materials and services should be enough in inventory storage as inventory control systems management demand (Girma, 2016).

According to Ondyeki (2019), inventory control system management depicts the accumulation of materials in stores to satisfying the needs of organisational actors and customers in effective and efficient manner. It is made up of material and service's needs, accurate forecasting of resource usage, monitoring and evaluation of resource usage, resources control process and internal logistics management of corporate entities (Mwikwabe, 2020; Adegbie et al., 2020; Nur & Koori, 2017). Similarly, Mbugi and Lutego (2022) harangued that the readiness of organisational materials and services are facilitated by suppliers and inventory officers who must have competence in procurement processes, storage techniques and supply chain management. Procurement processes, inventory control systems and their operations should be implemented to ensure regular supply of goods and services to the organisation (Jelagat & Paul, 2020; Demissie, 2015; Makori & Muturi, 2018). In addition, these operational systems are aligned to provide better demand forecasting trends to avoid unforeseen procurements rush in corporate entities (Qu et al., 2013; Mahande & Iravo, 2017). Ondyeki (2020) suggested that accurately predicting organisational needs, requirements and demands decreases operating expenditure, promotes efficiency and effectiveness and timely inflow of products and services to satisfy organisational actors and customers in an inventory control system environment.

Despite the relevance of inventory control systems, complexities of inventory control systems are to be resolved to optimize storage capacities and make necessary stocks available for staff usage in firms (Mbugi & Lutego, 2022). In other scholarly works,

Makombe (2015) claimed that about twenty five percent (25.0%) to forty percent (40.0%) loss of efficiencies are recognised due to deficient inventory control systems in organisations around the world. For an effective organisational operations in the corporate world, proper inventory control system should be part of the entire establishment of institutions like universities in developing and developed countries (Mohamed & Kibet, 2019; Ondyeki, 2019).

For the past decades, issues related to the management of inventory control systems in educational establishment have called for scholarly investigations into the management of materials and services at the public educational institutions including universities in developing and developed countries (Nzioka & Were, 2017; Qu, Obimpeh-Quayson & Sarpong, 2013). Klebed (2013) opined that poor inventory control systems negatively influence quality education provision to students in educational establishments. Furthermore, in Kenya, Mohamed and Kibet (2019) claimed that fifty percent (50.0%) of public educational institutions do not have proper storage space for facilities, equipment and materials stowage in view of implementing effective inventory control systems. This hampers the progress of education in some ways in Kenya. Highlighting the relevance of inventory control systems in Ghanaian educational institutions, Okosso (2008) discovered that about sixty five percent (65.0%) of public educational institutions in Ghana have poor inventory control systems. This leads to massive wastage of materials and services at the educational facilities in Ghana.

In some ways, this phenomenon is currently being observed at the University of Education, Winneba (UEW) according to preliminary investigation by the researcher of this study. UEW is not all that different from public universities in Ghana and the material

resources wastage as revealed by Okosso (2008) is likely to happen in UEW. The UEW trains and awards students with degrees and other professional certificates. Nonetheless, for these to be achieved, UEW purchases various materials and equipment including tables, chairs, books, calendars, materials for examinations, vehicles and many others. These resources are to be properly stored for future usage in UEW. To prevent loss of materials and other relevant items, there is an urgent need to create an effective inventory control systems in UEW. Despite the relevance of the inventory control systems in corporate entities (Kaudunde, 2013; Tharuna, 2017), there is insufficient empirical studies on the public universities in Ghana especially the University of Education, Winneba. This study seeks to address this issue by conducting scholarly investigations on the effectiveness of inventory control systems in the UEW.

1.1 Research Problem Statement

The importance of inventory control systems cannot be underestimated in organisations including public universities (Qu et al., 2013). Universities in developing world want to be effective and efficient in managing their scarce resources (Mohamed & Kibet, 2019; Kipkemoi, 2019). However, some public universities in developing countries face the disturbing challenges of improper inventory control systems (Yinyeh & Alhassan, 2013). These challenges cut across resource materials intake, storage and distribution in various institutions. Managing organisational material resources within institutions without a well-established inventory control system posed challenges to organisational management especially in public institutions (Mwele & Gichure, 2017; Nur & Koori, 2017). Public institutions such as the public universities encounter inventory challenges in managing their material resources and other assets (Yinyeh & Alhassan, 2013). In some

cases, poorly managed stocking processes produces incremental inventory cost in public universities particularly in developing countries (Ondyeki, 2019; Adegbie et al., 2020).

Similarly, the University of Education, Winneba (UEW) has to manage the available resources assigned to the university by government and other authorities according to the UEW financial and stores regulations (UEW, 2007). Management of UEW have established inventory control systems in order to manage resources for effective and efficient usage. However, is the inventory control systems in the UEW working according to expectations by the management and other relevant authorities? Scholarly studies covering the aforementioned research issue are extremely scarce in Ghana. Scholars such as Yinyeh and Alhassan (2013) and Qu et al. (2013) have performed few research works on the research issue in focus. Yinyeh and Alhassan (2013) studied and designed inventory management system software for public universities in Ghana. Their study was more of computer systems design and implementation than social sciences and business research. Another study by Qu et al. (2013) focused on the influence of inventory management practices on the performance of technical universities in Ghana. Their study uncovered the influence of inventory accuracy, capacity, investment, reduction and inventory turnover on the performance of the technical universities. They recommended that institutional authorities should focus on relatively cheap materials to mitigate inventory cost and losses in organisations. These few studies indicate a clear paucity of research works in the focused research issue. This dissertation seeks to contribute in addressing the identified research shortfall.

Theoretically, the few studies identified did not emphasis on any theoretical framework. The research works by Yinyeh and Alhassan (2013) and Qu et al. (2013) failed

to utilise inventory management theories such as agency theory, economic order theory and just in time theory suggested by Mwikwabe (2020). In a brief, the agency theory for inventory control systems explains the delegation of inventory authorizations to the organisational management (agent) by principals (higher authorities and shareholders) of the organisation to perform all inventory activities (Namazi, 2013). The economic order quantity theory elucidates the suitable ordering processes for appropriate total quantity to be ordered with respect to reducing material cost (Ziukov, 2015). The just in time theory explicates the waste removals, products and services quality advancement and staff inclusion in the entire inventory control processes in achieving inventory effectiveness and efficiency at the right time (Dange et al., 2014). So far, arguably, none of the identified studies in Ghana fully applied these theories in examining the effectiveness of inventory control systems in Ghanaian public universities. This dissertation seeks to help scholars close the aforesaid research lacuna.

Methodologically, Yinyeh and Alhassan (2013) research works performed in Ghana placed less emphasis on research methodology. Their study considered development of inventory management system software. Hence, they did not use any social science research methodology. Nevertheless, Qu et al. (2013) adopted quantitative approach in examining the influence of inventory management practices on the performance of technical universities in Ghana. The paucity of research methodology application for performing scholarly studies on the research issue in focus will be addressed by this dissertation. This dissertation employs quantitative and qualitative approaches to conduct the study.

1.2 Brief Theoretical Framework of the Study

This dissertation is largely immersed in agency theory, the economic order quantity theory and the just in time theory. These theories provide the relevant information on the components and research modules needed to comprehensively elucidate the effectiveness of inventory control systems in public universities in Ghana with a major focus on the University of Education, Winneba and its recognised inventory control systems. The aforementioned theories are comprehensively elucidated in the chapter two of this scholarly work.

1.3 Purpose of the Study

The dominant aim of this research work is to examine the effectiveness of inventory control systems in Ghanaian public universities using the University of Education, Winneba as a case. Conducting this investigation is very relevant in realising the degree of actors' knowledge in organisational inventory control practices that constitute effective ICS operations in institutions such as public universities. Moreover, the outcome of this study will lead to ICS implementation and usage policy formulation for ensuring material resources wastage reduction, inventory items cost reduction and proper funds management of public universities material resources according to the institutional standard inventory control practices.

1.4 Objectives of the Study

The purpose of the study can be achieved through the following specific objectives:

i. To assess the types of inventory control systems.

ii. To examine the effectiveness of inventory control systems.

iii. To assess the challenges of the inventory control systems.

1.5 Research Questions

The following research questions are addressed to achieve the specific research objectives.

i. What are the types of inventory control systems?

ii. How effective are the inventory control systems?

iii. What are the inventory control systems challenges?

1.6 Research Hypotheses

Relying on the reviewed literature and empirical studies on the types of inventory control systems, inventory control system components, inventory control system actors and effectiveness of inventory control systems as explicated in chapter two, this study seeks to postulate the following hypotheses.

H_1: Type of inventory control system influences the inventory control systems effectiveness.

H_2: Inventory control system components affect the inventory control systems effectiveness.

H_3: Inventory control system actors impact the inventory control systems effectiveness.

1.7 Significance of the Study

This study is expected to contribute to scholarly literature, policy formulation and practice in developing and developed worlds. For the literature contribution, the reviewed

literature concerning the types of ICS, component of ICS, document processing in ICS, ICS actors, effectiveness of ICS, ICS challenges and solutions in this study add to the body of scholarly knowledge on the effectiveness of inventory control systems in Ghana and outside Ghana. Moreover, the literature contributions point out future studies directions on inventory control systems in public universities especially in Ghana and beyond. In the case of policy contribution, inventory control systems policy makers would rely on the findings and recommendations from this dissertation in formulating policies on inventory control systems for organisations in developing and developed countries.

For practice, the findings and recommendations from this study is expected to educate readers, researchers, scholars and other professionals on advantages of implementing proper inventory control systems in organisations particularly in public universities. In addition, the challenges identified in this study would inform management and higher authorities to find solutions to the challenges and prevent the occurrence of future challenges in the inventory control systems in various institutions especially the public universities in a developing country like Ghana.

1.8 Delimitation of the Study

This study focuses on the effectiveness of inventory control systems in the University of Education, Winneba (UEW). It covers the types, various component, and challenges of the inventory control systems towards ICS effectiveness in UEW. The discussions of the inventory control system components include economic order quantity component, fixed order quantity system component and fixed order period system component. The types of inventory control system covers perpetual inventory control system, perioic inventory system, barcode inventory control system and radio frequency

identification (RFID) inventory control systems. Moreover, inventory control system actors (ICSA) are explicated in this study. Geographically, the study is conducted in the University of Education, Winneba. It includes UEW staff who are involved in ordering materials from UEW inventory stores and other inventory activities in the University of Education, Winneba.

However, the study did not consider detailed elucidations on the inventory categories, inventory control techniques and material controls towards institutional financial performance as a measure of ICS effectiveness. These non-considerations will not destruct the validity of this scholarly work since all the constructs needed to accomplish the study objectives have been included in the research issue discussions. Hence, the purpose of this study is attained appropriately.

1.9 Brief Research Methodology

Firstly, the first objective of the research is to assess the type of inventory control systems. To achieve the aforesaid objective, a case study research design is utilised. This includes exploratory and descriptive explanations. Qualitative and quantitative research approaches are employed. Interview data are obtained from appropriate UEW staff whiles the quantitative data are gotten from suitable UEW staff through questionnaires administration on the note of purposive sampling. Secondly, the second objective is to examine the effectiveness of inventory control system. Mainly, this side involves quantitative research approach. Questionnaires are administered to appropriate UEW staff through purposive sampling techniques.

Thirdly, the third objective is to assess the challenges of inventory control systems. Case study research design with explorative and descriptive explanations is employed. In addition, qualitative and quantitative research approaches are adopted. The qualitative part make use of interview guide to collect qualitative data on the challenges of inventory control systems from fitting UEW staff while the quantitative side employs questionnaire administration through purposive sampling. In all, the source of data is the UEW staff who are involved in the design, implementation and usage of UEW inventory control systems.

1.10 Organisation of the Study

This dissertation is organised into five chapters. The first chapter introduces the whole study. It explains the research background, research problem statement, purpose of the study, objectives of the study, research hypotheses, significance of the study, research delimitation and definition of terms. The chapter two mainly explicates the literature review on inventory control systems for public universities as well as the University of Education, Winneba. The chapter three expound the research methodology employed in this study. The chapter four presents and discusses the research findings in accordance with the reviewed literature. The chapter five summarises, concludes and provide recommendations from this dissertation to interested individuals, organisations and many others.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.0 Introduction

This chapter focuses on scholarly literature reviews on effectiveness on inventory control systems in corporate entities. Further, it looks at the theoretical foundations and conceptual issues underpinning this study. Discussions on empirical studies in developing and developed countries are performed in this chapter. The chapter presents a conceptual framework which is developed from the conceptual issues, the theoretical foundations, the empirical evidence discussions and the analytical lessons.

2.1 Theoretical Review

The theoretical stance of this research work commence with the agency theory. It continues with economic order theory and ends with just in time theory. These theories are crucial in explicating the effectiveness of inventory control systems in an institution such as the University of Education, Winneba (UEW). The following subsections discuss the aforementioned theories with a focus on inventory control systems (ICS) effectiveness.

2.1.1 *Agency theory*

The agency theory was propagated by Stephen Ross and Barry Mitnick in 1973 (Mwikwabe, 2020; Namazi, 2013). It elucidates the relation of how principals define jobs for agents (managers) to perform the assigned works. Talet (2014) explained that in a corporate setting, managers do works which are normally not performed by shareholders but needed to be done for the growth of the organisation. For instance the governing council of UEW acting as principal stakeholders entrust the management of UEW to the vice chancellor and his or her management team for effective and efficient management of the

university. The assumption of the agency theory focuses on preferences and motivations of actors towards completion of assigned tasks in organisations (Akinleye & Kolawole, 2020). Ondyeki (2019) indicated that completion of tasks does not demand clear ownership separation from organisational management. Additionally, Nur and Koori (2017) orated whenever ownership clearly separate itself from management there is a likelihood occurrence of goal conflict between shareholders and organisational management. A study by Muhunyo and Jagongo (2018) talked about autonomous nature of agent that is likely to hugely influence agent to have personal gains mind-set without considering the mutual gains among the principal and the agents in organisations.

Moreover, Katushabe (2016) suggested that the existence of information asymmetry between shareholders and agents could originate from organisational ownership and control challenges. Information asymmetry connotes the information disparity occurring in institutional settings in terms of delivering and acceptance (Ringo, 2013). Generally, corporate entities agents possess elaborated information on the operational activities of their entities than the principals. These make the principals have a feeling that they are being duped in diverse ways and hence do not holistically trust the activities performed by organisational agents (Akinleye & Kolawole, 2020; Mwikwabe, 2020). Another scholarly work by Mohame and Kibet (2019) revealed that this situation could to agency loss. The organisational systems such as established inventory control systems in organisations have been proposed to reduce agency loss rate in developing and developed countries (Nur & Koori, 2007).

Moreover, through the established ICS implementation and usage in organisations agency cost can be mitigated in terms procurement, storage and distribution of items to

various institutional units (Namazi, 2013). In addition, Mwikwabe (2020) argued cased for a robust inventory control activities towards proper information sharing for all stakeholders. This is to prevent information imbalance in the receipt and delivery of materials in institutional inventory control systems environment. The scholarly discussion put forward by Mohamed and Kibet, (2019) and Mwikwabe (2020) were directed towards agency cost reductions. Nonetheless, Nur and Kroori (2007) uncovered agency cost reduction is absolutely realised if there is holistic commitments from actors concerning the implementation and usage of the inventory control systems in organisations. Their arguments on users commitments were underpinned with actors obedience to ICS implementation rules and guidelines.

Empirically, Mwikwabe (2020) used agency theory to study the elements impacting inventory control system usage in Tanzania. The research work revealed that documentation, professionalism and timely availability of funds influence the usage of inventory control systems in Tanzania public organisations (Mwikwabe, 2020). Similarly in Kenya, Nur and Koori (2017) did a study on the inventory controls and financial performance of Garissa County Government using agency theory. Mainly, the study indicated that inventory recordings positively impact the financial stability of the treasury department in Garissa country. Despite the application of the agency theory in inventory control scholarly works, some researchers have critique some assumptions of the agency theory in organisational environment (Sanfelix & Puig, 2018). For instance, Bruce, Buck and Main (2005) mentioned that agent's self-interest supposition is extremist approach. They harangued that abovementioned supposition creates alike goals connection between organisational principals and agents is unrealistic in institutions.

Another critique offered by agency theory critics was the lack of focus on roles and responsibilities in competitive and dynamic organisational settings towards effective and efficient implementation and utilisation of institutional systems such as inventory control systems to achieving corporate objectives (Amissah, 2017 & Mwikwabe, 2020). Further, investigative work by Lubatkin (2005) unveiled the failure of agency theory in elucidating institutional challenges to appropriate stakeholders. The failure emanated from the inadequate information communication among shareholders and agents in driving business operations in organisational inventory control systems (Mwikwabe, 2020; Nur & Koori, 2017). Scholarly argument of the agency theory have been performed in accordance with inventory control systems in organisations. In this research work, agency theory is applied to investigate how the management of the UEW inventory control systems are performing their duties assigned to them by higher authorities and shareholders (Government of Ghana) of the UEW. In view of that application, investigations on the effectiveness of inventory control systems in UEW is performed by the author of this research work. The next subsections concentrate on economic order quantity theory which basically determines the ultimate inventory level existing in institutions.

2.1.2 *Economic order quantity theory*

The economic order quantity theory (EOQT) was initiated and propagated by Haris (1913) according to Mwikwabe (2020). The underlining concept of the EOQT is to determine the optimum of level stock in the inventory control system in order to avoid bad inventory processes handling and hire cost of ordering inventory items (Kyalo et al., 2019; Ghafour & Rashid, 2016). Dissimilar to the agency theory, the assumption leading the initiation and establishment of this theory was that the request for inventory items should

match the annual ordered quantity of inventory items for a specific period in organisations (Ondyeki, 2019; Mubiru, 2015). Therefore, it focuses on trading off inventory goods and services between storage and high ordering cost for the benefit organisational operations (Nishadd, 2018). Inventory cost are diminished through appropriate ordering of stock items (Mili et al., 2012).

Philosophically, cost of ordering for inventory items is explicated as an additional charges incurred aside the carrying cost of the ordered inventory items (Mbugi & Lutego, 2022). The EOQT provides further understanding on the association between the ordering cost and the actual carrying cost of the inventory items (Kaudunde, 2013). In some cases, the ordering cost turns to be equivalent to the carrying cost (Ondyeki, 2019). This is typically avoided through proper assessment of items to be ordered to replenish the inventory control systems storage (Wauna & Obwogi, 2015; Kipkemoi, 2019). Hence, the EOQT is used to decide the most need inventory goods for stock storage and onward distributions to suitable department and sections in organisations (Adegbie et al., 2020).

For this study the EOQT is selected to guide the investigation into procurement of the right amount of inventory items to the demand by customers, department and section in an institution like the University of Education, Winneba (UEW). Moreover, the EOQT elucidate the need for inventory control system handlers to ensure there is enough stock in the inventory storage to balance institutional liquidity and inventory items for better financial and resource management of an institution like the UEW (UEW, 2007).

2.1.3 *Just in time theory*

The just in time theory (JITT) was initiated by British Motor (1950) in Australia (Abdul et al., 2017; Dange et al., 2014). Just in time theory researchers proclaimed that the

theory looks at the financial performance of corporate organisation with respect to the items overload reduction and cost effectiveness (Bhushan et al., 2017). It is pillared on three core principles according to (Mwikwabe, 2020). The first one is complete elimination or reduction of wastage. That implies that there no room for institutional materials wastage in any form (Mohamed & Kibet, 2019; Adegbie et al., 2020). The second principle is the progressive advancement of goods and services (Mbugi & Lutego, 2022; Mwikwabe, 2020). The third is product quality enforcement through skilled staff involvement at the right and in accordance to organisational strategies (Tundura & Wanyoike, 2016; Javadian et al., 2013). Actually, it is one of the management theories employed to control wastage in inventory control systems for improved productivity in organisations (Dange et al., 2014; Jelagat & Paul, 2020). Mbugi and Lutego (2022) opined that the theory connotes the concept of corporate entities possessing the right goods, the right quality, the right item quantity in the right destination at the time in many situations.

The application of this theories by inventory control system professionals in institutions improves delivery and effective distribution of inventory items to apposite stakeholders (Bhushan et al., 2017). Further, Zaferullah and Kumar (2013) asserted that the JITT is mostly used to elucidate the inventory items wastage reductions and the minimum inventory items quantity available for usage in institution like the UEW. Buttressing the assertion, Dange et al. (2014) mentioned that for an institution to operate effectively with available resource, there must be a positive linkage between resource material distributors and receivers of resource materials. Further, Mbugi and Lutego (2022) indicated the just in time framework for inventory practices directs organisational authorities to have unique inventory control systems that respond to distribution demands

at the right time. This proclamation is similar to the inventory control issues elucidated in the lens of just in time theory by Mwikwabe (2020).

Nevertheless, Mbugi and Letego (2022) suggested that right type of inventory control systems selection by organisational management could aid just in time theory application for inventory control management in various institutions. From the aforesaid explication just in time theoretical framework communicates one of the fundamental selection criterion for the right type of inventory control system in corporate settings. Hence, the requirement specification for establishing and implementing ICS in an institution like UEW should follow the principles of just in time theory. Moreover, some just in time theory scholars recommend that when institutionalising inventory control systems, there should be a critical look into the various components constituting the established organisational ICS. This is to ensure the right output from the ICS at the right time for effective and efficient execution of inventory jobs.

In another scholarly view, the just in time theory must be applied to define institutional inventory control systems structural settings according to material demands and emergency request satisfaction guidelines in corporate entities (Nzioka & Were, 2017). Abdul et al. (2017) declared that effectiveness of organisational ICS is uncovered if there is a total satisfaction and meeting of material demands put forward by requesters. Thus, the right inventory control systems are the systems that provide inventory services satisfaction for all inventory requests (Tharuna, 2017; .Bhushan et al., 2017). The just in time theory provides a framework for effective implementation of the aforesaid concept in an institution like the UEW. This research work employs the just in time theory in conjunction with the economic order quantity theory and agency theory to position this investigative

work in a theoretical framework. The next section presents the reviewed empirical studies on the research issue of this study.

2.2 Overview of Inventory Control Systems in University of Education, Winneba

Ondyeki (2019) asserted that educational institutions require an established inventory control systems to facilitate their operations. The University of Education, Winneba (UEW) is one of the tertiary institutions in Ghana with an existing inventory control systems seeking to aid in the operations of the university through storage and distribution of material resources. In 2007, UEW established financial and stores regulations (UEW, 2007). This policy and regulations documentation guides the operations of inventory control systems at the stores and other departments in UEW. The section thirteen (13) of the financial and stores regulations documentation concentrates on the stores and procurement practices and procedures in UEW (UEW, 2007). This section comprehensively elucidates UEW stores procurement authorisations, rules and regulations; stocks control, central stores optimum stock; stores receivables and issuance; stock intelligence and advice; departmental and sections briefings on stores; assets register management; inventory checks and controls; departmental inventories reconciliations; inventories write-off and financial year stock takings.

In furtherance, only individuals with Value Added Tax (VAT) and Health Insurance Levy (NIL) registrations are allowed to engage in procurement services. Nonetheless, there could be exemptions determined by the university and the minister of finance. All procurements follow the guidelines provided by the Public Procurement Act 2003 (Act 663) and the Public Procurement Board now Public Procurement Authority. In terms of stocks control, the Stores Superintendent ensures and supervises effective

execution of stocking services especially in the case of unallocated and departmental or sectional direct procurements. Supervisions at the Central Stores makes sure stocks amount does not exceed the approved maximum stock amount authorised by the university authorities. In case it happens, the Stores Superintendent is queried by the finance officer in charge of stores. Rectifications are made through authorised items disposal procedures recognised by the UEW.

At the UEW Central Stores, purchases are performed by the purchasing personnel in accordance to the university's procurement plans. Every item received at the stores go through quantity and quality inspections conducted by the user department and technical professional. The items are stocked upon passing all necessary examinations and inspections. The Stores Superintendent prepares store receipt voucher on the received items at the stores for onward submission to the finance office. All requests from the departments or sections to the Central Stores are done through the Combined Requisition and Issue Voucher (C.R & I.V) forms. The C.R & I.V forms are prepared and signed by the appropriate heads of departments or sections with vivid clarification on request specifications. The signed C.R & I.V are sent to the internal audit for pre-auditing activities and then to the budget unit for commitment. The Store Superintendent make first authorisation after the C.R & I.V registration by the Storekeeper. The Storekeeper document appropriate details of the request in words and figures. Stores ledgers clerk prices requested items and forward the voucher to the next personnel for processing and issuance of items. Triplicate copies of the invoices are sent to the requisitioning officer for further processing. This is followed by a duplicate copy of the invoice forwarded to the Stores

Accounts Office for monthly statements preparations and necessary entries and fillings into Central Store ledgers and tally cards.

At the end of every week, the Storekeepers submit low stock intelligence to the Stores Superintendent. The intelligence explains items that are below the minimum stock level at the Central Stores for effective refill. Similarly, stores statements from the central stores are sent to the various departments and sections for recordings into their vote register. Copies of the delivered stores statements are sent to the finance office for appropriate filings. An assets register is kept by the departments and sections. This register is used in recording departmental and sectional machineries, books, equipment and many other office items. It aids in capturing the asset description, asset receipt date, supply sources, manufacturing date of items, quantities and value of received items, state of the items and identification mark of the estate section. A master assets register is kept by the finance officer. This register is examined by the internal audit section of UEW.

At the end of every financial year, the heads of various department and sections perform inventory checks and ensure inventory list agrees with assets register records. The heads offer detailed elucidations to discrepancies that may occur during inventory checks. Report on checked inventories is certified by the head of departments and sections and sent to the finance office within the two weeks period after closing of the financial year. The account officer in the finance office performs inventory reconciliation with received report and the master register existing in the finance section. Discrepancies and anomalies identifications are reported to appropriate department and sections for necessary actions. The inventory report submitted by departments and section may entail recommendations for a total write-off of unserviceable items. A survey board is organised by the registrar

based on the finance offer's advice on the recommendation submitted by the departments and sections of the university.

Annually, stocktaking is conducted by the various department and sections of the UEW. This is jointly performed by verifying team from the audit section of the university. On 31st December of every financial year, stock values are certified by the head of departments and sections during the stock taking exercise. The original certified stock-taking sheets placed in valuation through current market values. Nonetheless, the finance officer can occasionally call for stock-taking if the need emerges. The aforementioned narration of the inventory control systems (ICS) operations in UEW according to UEW (2007) speaks to the relevance of ICS in an institution like the UEW. For instance, the ICS in UEW ensure that relevant materials and tools are stored and made available at the appropriate time for teaching staff to effectively perform their teaching work. On other side, improper handling of inventory control systems could lead to funds wastage in UEW. Hence, UEW must have a critical look and supervision for ICS operations in the various departments and sections. This dissertation seeks uncover and address some of scholarly issues concerning ICS implementation and usage in UEW.

2.3 Inventory Control System Overview

Inventory control system (ICS) is a system consisting of thorough list of stock items in organisations (Aro-Gordon & Gupte, 2016). Mbugi and Lutego (2022) explained that the inventory control system involves step by step recording of raw materials, work-in-progress goods and finished products placed in storage or distribution in accordance to the usage needs of organisational actors. The elucidations from Aro-Gordon and Gupte (2016) and Sohail & Sheikh (2018) emphasised on listings and recordings of items characterizing

the first phase of organisation items inventory process. Moreover, the ICS is embodied with policies and regulations for optimising resources materials usage in organisations (Jelagat & Paul, 2020). In other statements, effective and efficient ICS implementation and usage reduced total cost of inventory (Kipkemoi, 2019; Bhandari, 2017).

It is one of the essential systems in organisational system's infrastructure ensuring cost effective utilisations of institutional resources (Oballah et al., 2015; Costantino et al., 2014). Simply, inventory control systems are solutions integrating various inventory sections of the organisation in terms materials storage and distributions (Adegie et al., 2020; Godana & Ngugi, 2014). These various sections include shipping, procurement, delivery, storage, tracking and reordering sections (Makombe, 2015). All arguments and discussions on the conceptual issues of organisational inventory control systems holistically concentrates effective and efficient procurement practices, storage and distribution of materials to optimize productivity in organisation (Makori & Muturi, 2018; Mohamed & Kibet, 2019)

2.4 Types of Inventory Control Systems

According to a research work performed by Ondyeki (2019), the type of inventory control systems affect the operation of ICS in organisations. The aforesaid study was conducted was at the Open University of Tanzania (OUT) with one hundred and fifty research participants. A case study research design was used in performing the scholarly work. Interviews, observations and documentary reviews were the data collection methods. SPSS was use to analyse the data. One of the striking results was that effectiveness of inventory control systems was achieved based on correct data and cost effectiveness originating from the type of inventory control systems being implemented in OUT.

Another study by Mbugi and Lutego (2022) looked at the influence of inventory control management systems on the performance of companies in the Tanzania manufacturing industry. Specifically, the study sorted to determine types and purpose of the inventory control systems and management in relation with the performance of organisations in the Tanzanian manufacturing industry. To attain the specific objective, qualitative research approach was employed. Five respondents were selected from the inventory and production departments of food and beverages through purposive sampling. The obtained interview data were subjected to content analysis techniques in Nvivo qualitative analysis application environment. The findings revealed that performance of companies in the manufacturing industry in Tanzania was influence by the identified types of inventory control systems. Further, the types of inventory control systems impact items cost reduction and production efficiency in the manufacturing companies in Tanzania.

Again, in Tanzania, Kaudunde (2013) examined the effectiveness of inventory control system in the public sector. The study used quantitative and qualitative research approached. In the quantitative approach, forty (40) research participants were obtained through purposive sampling. In addition, these respondents were interviewed to obtain qualitative data towards achieving the research objectives. The findings showed that implementation and usage of appropriate type of inventory control systems lead to on-time inventory items order and delivery, accurate billing and filling of inventory materials. Drawing from this findings and the abovementioned research results. This dissertation postulates the following hypothesis.

H_1: Type of inventory control system influences the inventory control systems effectiveness.

According to a study conducted by Ondyeki (2019), there are four types of inventory control systems. These include the perpetual inventory control system (PeICS), periodic inventory control system (PICS), barcode inventory control systems (BICS) and radio frequency identification inventory control systems (RFIICS). The types of inventory control systems are elucidated in the following subsections.

2.4.1 *Perpetual inventory control system*

Mbugi & Lutego (2022) asserted that perpetual inventory control system focuses on a constant updates of inventory recordings in view of additions and subtractions emerging as a result of items request, deliveries, movements, distributions and many others. In some institutions, authorities fall on perpetual inventory control systems for contemporary information on inventory issues (Kaudunde, 2013; Demissie, 2015). Likewise, Ondyeki (2019) claimed that PeICS involves current tracking on inventory activities and thus deliver accurate data and information in a continuous form to appropriate organisational actors for effective and efficient management. The clarifications performed by Mbugi and Lutego (2022) and Ondyeki (2019) point to a common goal of constancy, frequency and continuation of suitable updates on inventory matters in organisations. Addition, Girma (2016) harangued that this type of inventory is normally implemented in conjunction with other systems feeding into organisational inventory database for constant update in real time inventory activities in warehouses and other locations.

Despite the benefits of using the perpetual inventory control systems, this systems is not free from challenges (Demissie, 2015) The first challenge is the difficulty in handling PeICS in manual form. Normally, it needs specific equipment and well-design software (Luwumba, 2013). This makes the design and implementation of this type of inventory

control systems very expensive for organisation especially small businesses organisations with several stores and warehouses (Mbugi & Lutego, 2022; Luwumba, 2013). Another PeICS challenge is regular maintenance of the system as opined by (Ondyeki, 2019). Also, Kaudune (2013) added that maintenance and upgrades of PeICS become challenging in the midst of scattered organisational warehouses. Girma (2016) and Ondyeki (2019) revealed that intelligence on current records of items in storage or distribution may be badly affected due to irregular inventory system practice experienced in the usage of organisation perpetual inventory systems. For instance, institutional employees may be in a haste to counting stock items because of time limitations. Therefore, it become challenging for workers to identify anomalies and regularities due to elongated period between counts posed by PeICS in an institution such as UEW.

2.4.2 *Periodic inventory control system*

Periodic inventory control system (PICS) is another type of organisation inventory control system. Ondyeki (2019) expounded this type of ICS does not consider daily inventory activities but on only functions according to a schedule duration of inventory activities. Normally, it monitors and tracks inventory activities through a physical inventory counts process (Mbugi & Lutego, 2022). Deducing, the elucidations put across by Ondyeki (2019) and Mbugi and Lutego (2022) draw on a particular inventory event commencement and ending. Therefore, a calculative duration is established by institutional ICS management team and relevant bodies to examine all inventory activities and processes. These processes including items physical counts, items inflows through procurement, costs and balances are performed in the space of the inventory periodic duration. The inventory periodic duration indicates the beginning and ending of the

inventory activities specified by the inventory control systems rules and regulations (Jelegate & Paul, 2020; Nur & Koori, 2017). According to the financial and stores regulations of UEW, the university mostly engages in periodic inventory control systems. This study dwells on this intelligence to conduct further research on inventory control systems in UEW.

2.4.3 *Barcode inventory control system*

The barcode inventory control systems implementation and usage ensure high levels of accuracy than the utilisation of the manual inventory control system processes (Ondyeki, 2019). It is considered as one of the highly computerised part inventory control systems in organisations (Mbugi & Lutego, 2022). Usually, the inventory control system automatically update inventory records through barcode scanning processes (Oluwaseyi et al., 2017; Luwumba, 2013). Mbugi and Lutego (2022) outlined some benefits of using the barcode inventory control system. These include accurate records on inventory activities and eradication of manual data entry errors into organisational inventory control systems (Yinyeh & Alhassan, 2013; Mbugi & Lutego, 2022).

2.4.4 *Radio frequency identification inventory control system*

The radio frequency identification inventory control system (RFIICS) employs active and passive communication technologies to facilitate inventory transactions in institutions (Girma, 2016). Mbugi and Lutego, 2022 argued that active radio frequency identification technology utilises static identifier readers to manage institutional inventory activities and ware house distributions. As soon as the reader receives the radio frequency identification tag signals, the transaction movement are directed to recording database in the inventory management application (Lwiki et al., 2013). This occurrence allows active

radio frequency identification tags to function effectively and efficiently in institutions demanding real time inventory activities monitoring and tracking checks. For instance, the UEW needs a real-time inventory technology to properly track inventory items in real-time according to the preliminary findings from the inventory control systems actors in UEW. Hence, a pressing to streamline that inventory control activities with active radio frequency identification tag technology in UEW. On the other side, passive radio identification tag uses handheld and manually operated readers to monitor and track inventory activities in organisations (Mbugi & Lutego, 2022). According to Girma (2016) and Ondyeki (2019), the passive radio frequency identification tag does employ real-time readings and recordings technologies. While the active frequency identification tag use a 300 feet reading range, the passive frequency identification has a 40 feet approximation reading range in institutional inventory control systems environment.

Mbugi and Lutego, (2022) opined that this type of inventory control system has some difficulties. The first challenge is the expensive nature of the radio frequency identification inventory implementation. Hence, it is used in the inventory control management practices of expensive inventory items (Kaudunde, 2013). Second, there are signal interference during organisational inventory operations in some institutions (Ondyeki, 2013). This could happened as a result of radio frequency identification tags malfunctionalities and improper positioning of radio gadget system. Another challenges is the high cost of radio transmission gadgets. Despite the high cost of the radio transmission gadgets, all actors in the institutional inventory control systems must have effective radio communication gadgets to effectively and efficient operate in organisations according to the rules and regulation of the inventory control systems (Girma, 2016; Mbugi & Lutego,

2022). In some corporate environments, selection of this type of system hugely depend on the availability of robust servers (Yinyeh & Alhassan, 2013; Ondyeki, 2019). The RFIICS involves the usage of more data as compared to the other type of inventory control system. Therefore, it require robust servers with enough storage space. For a complete inventory solution with this type of inventory control systems, stakeholders must have enough funding to facilitate daily inventory operations (Mbugi & Lutego, 2022). Is the UEW management ready to implement and use RFIICS to ensure ICS effectiveness? This dissertation scholarly digs around this research issue in UEW.

2.5 Components of Inventory Control System

For effective utilisation of institutional inventory control systems, Ondyeki (2019) suggested that ICS must possess some components. These components include economic order quantity component (EOQC), fixed order quantity system component (FOQSC) and fixed order period system component (FOPSC). Thomopoulos (2015) opined that before the invention of computerised system for inventory practices, there existed component aiding the computation of optimal order of items in materials demand and supply environment. This phenomenon is still occurring in organisational daily inventory operations (Mwikwabe, 2020; Mbugi & Lutego, 2022). Nonetheless, the process of computation is being modified by the advancement of computers and information systems technologies (Luwumba, 2013; Jelagat & Paul, 2020). In contemporary institutions, computer technologies for inventory control systems are being implemented to ensure accurate data inputs, accurate cost for products and services, proper rating cost of activities, effective and efficient prediction for demand and supply of items, suitable items history recordings and archiving (Luwumba, 2013; Mwele & Gichure, 2017).

Another point made by Makombe, (2015) suggested that computer application for inventory control activities are embedded with functions for automatic calculation of economic order quantities scenarios. Following this assertion, Mwikwabe (2020) argued that the computer application for inventory control activities reduces the user effort in performing complex calculation for EOQ issues in business transaction. Both Makombe, (2015) and Mwikwabe (2020) explicated and implied the need for innovative inventory control systems in steering business operation in organisations. Unfortunately, some users of these systems have challenges due to lack of expertise and appropriate applications of the inventory control systems guidelines and recommendations (Okosso, 2008; Mohamed & Kibet, 2019). Ondyeki (2019) expounded that whenever there are such happenings, inventory control system users should consult higher authorities for rectifications and other modification to accommodate items diversity and related processes.

The second component to consider in the establishment of modern inventory control systems is the fixed order quantity system component (FOQSC). The components functions in such a way that whenever stock items requires reorder levels, authorities of inventory control systems can focus on ordering a fixed quantity of items (Mili et al., 2012; Girma, 2016). The fixed quantity of order items in some business transactions are treated as economic order quantity in some ways (Kaudunde, 2013; Mwele & Gichure, 2017). This advocates a similarity between FOQSC and EOQ. In the FOQSC, the fixed order quantity procedure facilitates a prearranged amount of items according to the order rule for a specific duration in organisations (Kaudunde, 2013). A study conducted by Ondyeki (2019) in Tanzania supported the claim made by Kaudunde (2013). In so doing, the process of fixed order quantity components diminishes inventory stocking mistakes, creates more

storage spaces for storing extra items and prevents excess funding cost for establishing additional storage facilities (Nishad, 2018; Ondyeki, 2019).

Ghafour and Rashid (2016) revealed that using the fixed order quantity system component for inventory control activities posit some benefits in organisations. These benefits include utmost economical quantity procurement of materials, only needed items calls for the attention of inventory control system supervisors for effective and efficient inventory investment in institutions. Nevertheless, Ondyeki (2019) and Kaudunde (2013) discussed some disadvantages of using the FOQSC. They mentioned that in some cases, ordering of items at irregular period could create discomfort for producers and suppliers. Further, challenges in categorizing items for order period persist and thereby disrupting reorder pattern of the corporate entity. This could lead to several items to be ordered in a congested pending situation with suppliers and producers (Mwele & Gichure, 2017).

The last but not least component to consider in an effective and efficient inventory control systems implementation and usage is the fixed order period system component (FOPSC). The component depicts a constant check on items in stock according to a stipulated duration (Costantino et al., 2014; Tharunas, 2017). It indicates a regular inspection of the stock items levels in the inventory storage at a specific period of time (Ondyeki, 2019). The rules for checking on the stock items varies from institution to institutions in developed and developing countries (Godana & Ngugi, 2014; Qu et al., 2019).

Existing FOPSC within the inventory control system has some advantages and disadvantages (Nishad, 2018; Ziukov, 2015). The advantages include low cost of items

ordering and storage. The cost of orderings items and their delivery from suppliers and producers diminishes drastically (Kamau & Kagiri, 2015; Lwiki et al., 2013). (Ondyeki, 2019) opined that this component is suitable for irregular and ungrouped materials which normally inconvenience suppliers and producers in terms of recurring ordering during irregular procurement duration. Deducing from the aforementioned presentation, Kamau and Kagiri (2015), Lwiki et al. (2013) and Ondyeki (2019) stressed on the convenience stocking of irregular items and its attendant benefits of low cost of procuring and storing the items. Inventory superintendents plan very well with this inventory control systems component due to the time space provided as a result of the periodic inspection (Mwikwabe, 2020; Qu et al., 2019; Nzioka & Were, 2017). They are able to perform items negotiations with suppliers and producers to arrive on attractive discount for ordered items. Hence, effective procurement deals are engaged by parties in the inventory stocking and replacement processes.

Nevertheless, there are some disadvantage of using fixed order quantity system component in an inventory control system. According to Mwikwabe (2020), in a situation where minimum ordered items are lower than supplier's minimum items in stock, there is a likelihood of delay in honouring ordered items to fill empty spaces in the inventory control systems storage. This could lead to distribution and usage instability of inventory bound items in organisations. Another point is that fixing new order and delivery deadlines could worsen the instability due to cumbersome bureaucratic processes in some institutions (Okosso, 2008; Ghafour & Rashid, 2016). The inflexibility registered by the documented periodic intervals creates delays in items restocking and administrative inefficiencies in organisations (Kairu, 2014; Muhande & Iravo, 2017). In UEW, the preliminary

investigation by the author of this study revealed some sort of fixed order period system component in the UEW inventory control systems. Base on the preliminary findings and the aforesaid narrations, the following hypothesis has been developed.

H_2: Inventory control system components affect the inventory control systems effectiveness.

2.6 Inventory Control System Actors

Organisational staff involved in the implementation and usage of the inventory control systems represent the actors within the organisational ICS environment (Kairu, 2015). It said that skilled institutional staff make encouraging impact in the design, implementation and usage of ICS (Namazi, 2013; Muturi, 2016). Therefore, Mwikwabe (2020) orated that highly skilled staff should be considered in daily operational activities of an organisational ICS. This is to avoid irregularities in stocking, damages to inventory items and many other labour practices that hinder the effectiveness of inventory control systems in organisations.

Furthermore, Bhandari (2017) concluded that inadequate skilled staff may exist in the organisational inventory operational line due to inadequate training offered to staff concerning institutional ICS design, implementation and usage. This could bring about poor inventory management and ineffectiveness in organisations (Godana & Ngugi, 2014). Hence, institutional management on ICS should look for qualified persons to handle inventory activities in organisations. In addition, ICS management and relevant stakeholders should organise trainings and workshops for ICS users in corporate entities (Kipkemoi, 2019).

Are these research conclusions and recommendations being implemented in the UEW's inventory control systems establishment? This study investigates the conclusion and recommendations by the above mentioned scholars concentrating on the case of inventory control systems in UEW. In addition, relying on the above reviewed scholarly works, this dissertation has postulated the following hypothesis.

H_3: Inventory control system actors impact the inventory control systems effectiveness.

2.7 Inventory Control System Funding

Designing, implementation and usage of institutional inventory control systems require a sounding financial investment as harangued by Mili et al. (2020). This financial investment comes in the form of allocated funding from the respective organisations (Aro-Gordon & Gupte, 2016; Mohammaditabar et al., 2012). According to Mwikwabe (2020), there could be an incurring cost of operating ICS in organisation. Hence, there a need for management in corporate entities to set up a funding solution to overcome every inventory activities. The claims made by Aro-Gordon and Gupte (2016) as well as Mwikwabe (2020) suggest that no institutional inventory control system can effectively and efficiently function without appropriate funding. A similar instance is applied to inventory control systems in UEW (UEW, 2007). The next section discusses the types of inventory control systems.

2.8 Documentations Processing in Inventory Control System

Documentation processing is one of the core issues to consider in inventory control systems (ICS) operations (Mwikwabe, 2020; Mohammaditabar et al., 2012). According to Muturi (2016), inventory management administration demands competence in managing

documentation concerning stock intake delivery, storage and distribution of inventory items to appropriate users. This assertion was confirmed by Kyalo et al. (2019) in studying inventory management and stock control in Kenyan government ministries. Additionally, documentation on inventory procedures, processes and reporting tends to avail details of inventory transactions to the management members of the inventory control systems in institutions (Ogbo & Ukpere, 2014; Oluwaseyi et al., 2017). These discussions among inventory systems scholars have recommended that the documentation information of inventory transactions should include stock taking, stock auditing and item tracking procedures for accountability and compliance towards stipulated ICS policies and regulations in organisations (Mwikwabe, 2020).

Reacting to the relevance of documentation processing in ICS, Chan et al (2017) opined that ICS documentation process impact the institutional ICS effectiveness. Their study unveiled that one of the challenges encountered in inventory control systems operations is lack of proper documentation processing of inventory items. Tundura and Wanyoike (2016) proclaimed that every inventory operation should have a typical documentation procedure to avoid inventory items misplacement, improper channelling of items and wrong distributions of inventory items in organisations. The assertions made by the aforesaid scholars drive towards a critical importance of documentation processes competence existing within the institution's ICS to realise ICS effectiveness in institution like UEW. This dissertation looks forward to investigative the proclamation made by Tundura and Wanyoike (2016) as well as Chan et al (2017) in the case of UEW.

2.9 Effectiveness of Inventory Control Systems

Effectiveness of inventory control system is one of the crux measures of a successful inventory operations in organisations (Chan et al., 2017; Muhande & Iravo, 2017). It is very important for institutional authorities to attain effective and efficient inventory control systems with respect to accurate items storage and distributions to all entities (Makori & Muturi, 2018). Qu et al., 2013 argued that effective inventory control systems contribute to entire operational cost reduction in institutions. This cost reduction is fuelled by other organisational systems which function well the established inventory control systems (Mwikwabe, 2020). Also, Koin et al. (2014) added that effective ICS must at least break even with the ICS operational costs and the benefit of using the ICS. In another scholarly work, Kaudunde (2013) and Kyalo et al. (2019) revealed that effectiveness of organisational inventory control systems considers items price lowering during procurement, keeping stock items at normal level to satisfy demands, avoidance of stocking unnecessary inventory items, maintenance of variety of stocks and increment in inventory investment.

Nevertheless, Tharuna (2017) orated that the extent of these factors influencing the ICS effectiveness in organisation depends on the organisational structure and inventory control systems functionalities. Institutional structures must be designed in conjunction with innovative inventory control systems to accelerate items tracking and monitoring for effective and efficient organisational operations (Mohammaditabar et al., 2012). The accelerated monitoring and tracking of items in the ICS tends to provide a reduced lead-time in the items order and purchasing services for effective stocking (Dimissie, 2015; Muturi, 2016). Similar case is applied to items re-ordering and delivering from suppliers

to institutional ICS in developing and developed countries (Mwele & Gichure, 2017; Ogbo & Ukpere, 2014). Mwikwabe (2020) revealed that research issues surrounding organisational ICS deal with waste reduction, cost reduction and funds management for the entire ICS facility established in corporate bodies. This mentioning by Mwikwabe (2020) constitutes a major ground for developing a conceptual framework for this study especially on the side of ICS effectiveness in UEW,

2.10 Challenges of Inventory Control Systems

Institutional inventory control systems like any other systems are also embedded with challenges (Yinyeh & Alhassan, 2013; Ondyeki, 2019). First, one of the biggest challenge is the identification and implementation of the right type of ICS that covers all inventory needs of all institutional actors and other authorities (Mwikwabe, 2020). Jelagat and Paul (2020) harangued the type of ICS selection become problematic if intelligence surrounding customer satisfaction, materials availability, production cost and operational cost and other factors related to the organisational ICS are scanty and inaccurate. Moreover, Nzioka and Were (2017) claimed that selecting the ICS type for an organisational become a critical challenge if expert do failed to consider customer satisfaction. From the aforesaid assertions by scholars, the fundamental challenges which could disrupt the entire operations of the organisational ICS is inappropriate selection of ICS for institutional setup. Is there a case like that in the UEW? This dissertation seeks to uncover and address such a situation in the UEW.

The next ICS challenge happening in organisations is interrupted supply chain due to unforeseen circumstances in suppliers and producers camp (Mbugi & Lutego, 2022). In inventory operations, procurement of goods and services are effectively and efficiently

scheduled (Ondyeki, 2019). Authorities handling the ICS operations expect the prompt supply of ordered items to stocking inventory storage facilities (Mwikwabe, 2020). In some cases, the suppliers and producers failed to deliver ordered items on time. The effect of this occurrence badly affect the daily operations of the inventory control systems in organisations (Girma, 2016). Nur and Koori (2017) proclaimed that the good inventory control systems requires timely performed activities from all actors to ensure effectiveness. This goes along with right items and services distribution to customers. Here, the difficulty is the supplier of wrong items and its onward distribution to users of the items (Muhande & Iravo, 2017). This is supported by a scholarly work by Girma, (2016) and Tharuna (2017). They opined that supply and distribution of toxic items hinders the progress of organisations growth in developing and developed countries. Investigation by Kamau & Kagiri (2015) revealed an unacceptable incompetence on the part of suppliers and producers to offer a right type and quantity of items to honour purchasing orders.

Another ICS challenge suggested by Ondeyi (2019) is irregular parameter reviews existing in the management of the inventory control systems. The inventory control systems management parameters include stock quantity safety, stock item refill, continuous reordering and many others (Mwikwabe, 2020). Most of these parameters involve calculations concerning refill lead time of suppliers and demands levels characteristics. Nonetheless, intermittent changes in markets, products and services as well as product lifecycles disruptions create disturbances in institutional ICS (Koin et al., 2014; Nur and Koori, 2017). The situation worsens if the authorities failed to regularly check the inventory control systems environment for constant update on the parameter before the execution of any calculations for reporting, file keeping purposes and procurement services

(Mwikwabe, 2020). This could lead to a complete ineffectiveness of the institutional ICS (Okosso, 2008)

Further, Qu et al. (2019) reported that inefficient processes posed difficulties in organisational inventory control systems operations. A lot of ICS in many institutions are surrounded by manual processes or obsolete systems (Luwumba, 2013). These manual processes oriented systems and obsolete technologies are less effective and efficient regarding the visions, goals and objectives of the organisational ICS. In an event where the delays emanating from the manual processes, demands from individuals and organisations become an extraordinary challenges for the inventory control systems to deliver towards the satisfaction of individuals and organisational demands (Kipkemoi, 2019; Ondyeki, 2019)

2.11 Empirical Review

This section present the empirical reviews concerning the research issues. It analyses past research works focusing on evidence for scholarly comparison with study results originating from this investigative work. Furthermore, this section offer various critiques and suggest how the current investigative work filled the research lacuna identified in the reviewed past scholarly works. The subsequent paragraphs elucidate reviews of the appropriate empirical studies.

In Ghana, Qu et al. (2019) examined inventory management practices influence on Ghanaian technical universities performance through a quantitative research approach. The study considered three hundred and thirty nine (399) sample size from Ghanaian technical universities through using a well-structured questionnaires. The study utilised purposive sampling as a sampling procedure. The Smart PLS analytical software was used to analyse

the data obtained from the technical universities. The study revealed a major influence on the performance of the technical universities by research constructs such as capacity, shrinkage, turnover and inventory accuracy. In addition, inventory investment and turnover on capacity really influenced inventory management in Ghanaian public universities. Moreover, the study showed inventory shrinkage affecting hold cost and the cost of ordering inventory items in an inventory control system. They recommended that inventory control system actors should focus on purchasing relatively cheap items to diminish the entire inventory cost in organisations.

A similar study by Ondyeki (2019) in Tanzania examined inventory control system management in higher education institutions using Open University of Tanzania as a case. The study used mixed methods approach. The quantity approach used on one hundred and fifty (150) respondents through simple random and purposive sampling using administered questionnaires. Data obtained from these respondents were analysed using Statistical Package for Social Sciences (SPSS). The study revealed methods employed by the Open University of Tanzania (OUT) for inventory control management were constant review of stocks, stocking policies for mid and yearly reviews, just-in-time reviews methods and the inventory time ratio methods. Moreover, study uncovered some challenges encountered by OUT during inventory control management. These challenges include selecting and maintaining a suitable amount of inventory items to satisfy demands, excessive budget constraints and human resources incompetence. In addition factors such as correct data attainment, cost effectiveness, lower prices of purchase inventory items and usage of ICT for inventory order and delivery services constitute effectiveness of inventory control

systems. The study recommended that diverse working inventory methods should be used to enhance ICS effectiveness in the Open Universtity of Tanzania.

Another study by Kaudunde (2013) looked at the inventory control system effectiveness in the Tanzania public sector. Forty (40) official form the Kilwa District Council Headquarters were interviewed to obtained qualitative data. The research work uncovered that ordered and delivered inventory items were completely received, free from damages and accurately priced. Hence, the inventory control systems at the district councils were effective, functioning properly and reliable at all times. Moreover, the Kilwa district has institutionalised an inventory control system with a minimal cost of operations. The minimal cost operational techniques include cycle stocks economics associations, reduced purchases, maintenance of inventory balances, diminished lead time for acquisitions, joint procurement services for inventory items and diminished cost of transactions for ordered inventory items. In recommendations, the study suggested that there should be enough funds to support the activities of the store departments, better education on inventory procurement practices and implementation of computerised inventory control system for storage and distribution of inventory goods.

An empirical study by Mwikwabe (2020) examined the elements impacting public instituions in Tanzania. Questionnaires were administered to one hundred and eighty two (182) Tanesco staff were purposefully and randomly sampled. The responses of these one hundred and eighty two (182) staff were subjected to statistical analysis using SPSS. The study findings unveiled the influence of proper documentation, timely funding and professionalism on the inventory control system effectiveness in public institutions. The investigative work suggested that public organisations should implement computerised

systems to manage documentations in the inventory control system for effective and efficient operations organisational inventory management. There should be strict compliance to procurement rules and regulations in public organisations.

Nzioka and Were (2017) conducted investigation into the influence of inventory management on educational sector performance in Kenya. The study utilised mix methods research approach. The quantitative data were collected form one hundred (100) research participants were processed in descriptive and inferential statistical techniques using SPSS. The qualitative data were processed using content analytical technique and presentation made in prose form. The investigation found that the economic order quantity of inventory items, just-in-time refill of inventory stocks, planning for materials and demand satisfaction positively impact the performance of Kenyan educational sector. Moreover, implementation and usage inventory control systems improves performance of educational sector in Kenya. The suggested that authorities should invest in inventory control systems institutionalisations in the Kenyan educational sector.

In another scholarly work, Mohamed and Kibet (2019) assessed the impact of inventory management on fulfilment of customer request in Kenyan public higher learning entities. The study utilised survey research design. Similar to investigative piece by Nzioka and Were (2017) the study employed descriptive and inferential statistical techniques. The findings from the study indicated that customer satisfactions in the higher institution of learning are influenced by inventory control system, variation in demands and economic order quantity of inventory items. The study recommend effective and efficient operations of a robust inventory control systems inventory items. These should include correct

handling of inventory materials, absolute qualitative and quantitative inspection of inventory goods.

2.12 Conceptual and Theoretical Lessons

The conceptual issues presented focuses on institutional inventory control systems. These included general understanding of inventory control systems, types of inventory control systems, inventory control systems effectiveness, challenges encountered by inventory control systems implementation and usage in organisations. These concepts have been used as the founding pillars in inventory control systems research in many nations including Ghana, Tanzania and Kenya. Inventory control systems in educational institutions for that matter public universities is one of the research disciplines in inventory control systems research. This is lacking in Ghana. Hence, this research work fills the identified research void.

Scholarly reviews on empirical works inform this study on the frequent utilisation of quantitative research approach using structured questionnaires to perform research works. Majority of the reviewed empirical studies use quantitative data collection, purposive sampling and stratified sampling as sampling technique choices. This positioned this dissertation to espouse purposive sampling as techniques of sampling. In addition, reviews on agency theory, economic order quantity theory and just in time theory. Lessons deduced from the review of these theories depicts the relevance of implementation and usage of inventory control systems in institution such as the University of Education, Winneba.

The agency theory drives a lead on how organisational management in charge of inventory control systems is directed by higher authorities to operate in UEW in order to

enforce inventory control systems effectiveness in UEW. The lessons obtained from reviewing research works on economic order quantity theory indicate a clear minimal and optimal level of items in the inventory storage at a particular point in time to satisfy request from institutional staff. Additionally, lessons from the analyses of the just in time theory reflect the delivery of appropriate inventory goods in the inventory storage and onward distribution to the right people at the right time within the institutional inventory control systems environment.

2.13 Conceptual Framework for the Study

Drawing from the above-discussed reviewed literature, the conceptual framework for this study designed and illustrated in figure 2.1. Primarily, this study concentrates on inventory control systems types, components of inventory control systems, actors of inventory control systems, challenges of inventory control systems and solutions to inventory control system influencing institutional inventory control systems effectiveness. This dissertation explores how the aforesaid constructs impact the effectiveness of inventory control systems in institution like the UEW.

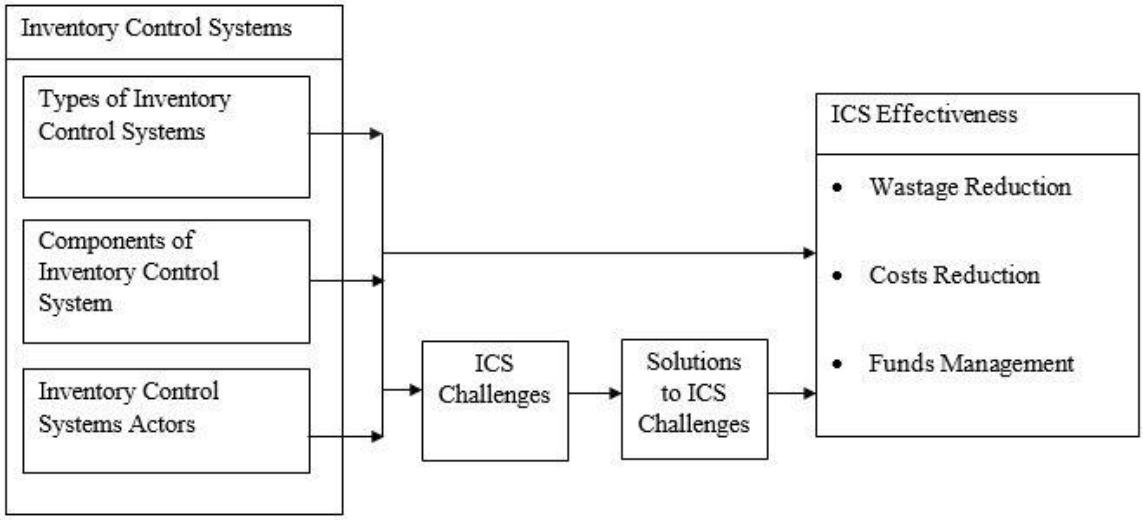

Figure 2. 1: Conceptual Framework of Inventory Control Systems in an Institution

Source: Author's construct based on Mwikwabe (2020) and other reviewed literature.

2.14 Chapter Summary

The chapter was positioned into thirteen main sections. Philosophically, the study was grounded in agency theory, economic order quantity theory and just in time theory. The second section presented an overview of inventory control system in the University of Education (UEW). This was followed by thorough elucidation on inventory control systems in organisations. In order to attain the first objective a section was devoted to review the types of inventory control systems in institutions. These included perpetual inventory control systems, periodic inventory control system, barcode inventory control systems and radio frequency identification inventory control system as opined by Ondyeki (2019). To help achieve the second objective, another section was assigned to scholarly discuss the effectiveness of inventory control system. To assist in obtaining the third objective, a section was made explicate the challenges of inventory control system in institutions. These were followed by empirical reviews concentrating the main research

issues. Moreover, the chapter presented lessons drawn from the conceptual and theoretical framework of the study. The chapter ended with explanations on the explanations on the conceptual framework for this research work.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter looks at the research methodology used in conducting this research work. It focuses on available studies explaining the suitable methods, approaches and designs. The chapter ponders on research approaches and design, the study area, the study population, study sample and sampling design, data gathering instrument and procedure, data processing and analysis, reliability and validity and ethical consideration used in completing this research.

3.1 Research Design

According to Mwikwabe (2020), research design is a conceptual blueprint for conducting research. It enables a researcher to perform detailed and comprehensive investigation into research event (Kaudunde, 2013). Ondyeki (2019) orated that research design directs evidence required to respond to study's research questions appropriately. In other words, it is the plan, structure and strategy arranged to ensure the achievement of research objectives (Muhande & Iravo, 2017). Kipkemoi (2019) added that research design portrays a logical basis for data collection, processing and analysis towards attaining research purpose and objectives. It outlines a master plan that consist of methods and procedures for research data collection and analysis in accordance to the research objectives.

The aforementioned elucidations by research scholars focuses on plans, data collection and data analysis to satisfy research objectives. Hence, it is important to prepare a good research design before commencing a research process (Creswell, 2009; Rubin &

Babbie, 2013). A good research design has theoretical grounding, situational focus, flexibility, redundancy elimination and efficiency (John & Johnson 2012; Sekaran & Bougie, 2010). According to Creswell (2009), there are four types of research designs. These include exploratory research design, descriptive research design, explanatory research design and experimental research design. To achieve the research objectives of this dissertation, exploratory, descriptive and explanatory research designs were adopted. The follow subsections discuss the types of research designs applied in this study.

3.1.1 *Exploratory research design*

Exploratory research design provides a platform to attain new insights into research events. These insights help in research problems and hypotheses formulation (Ondyeki, 2019; Creswell, 2009). Normally, it is applied in research areas where there is lack of enough information on the research issues being considered (Cooper & Schindler, 2011). For instance, literature analysis on past studies concerning inventory control systems revealed an extremely lack of information on the effectiveness of inventory control systems in Ghanaian public universities especially in the case of University of Education, Winneba (UEW).

This prompted this study to adopt exploratory research design. According to Creswell (2009), one of the exploratory research design is case study research design. It focuses on the analysis and interpretations of cases related to research settings (Kipkemoi, 2019; Kumar et al., 2015). This includes a detail study on the causes or elements influencing research issue in organisation (Ondyeki, 2019; Mugenda & Mugenda, 2003). This dissertation utilised case study design to examine cases leading to effectiveness of inventory control systems in the University of Education, Winneba (UEW). The aforesaid

activity helps in achieving the study objectives especially the first research objective which concentrates on the type of inventory control systems.

3.1.2 *Descriptive research design*

The descriptive research design explicates available research phenomena (Kipkemoi, 2019; Mbugi & Lutego, 2022). It describes social events, structures and situations as they are founded (Jelagat & Paul, 2020). The descriptive research design focuses on the uncovering scientific information base on the characteristics of a research phenomenon (Creswell, 2009). Rubin and Babbie (2013) opined that this type of research designed is pillared on a narration of research event, structure, situation and many others. Their assertions are backed by Kipkemoi (2019) proclamation which indicated that a researcher really observes and narrate the appropriate unveiled research findings. The findings are basically based on satisfying the research purpose and research objectives (Creswell 2003). For instance, the purpose of this study is to examine the effectiveness of inventory control systems.

Nonetheless, there are three objectives to be achieved in order to attain the research purpose. Therefore, this research work adopted the descriptive research design in realising study purposes and objectives especially in the case of the second research objective. Creswell (2009) and Kipkemoi (2019) harangued that the descriptive research design thrives on surveys, sampling, questionnaires administration and interviews in research execution. This study followed a similar trend suggested by Creswell (2009) and Kipkemoi (2019).

3.1.3 *Explanatory research design*

Cooper and Schindler (2011) explicated that the main aim of an explanatory research design is to explore research occurrences. It deals with causes and why elements of scientific phenomenon (Creswell 2003). This is to produce author familiarities in unfamiliar study areas (Creswell, 2009). The familiarities aids in the formulation of research problems and hypotheses according to Hair et al. (2009). Mainly, the hypotheses formulation depicts a section of correlation among causal variables (Creswell, 2009). In this study, explanatory research design was adopted to investigate the causes of inventory control systems effectiveness in public universities using the University of Education, Winneba (UEW) as case.

3.2 Research Approach

According to Mbugi & Lutego, 2022, research approach elucidates a particular methodological philosophy underlying a specific research phenomenon. In some cases, the research approach make directions towards qualitative methods, quantitative methods and mixed methods (Creswell, 2009). The qualitative research method concentrates on detailed subjective investigation of research event for inductive reasoning in attaining the purpose of a study (Mohamed & Kibet, 2019). Mostly, it deals with non-numerical data analysis. Case studies, observations and interviews are some of the research techniques utilised in qualitative research methods. The qualitative research concerns the rich data collection and analysis to achieve the research objectives (Mugenda & Mugenda, 2003). Ondyeki (2019) revealed that qualitative research approach looks at entities qualities, processes and meanings of research issues which have difficulties in quantitative measurement. Another

scholarly suggestion by Kumar et al., (2017) indicates that qualitative research approach facilitates investigative socialisation among the investigator and the research participants.

On the other hand is the quantitative research approach. This approach expounds an investigation process of accuracy, reliability and generalizability towards research phenomenon (Domyei 2007; Emory, 2011). It uses numerical data analysis to unveil causal relationships and associations depending on the stipulated research objectives. The author considered quantitative research approach especially in attaining the second research objective. The combination of the qualitative and quantitative research approaches depicts mixed methods research approach (Cohen et al., 2007; Creswell 2009). This study employs mixed methods research approaches. According to Creswell (2006) the mixed methods research approach leads to expansion, development and confirmation of research hypotheses, objectives and purpose. In critical cases, scholars consider the integration of qualitative and quantitative approaches to effectively and efficiently conduct investigation into research phenomenon (Domyei 2007; Malhotra et al., 2017). This offer the opportunities for investigators to explicate the research events in a theoretical framework (Orodho 2012; John & Johnson 2012; Luwumba, 2013). Considering the elaborative nature of the research objectives of the study, this dissertation utilises mixed methods research approach.

3.3 Study Location

The study location is the University of Education, Winneba (UEW) in Ghana. Ghana is located in west Africa. It is bounded in west by Ivory Coast, in the east by Togo, in the north by Burkina Afaso and in the south by the gulf of Guinea. Ghana is divided into sixteen (16) administrative regions. One of the regions in Ghana is Central region. This is

where UEW is located. Precisely, the UEW is situated in Winneba in Central region (UEW ACT, 2004). There are two campuses making up the UEW. These campuses include the Winneba and Ejumako campuses. The selection of UEW was triggered by the near total absence of research works that focus on inventory control system in public universities in Ghana. Nonetheless, there were few studies in Ghana which were used to create research pathway for this dissertation. This include a system for inventory management in public universities (Yinyeh & Alhassan, 2013) and the influence of inventory management practices on the performance of technical universities in Ghana (Qu et al., 2019). This study performs detail investigation into the inventory control systems in Ghanaian public universities using UEW as case.

3.4 Study Population

Kipkemoi (2019) explained that population indicate the total number of individuals participating in a research. Another scholarly opinion by Hair et al. (2009) revealed that a study population depicts individual groups that an investigator has the intension of producing generations to fulfil research objectives in a study. These individual groups should possess beneficial characteristics towards the execution of the scholarly investigations as well as to satisfy the requirement of a research target population (Creswell & Clark, 2007; Emory 2011). In this dissertation, the target population consist of every employee who uses the inventory control systems in UEW. Their involvement in the operations of the UEW's inventory control system give them the opportunity to acquire knowledge on the implementation and usage of the ICS in UEW. Therefore, these employees are likely offer intelligence on the effectiveness of inventory control systems in UEW. The employees include storekeepers, purchasing personnel, finance and account

staff, stores superintendent, departmental and sectional administrators as well as heads of sections and departments in UEW.

3.5 Research Sample and Sampling Design

The research population entails UEW employees involved in the ICS implementation and utilisation in UEW. Large number of employees participate in the UEW's inventory control systems operations. This informs the relevance of selecting an appropriate portion from the total number of working forming the population for this research work (Mbugi & Lutego 2022; Mwikwabe, 2020; Kumar et al., 2015). Moreover, Cooper and Schindler (2011) proclaimed that it is difficult, time consuming and very costly to consider all cases during the performance of research works. Therefore, one hundred and ten (110) research participants from the University of Education, Winneba (UEW) were selected for this dissertation. The sample period was between August and September 2022. The calculation of the sample size was based on formula for determining sample size from large population according to Israel (2003). Drawing from Israel (2003), this research work sample size was calculated using:

$$n = \frac{Z^2\, pq}{e^2} = \frac{1.96^2 * 0.92 * 0.08}{0.05^2} = 110$$

where n = sample size, z = 1.96 as critical value of the normal distribution at 95% Confidence level, assumed p = 0.92, assumed q = 0.08, e = 0.05 as acceptable error

Purposive sampling method was used in selecting the respondents form appropriate sections and departments including stores section. The respondents were basically made up of employees in high authorities who are associated with the UEW's inventory control systems, departmental or sectional heads, departmental or sectional administrators, stores superintendent, finance officers, purchasing personnel, storekeepers, stores ledgers clerk

and many other respondents who are using the ICS in UEW. These research participants were specifically selected based on their relevance of information possession concerning the ICS operational activities in UEW.

3.6 Data Gathering Instrumentation

The dissertation adopted case study and survey research designs. In the case study design, an interview guide (see appendix A) was developed by the researcher. The interview guide was divided into six sections. The section A focused on inventory control systems types and how they influence ICS effectiveness in UEW. The section B concentrated on the inventory control system components and how they impact ICS effectiveness. The section C dealt with inventory control systems actors and how they influence ICS effectiveness. The section D focused on inventory control systems challenges whiles sections E and F looked at the recommended solutions to ICS challenges and the effectiveness of inventory control systems respectively. The interview guide was made up of thirteen (13) questions.

From the reviewed literature, considerable research works have used questionnaires in inventory control systems studies (Ondyeki, 2019; Kaudunde, 2013; Mwikwabe, 2020). In this study, questionnaire was design according the research objectives and the conceptual framework. Similarly, the questionnaire has seven sections. It started with background information of the research participants (section A). This was followed by inventory control system types (section B), inventory control systems components (section C), inventory control system actors (section D), inventory control systems challenges (section E), recommended solutions to ICS challenges (section F) and inventory control systems effectiveness (section G). Apart from section A, each section was itemised with

six questions. The itemised question statements operated on a five-point likert scale (1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree). The questionnaire is made up of forty two (42) questions. Appendix B exhibits the designed questionnaire for this study.

3.7 Data Gathering Procedures

The data gathering started with pre testing of the designed questionnaires on ten (10) respondents. This satisfies the minimum requirement on a pre-testing sample by Saunders et al. (2009). The pre testing unveiled mistakes and ambiguity in the design questionnaire for necessary corrections, printing and onward administration of final questionnaires to appropriate respondents for data gathering. The data gathering was done in the last week of September 2022 and the first week of October 2022. The author entered various offices of the respondents to administer the questionnaires to the suitable research participants. Three days after the questionnaires administration, the author placed a follow up communication to the various research participants for the collection of filled questionnaires. One hundred and ten (110) out of the one hundred and ten (115) questionnaires were completed and returned by the respondents to the author of this research work.

3.8 Data Processing and Analysis

Immediately after the data collection, the data processing and analysis were done. First, the one hundred and eight (110) questionnaires were subjected to cleansing to unwanted responses from the research participants. The Statistical Package for Social Sciences (SPSS) version 19 was utilised in the processing and analysis of the collected data. Various statistical techniques were employed in the data processing and analysis in

this study. These include principal components method for factor analysis, means and standard errors of means techniques, skewness and multiple linear regression techniques to answer the research questions. On the side of the qualitative data, the texts and audios were transcribed and thematically analysed to answer the research questions in this study.

Mostly, the analyses focus on inventory control systems (ICS) and ICS effectiveness in an institution like the University of Education, Winneba (UEW). Moreover, the study objectives served as ultimate guide in developing the various analytical themes and constructs as suggested by Ondyeki (2019) and Mwikwabe (2019). The analysis began with the reliability and validity test were conducted for the several constructs through the application of the Cronbach's alpha coefficient statistical technique. This was shadowed by statistical distribution on the demographics of the respondents. Progressively, the first objective of the study was to assess the types of inventory control systems in a public university such as the UEW.

Exploratory factor analysis (EFA) was espoused to explore research issues concerning the inventory control system types in public university like UEW. Analytical points in the EFA application includes the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy, values of communality and construct loadings of factors measuring ICS types. In addition, the means, standard errors of means and skewness analytical treatment were applied to the ICS type dimensions. As explained by Hair et al., (2009), skewness explicates the data and information distribution symmetry in scientific studies. Moreover, the collected qualitative data on ICS types were thematically analysed to buttress revelations on ICS types in a public university such as the UEW.

The second objective of this research work was to investigate the effectiveness of inventory control systems. A multiple linear regression was adopted in analysing research data concerning the aforesaid investigative objective. The significant values of factors determining the ICS effectiveness regulates the rejection or acceptance of the study hypotheses. The significance values above 0.5 leads to rejection of the research hypothesis whereas those below 0.5 directs the acceptance of the stipulated hypothesis in this study. In addition, qualitative data on ICS effectiveness were thematically analysed to support the claims obtained from the quantitative data on ICS effectiveness. Lastly, the third objective was to unveil ICS challenges. These are explored using statistical analysis techniques such as means measurement, standard error of means and skewness. Nonetheless, information from the qualitative data analysis on ICS challenges in public university like University of Education, Winneba (UEW).

3.9 Reliability and Validity

Reliability shows the idea of similar research findings output of the same research data collection instruments with recurrent data gathering methods in specific investigative periods (Kipkemoi, 2019; Qu et al., 2013). Mohamed and Kibet (2019) suggested that reliability of research dimensions in scientific study instrument elucidates the consistencies in the attributes measuring the dimensions. Hair et al., (2009) opined that one of the statistical measurement techniques used in scientific studies is the Cronbach's alpha value. In this study, the Cronbach's alpha value technique was utilised in measuring the construct reliability.

Qu et al. (2013) unveiled that values above 0.9 indicate excellent internal consistency for the measured dimension. Further, values existing between 0.8 and 0.9

illustrate good internal consistency among the attributes measuring the dimension. In another study, Kipkemoi (2019) opined that values within 0.7 and 0.8 shows an acceptable internal consistency among construct items. Lastly Cronbach's alpha values below 0.5 depicts unacceptable internal consistency in the items measuring the dimensions in research works (Mwikwabe, 2020).

3.10 Ethical Consideration

Research works ethics indicate the rightness of researchers conducts, attitudes and behaviour towards effective and efficient performance of scientific studies (Demissie, 2015). A critical aspect of ethics in scholarly study is easy and transparent scholarly data and other research resources accessibility (Kaudunde, 2013; Demissie, 2015). In this study, the author obtained introductory letter from the department of accounting and finance to the various pertinent offices in the University of Education (UEW) for data accessibility and appropriate collections. Moreover, the author of this study informed the respondents on matters concerning the scholarly data collection for academic purposes. In so doing, the author assured the research participant on the case of strict anonymity and confidentiality in accordance to the research data provision. This was stipulated on the administered questionnaires. Entirely, every ethical principle was followed in the execution of this research work.

3.11 Chapter Summary

The chapter elucidated the appropriate study methodology for this scholarly work. Mainly, the explanations and discussions started with research design. In the research design, the exploratory, descriptive and explanatory research designs were appropriately explicated. These were followed by elaborations of the research approaches employed in

this study. Moreover, this chapter focused espoused research matters on the study area, study population, research sampling and sampling design, data gathering instrumentation, data gathering procedures, data processing and analysis as well as reliability and validity of data collection instrument. The chapter ended with research ethical consideration. The next chapter details the explications on the research findings and discussions with the relevant literature.

CHAPTER FOUR

RESEARCH RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter presents and discusses the findings of the study in accordance with the research objectives. It commences with presentation of the demographic characteristic of the research participants. It continuous with the research findings and discussions on the type of inventory control system, effectiveness of the inventory control system, and inventory control systems challenges in the University of Education (UEW). In accomplishing the research objectives, qualitative explorations of the research issues were performed. A well-structured quantitative analysis was conducted to buttress the results emanating from the qualitative explorations.

4.1 Respondents Demographic Information

This part of the investigative work elucidates the characteristics of the research participants in the University of Education, Winneba (UEW). One hundred and twelve (112) questionnaires were administered to the respondents. One hundred and ten (110) filled questionnaires were return for analysis. Hence, only around 2.0% none response to distributed questionnaires was recorded. The respondents' demographics consist of gender, staff group, staff position, years in service and highest educational level of the respondents. The findings indicated that 51 (45.4%) of the research participants were female whereas 59 (53.6%) of them were males as illustrated in table 4.1. This means that males engage in inventory control activities than female in the UEW. Surprisingly, the above mentioned research outcome does not reflect the ratio males to females population in Ghana. There are more females than males in Ghana according the Ghana Statistical Service (GSS).

Further, the staff group and staff position of the research participants were considered. The study engaged more senior staff 78 (70.9%) than management staff 19 (17.3%) and junior staff 13 (11.8%). For the staff position, 45 (40.9%) of the respondents were departmental and sectional administrators. This was followed by 35 (31.8%) finance and account staff, 15 (13.6%) departmental and sectional heads, 6 (5.5%) purchasing employees, 4 (3.6%) store keepers and 4 (3.6%) stores ledgers clerks as demonstrated in table 4.1. The employees have equipped skills in performing their responsibilities and duties towards effective inventory control systems operations.

Another respondent's demographic characteristic considered was the number of years in employees engagement with the UEW's inventory control systems. Majority of the research participants 74 (67.3%) have spent 6 to 15 years in using the inventory control systems at the UEW. This was followed by 24 (21.8%) respondents having 1 to 5 years working experience with the UEW's ICS, 9 (8.2%) of the participating employees have over 15 years involvement with the inventory control systems in UEW and only 3 (2.7%) have below one year practice with the UEW's ICS as illustrated in table 4.1. This shows the high level ICS experienced workers considered in this study. Lastly, 76 (69.2%) research participants were first degree holders. This was followed by 13 (11.8%) masters degree holders, 10 (9.1%) PhD holders, 5 (4.5%) professional certificate holders, 4 (3.6%) diploma certificate holders and 2 (1.8%) other certificate holders as shown in table 4.1. This indicated that this scholarly work focused on knowledge workers with significant intelligence in inventory control systems.

Table 4. 1: Demographics Information of Research Participants

Variable	Value label	Frequency	Percentage
Gender	Female	51	46.4
	Male	59	53.6
Staff group	Junior staff	13	11.8
	Senior Staff	78	70.9
	Management Staff	19	17.3
Staff position	Stores ledgers clerk	4	3.6
	Store keeper	4	3.6
	Purchasing personnel	6	5.5
	Finance & Account personnel	35	31.8
	Stores superintendent	1	1
	Departmental & sectional administrator	45	40.9
	Departmental & sectional head	15	13.6
Years in service	Below 1 year	3	2.7
	1-5 years	24	21.8
	6-15 years	74	67.3
	Above 15 years	9	8.2
	Diploma certificate	4	3.6
	First Degree	76	69.2

Highest	Masters	13	11.8
Educational	PhD	10	9.1
level	Professional	5	4.5
	Others	2	1.8

Source: Author's constructs from field survey (2022)

4.2 Reliability of Constructs

This scholarly work employed the Cronbach's alpha coefficient statistical technique to examine the reliability of the dimensions contributing to inventory control systems establishment in UEW. The dimensions are made up of inventory control systems types, inventory control systems components, inventory control systems actors, inventory control systems challenges, solutions to inventory control systems challenges and inventory control systems effectiveness.

Table 4. 2: Constructs Reliability and Validity Information on Inventory Control Systems

Dimension	Items	Cronbach's Alpha
Inventory control systems types	6	0.711
Inventory control systems components	6	0.801
Inventory control systems actors	6	0.765
Inventory control systems challenges	6	0.702
Solutions to inventory control systems challenges	6	0.734
Inventory control systems effectiveness	6	0.798

Source: Author's constructs from field survey (2022)

The outcome from the data analysis revealed that inventory control systems components construct had the uppermost internal consistency with Cronbach's alpha figure of 0.801. This was subsequent by inventory control systems effectiveness (0.798), inventory control systems actors (0.765), solutions to inventory control systems challenges (0.734), inventory control systems types (0.711) and inventory control systems challenges (0.702) as shown in table 4.2. All considered dimensions were reliable for onward and further analysis in this study since their respective Cronbach's alpha were more than 0.500.

4.3 Types of Inventory Control System Analysis

This section focuses on attaining the first objective of this study. The analysis concentrates on examining the type of inventory control systems in UEW. It began with a qualitative data investigation from a major respondent at UEW's inventory control system facility. The study wanted find out the types of ICS and how they are being implemented in UEW. The respondent said:

> *"Since I came here, we have only implemented perpetual inventory control systems. However, other types of inventory control systems will considered in near future. These may include barcode inventory control systems especially. Well, the effectiveness of the inventory control systems in the university happens if and when staff receive their material according to their request and the materials distribution policy in the university. Moreover, we take accounts of all materials into the register and make sure we minimize over distribution and wastage of resources in the university."*

The thematic analysis of the narration on the qualitative data obtained from the respondent suggested that the UEW implements perpetual inventory control systems. In addition, if

the perpetual inventory control system is well managed, the UEW is likely to experience full effectiveness of the implemented perpetual inventory control system. The operations of the perpetual inventory control system come with some elements.

This study focused on the quantitative responses offered by the research participants towards achieving the first research objective. The analysis looked at the means, the standard error of the means and the skewness of the agreement levels concerning the items measuring inventory control system type in UEW. The mean statistic is a measure of central tendency indicating the average of a particular data set (Cooper & Schindler, 2011). In this study, a five-point likert scale (1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree) directed the responses from the one hundred and ten (110) respondents. The computations results on the means values were within 4.05 to 4.51 indicating average agreement responses to the question statements since the mean value of 4.00 showed agreement according to the stipulated likert scale in this scholarly work. The standard error of means is a measure of dispersion that demonstrates the level of remoteness of the sample mean from the true population mean (Cohen et al., 2007). Skewness exhibits a measure of data distribution in a particular data set examination (Kumar et al., 2015). Skewness values nearer to zero portrays a normal distribution of the data set in a research work. Skewness values higher than positive five (+5) and negative five (-5) indicate that the data set in a study are not normally distributed. In this project work, the data from the respondents were normally distributed since all the skewness values occur between positive five (+5) and negative five (-5) as publicised in table 4.3.

Table 4. 3: Operational Information on UEW's Inventory Control System Type

Question statements on inventory control systems	Mean	SE of Mean	Skewness
ICS awareness, implementation and usage in UEW	4.01	0.065	-1.137
Documentation of ICS processes, policies, rules and regulations in UEW	4.05	0.068	-0.875
Clear organisational structure concerning ICS flow in UEW	4.32	0.065	-1.371
Integration of reporting structure in UEW's ICS	4.45	0.087	-1.376
Employees duties and role performance in ICS of UEW	4.21	0.071	-1.127
Distinction among staff roles and responsibilities in UEW's ICS usage	4.51	0.037	0.148

Source: Author's constructs from field survey (2022)

In this study, respondents averagely agreed that there was distinction of staff role and responsibilities in the implementation and usage of the perpetual inventory control system in UEW (mean = 4.51, standard error of mean = 0.037, skewness = 0.148) according to table 4.3. This was followed by the integration of reporting structure in UEW's ICS (mean = 4.45, standard error of mean = 0.087, skewness = -1.376), clear organisational structure concerning ICS flow in UEW (mean = 4.32, standard error of mean = 0.065, skewness = -1.371), employees duties and role performance in ICS of UEW (mean = 4.21,

standard error of mean = 0.071, skewness = -1.127), documentation of ICS processes, policies, rules and regulations in UEW (mean = 4.05, standard error of mean = 0.068, skewness = -0.875) and ICS awareness, implementation and usage in UEW (mean = 4.01, standard error of mean = 0.065, skewness = -1.137). Hence, the revelation from the analysis indicates the staff role and responsibilities should be highly considered in establishing the type of inventory control systems to be used in institutions like the UEW. On the other hand, the awareness creation on the ICS type for implementation and usage could be considered in the case selection, implementation and usage of institutional ICS types.

4.4 Analysis on the Effectiveness of Inventory Control System

This section concentrates on examining inventory control system effectiveness in an institution such as University of Education, Winneba (UEW). It is to accomplish the second research objective of this study. It starts with qualitative exploration of inventory control system effectiveness and end with quantitative analysis on inventory control systems effectiveness. First, the study seek to find out how the effectiveness of inventory control system is attained through resources wastage reduction, items cost reduction, proper funds management of the ICS. The respondent mentioned:

> *"As for the wastage reduction, it will reduce significantly. Right now, there is too much waste in the system. We have tried our best to reduce material resources wastage and we are making progress. So, we are made aware that we should make judicious use of the available limited resources through your research then there will be significant reduction in how we waste UEW resources in the stores and other areas. It is clear that now most of the office items and other resources are very expensive. So, we manage the inventory system well and get good suppliers*

who can supplies relatively cheap items why not use them. Moreover, if the outcome and recommendation help us get suppliers with quality and less costly resource materials we will appreciate it very well. Surely, if there is enough money to manage the inventory control system here in the UEW, I think we can make a lot of progress in the inventory management processes and practices. This is what we are suggesting to management of UEW that the whole facility needs face lift to a modern day stores and inventory control systems facility."

From the above respondent narration, it is vivid that appropriate implementation and usage of ICS in UEW produce effectiveness regarding resources wastage reduction, materials cost reduction and proper funds management of UEW. In support of the aforesaid result, inferential analysis in terms of multiple linear regression was performed to examine the UEW's inventory control systems effectiveness according to the types, components, actors, challenges and solution to ICS challenges in UEW. In the multiple linear regression for this study, effectiveness of inventory control systems (EICS) was used as the dependent variable whereas the independent variables include type of inventory control system (TICS), components of inventory control system (CICS), inventory control system actors (ICSA), inventory control system challenges (ICSC) and solutions to inventory control system challenges (SICSC).

A model fit information was obtained from the multiple linear regression analysis. This model fit information covers the R, R^2, adjusted R^2, Durbin Watson, F statistic and the significance value of the fitted multiple linear regression model. The Statistic R measures the correlation between the predicted values and the observed values of a research phenomenon (Cooper & Schindler, 2011). . The square of the R is known as

coefficient of determination. The coefficient of determination (R^2) demonstrates the percentage of variations in dependent variable explained by the predictors in the regression model (Emory, 2011). The adjusted R^2 focuses on the number of independent variables for elucidating the proportion of variations in the dependent variable. It is mostly used in multiple linear regression with considerable independent variables (Kumar et al., 2015). In this study, adjusted R^2 is used in expounding the percentage of variations in ICS effectiveness as contributed by type of inventory control system, components of inventory control system, inventory control system actors, inventory control system challenges and solutions to inventory control system challenges.

Another statistic contributing the model fit information is Durbin Watson. The Durbin Watson looks at the test for autocorrelation in the residuals of a statistical model in regression analysis (Rubin & Babbie, 2013). A normal Durbin Watson value range from 0.00 to 4.00. Nonetheless, a Durbin Watson value of 2.00 and above show there is no autocorrelation in the residuals of the fitted model obtained from the sample of the study (Cooper & Schindler, 2011). In this research work, the Durbin Watson value was above 2.0 and hence there was no autocorrelation detected in the sample responses. The F statistic a statistical measure for testing the significance of the regression coefficient in linear regression models (Kumar et al., 2015). It comes with a calculation of a probability value (p) which is used to determine the significance of the fitted regression model (Rubin & Babbie, 2013). The p value is normally compared with an alpha level which is normally set at 0.05. If the p-value is less than 0.05 then the fitted model is statistically significant.

Table 4. 4: Model fit for Inventory Control System in UEW

R	R^2	Adjusted R^2	SE of Estimate	Durbin Watson	F	Sig.
0.847	0.717	0.696	0.224	2.836	49.146	0.000

Source: Author's constructs from field survey (2022)

Looking at the model fit summary information in table 4.4, the fitted model was statistically significant ($p < 0.000$) in a 95% confidence interval and 5% error margin in the estimates. Moreover, the illustration in table 4.4 shows that 69.6% of the variations in inventory control system in UEW are elucidated by type of inventory control systems, components of inventory control system, inventory control system actors, inventory control system challenges and solutions to inventory control system challenges. The above mentioned analysis indicates the relevance of the factors contributing to the effectiveness of inventory in tertiary institution like the UEW.

In testing the second and the third research hypotheses for this study, analysis of the various elements contributing to the inventory control systems effectiveness in UEW was performed. The unstandardized coefficient from the multiple linear regression were used to determine the contribution of the type of inventory control system (TICS), components of inventory control system (CICS), inventory control system actors (ICSA), inventory control system challenges (ICSC) and solutions to inventory control system challenges (SICSC) to inventory control system effectiveness. The unstandardized coefficients (B and Std Error) depict the effect of the independent constructs on the dependent construct (Cooper & Schindler, 2011). It demonstrates the extent of change in

the dependent construct according every unit of change in the independent constructs (Emory, 2011).

Table 4. 5: Information on elements predicting Inventory Control Systems Effectiveness in UEW.

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std Error	Beta	t	Sig.
(Constant)	-0.288	0.348		-0.828	0.513
TICS	0.141	0.057	0.153	2.474	0.031
CICS	0.368	0.061	0.218	6.033	0.001
ICSA	0.611	0.045	0.546	13.578	0.000
ICSC	-0.008	0.049	-0.007	-0.163	0.911
SICSC	0.102	0.027	0.045	3.778	0.025

Source: Author's constructs from field survey (2022)

According to the coefficients statistics obtained from the multiple linear regression analysis as shown in table 4.5. The findings revealed that the prominent influential element for ICS effectiveness was the ICS actors. The aforesaid element was statistically significant with a value of 0.000 ($p < 0.05$). Hence, inventory control systems actors influence the effectiveness of ICS in institution like the UEW. This confirm the third hypothesis of this research work. In quantifying, an increment in inventory control systems actors is likely to affect ICS effectiveness in UEW by 0.611 if all ICS elements are held constant in the model.

In addition, the findings unveiled that components of inventory control system was statistically significant with a value of 0.001 ($p < 0.05$). Therefore, inventory control system components impact the ICS effectiveness in UEW. This confirms the second research hypothesis in this scholarly work. Quantitatively, an increment in inventory control system components increase the ICS effectiveness by 0.368 if all elements are held constants in the model. Another discovery was that the types of inventory control systems was statistically significant with a value of 0.031 ($p < 0.05$). Hence, inventory control systems types impact ICS effectiveness in the UEW. This supports the first research hypothesis stipulated in this study. In quantifying, an increment in inventory control system types increase the ICS effectiveness by 0.141 if all elements are held constants in the model. A similar case was uncovered for solutions to inventory control system challenges. Nevertheless, the inventory control system challenges was not statistically significant with a value of 0.911 ($p > 0.05$) according to table 4.5. Therefore, inventory control system challenges does not improve inventory control systems usage and implementation in institution like UEW.

4.5 Analysis on the Challenges of Inventory Control System

This section drives towards accomplish the third research objective. Similar to the previous sections, this section begins with qualitative examination of the inventory control system challenges. An interview with a research participant revealed some challenging factors confronting the operations of the inventory control systems in UEW. In the conversation, the research participant said:

> *"There are number of challenges in this facility. These include unexpected interruption in the supply of materials especially when there is a shortage, lack of*

regular training on new technologies and intelligence in inventory control systems, one way of the perpetual inventory control system is obsolete in some ways and to top it all is the manual processes existing within the systems. Very bad, if these challenges are not resolved, very soon they will hinder inventory control operations in this university. I am saying so that the university will not sit there for everything to go bad before they tackle these challenges."

The revelation obtained from the thematic interview narration suggested that the inventory control system in the UEW has challenges. Some of the challenges revolve around interruptions in materials supplies, lack of trainings and material intelligence on the part of handlers as well as the frustrating manual processes. Base on the information outlined in the narration, the study conducted a descriptive analysis on the obtained qualitative data from the research participants. The analysis concentrated on the means, the standard error of the means and the skewness of the agreement levels relating to the items measuring inventory control system challenges in UEW. The means statistic is a measure of central tendency illustrating the averages of a particular data set (Cohen et al., 2007).

In this research work, a five-point likert scale (1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree) guided the responses from the one hundred and ten (110) research participants. The computations on the means point to values from 3.84 to 4.21 showing average agreement responses to the question statements since the values in this research, work the mean values were hovering around 4.00. This indicated agreement according to the stipulated likert scale in this study. The standard error of means shows the level of distance of the sample mean from the true population mean (Cooper & Schindler, 2011). Skewness explains a measure of data distribution in data set inspections

(Kumar et al., 2015). Skewness values closer to zero depicts a normal distribution of the data set in a research work. Skewness values exceeding positive five (+5) and negative five (-5) show that the data set in a study are not normally distributed. In this dissertation, the data from the respondents were normally distributed since all the skewness values exist between positive five (+5) and negative five (-5).

Table 4. 6: Challenges of Inventory Control Systems Operations

Question Statements on ICS Challenges	Mean	SE of Mean	Skewness
Existence of challenges in UEW's inventory control system storage facility	4.10	0.043	0.212
Only periodic inventory systems usage creates challenges to inventory practices in UEW.	3.93	0.049	-1.194
ICS users lack intelligence on inventory items availability.	3.84	0.037	-1.232
Interruption in inventory items supplies in the UEW's inventory control systems.	4.16	0.057	0.217
Unexpected changes in parameters and processes of the UEW's periodic inventory control systems.	4.11	0.047	0.211
Manual processes prevent effective and efficient operations of the ICS in UEW	4.21	0.066	0.346

Source: Author's constructs from field survey (2022)

The statistical information in table 4.6 shows that the topmost challenge confronting the inventory control system in UEW was the manual processes existing within the inventory control system in UEW (mean = 4.21, standard error of mean = 0.066,

skewness = 0.346). This was followed by interruption in inventory items supplies in the UEW's inventory control systems (mean = 4.16, standard error of mean = 0.057, skewness = 0.217) and unexpected changes in parameters and processes of the UEW's inventory control systems (mean = 4.11, standard error of mean = 0.047, skewness = 0.211). These are critical challenges obstructing inventory control system effectiveness in UEW (see table 4.6 for details). Therefore, in examining the challenges of institutional inventory control system, manual processes within the ICS is a major factor to look out for. However, less attention could be directed towards unexpected changes in parameters and processes of the ICS in UEW.

4.6 Discussions of Research Findings

The purposed of this dissertation is to examine the effectiveness of inventory control systems in public universities using the University of Education, Winneba as a case. To accomplish the aforesaid purpose, three objectives were established. These include: (i) to assess the types of inventory control systems, (ii) to examine the effectiveness of inventory control systems and (iii) to assess the challenges of the inventory control systems. These objectives guided the data analysis in obtaining the research findings. This section presents the discussion on the study findings according to the research objectives.

Discussions on the Types of Inventory Control System (Objective one)

The first research objective is to assess the types of inventory control systems. This part presents discussions towards achieving the first research objective. Discussing the dissertation findings with appropriate literature, Mbugi and Lutego (2022) pronounced that awareness creation on the types of inventory control systems in organisation makes users know the various of using the ICS in organisation especially the manufacturing industry in

Tanzania. The research result in this dissertation revealed that respondents agree to the awareness of creation of ICS usage in UEW. Therefore, this disclosure affirms the findings from the Mbugi and Lutego research paper in 2022. In addition, documentation processing in ICS type in institutional settings must be critically considered by ICS stakeholders. In Tanzania public organisations, Mwikwabe (2020) investigated and confirmed the importance of documentation processing of ICS types in public institutions. The research outcome of this study indicated that research participant agreed to the significance of documentation processing, policies and regulations governing the use of ICS type in UEW. Hence, the aforesaid finding support the argument made by Mwikwabe.

Furthermore, Girma (2016) illustrated that vivid reporting structure existing in inventory control system types is ideal for inventory management practices. The study by Girma (2016) touched on the influence of good reporting structure in controlling inventory items in Ethiopian electric utility services organisation in Addis Ababa. Likewise, this research work orated the importance of effective reporting structure in inventory control system type in UEW according the research participants. The research result confirm the assertion by Girma. Lastly, Kaudunde (2013) focused on the roles and responsibilities distinction among employees using inventory control systems types in public sector organisations in Tanzania. Similarly, this scholar works considered and included the elements of roles and responsibilities distinction in investigating the inventory control system types in UEW. According to the research findings the respondents agreed that there were roles and responsibilities in usage of inventory control system type in UEW. This uphold the declaration made by Kaudunde in 2013.

Discussions on Effectiveness of Inventory Control System (Objective Two)

In discussing the research findings with relevant literature towards attaining the second research objective, Mwikwabe (2020) considered resources wastage reduction in way of ensuring inventory control systems effectiveness in public organisations in Tanzania. The study recommended that authorities in charge of inventory control systems should make sure there is a significant resources wastage minimization in organisation. The discovery in this research report as presented in the transcribed interview statements posit the idea of considerable minimization of resources wastage can lead to a realization of inventory control system effectiveness in institution such as the UEW. This discovery confirms the suggestions made by Mwikwabe.

Another underlining point on ICS effective is items cost reduction. Jelagat and Paul (2020) opined that every effective inventory control systems should reduce cost of items and operations appropriately. In Kenya, the oration made by Jelagat and Paul was considered as a major factor in the management of state corporations regarding inventory control systems effectiveness. Similarly, according to the transcribed interview statements in this dissertation, items cost reduction was relevant element for grading the effectiveness of inventory control systems in an institution such as UEW. This affirms the claim by Jelagat and Paul (2020).

Moreover, Demissie (2015) examined the factors impacting inventory control systems using population services international organisation in Ehiopia. The study opined that one of the factor influencing inventory control system in organisation is the case of user or actors in the inventory control system settings. According to the study, actor play critical roles in ensuring inventory control system effectiveness in corporate entities. The

findings obtained from this study's investigations showed that actors influence the effectiveness of ICS (B= 0.611, p = 0.000). This aligns with the revelation by Demissie.

Additionally, physical component such as asset register, request forms, ledgers and tally cards, computer systems, storage facilities and transportation machines contribute to the effective operations of the organisational inventory control systems according to Qu et al. (2019). These components cumulatively influence the effectiveness of inventory control systems in Ghanaian technical universities. Likewise, this study uncovered that the aforesaid component influence the effectiveness of ICS in institutions (B= 0.368, p = 0.001). This confirms the findings by Qu et al. (2019). Another scholarly work performed by Ondyeki (2019) concentrate on types of inventory control systems influencing ICS effective in higher educational institutions in Tanzania. A similar situation was observed in this study and that ICS type influence the ICS effectiveness (B= 0.141, p = 0.031). Thus confirming the proclamation put forward by Ondyeki.

Discussions on the Inventory Control System Challenges (Objective Three)

In discussion of findings with reviewed literature towards achieving the third objective, Ondyeki (2019) revealed that there were some difficulties preventing the effective operation of the inventory control systems in the Open university of Tanzania. Some of these challenges include inadequate competent employees and budget constraint to meeting supplies of inventory items. The findings from this study affirms the proclamation made by Ondyeki and that intelligence on inventory control items availability distract the processes of honouring requester demands. Mbugi and Lutego (2022) orated on how manual process affect the searchability and reachability of inventory items in satisfy customer request in food and beverage manufacturing organisation in Tanzania. The

discovery on manual process challenges in ICS aligns with that of Mbugi and Lutego in Tanzania.

Further, Nzioka and Were (2017) deliberated on the policy making decision challenges regarding inventory control management practices in the Kenyan educational sector. Likewise, this scholarly work agree to the assertion made by Nzioka and Were to the effect that there are challenges in the policy making and practices of inventory control system in UEW. In Tanzania, Kaudunde (2013) harangued that limited storage facility creates peculiar challenges in the reservations of inventory control items in public sector organisations. The findings in this research work relating to inventory storage challenges confirms the assertion made by Kaudunde. Another research work done by Lumba (2013) made major strike on unexpected changes to the process and parameter in existing inventory control system in Bulyanhulu Gold Mine Company in Tanzania. These unannounced challenges affect the operations of inventory control systems in institutions. The above mentioned proclamation by Lumba (2013) is supported by findings offered by this scholarly work and that respondent agree that expected changes in the inventory control system setup affect its effective operations in organisations.

4.7 Chapter Summary

The chapter elucidated the analysis and discussions of the dissertation findings on the inventory control system effectiveness in an institution such as UEW. It began with deliberations on respondent demographic information and proceed in testing the reliability and validity of the various research constructs employed in this study. Detailed analyses were performed on the inventory control system types, inventory control systems effectiveness and inventory control system challenges according to the objectives of the

study. It continued with discussions concerning the inventory control system types and inventory control systems effectiveness in accordance with the reviewed literature in this study. The chapter ended with a comprehensive discussions on the challenges confronting the implementation and usage of inventory control systems in a corporate entity such as UEW. The next chapter offers the summaries, conclusions and recommendations produced from this scholarly work to interested stakeholders.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This is the last chapter for this research work. It consists of summaries, conclusions and recommendations from this dissertation to interested organisations and individuals in the scientific community. The summaries consist of research findings regarding the research objectives in focus. Conclusions on key research discoveries are devised according the objectives of the study. The recommendations are derived from the summaries and conclusions towards tertiary educational institutions and other interested parties. Another point to be considered in this chapter is the study limitation. The ending part of this chapter focuses on the future pointers offered by this study to the research community.

5.1 Summary

The purpose of this dissertation is to investigate inventory control systems effectiveness in Ghanaian public universities using the University of Education, Winneba as a case. To attain this purpose, this dissertation concentrated on three research objectives. The first research objective was to assess inventory control systems types, the second research objective was to examine inventory control system challenges. The study stipulated three research hypotheses emanating from the second research objective and tested them appropriately. One hundred and ten (110) research participants were considered in this study. These sampled using purposive sampling statistical technique. Statistical Package for Social Science (SPSS) version 20 was used as a statistical application for the analysis. The main analysis commenced with frequency distribution

analysis on the respondents demographics. This was subsequent by the constructs reliability and validity inspections using Cronbach's alpha coefficient statistical measure.

To achieve the first research objective, interviews were conducted on the types of inventory control system in UEW. The findings were supported quantitatively using descriptive analysis in terms of means, standard errors of means and skewness. Prominent summaries on the first research objective include:

i. The type of inventory control system used in UEW is perpetual inventory control system.
ii. The most important item contributing to ICS type in UEW that was averagely agreed upon was distinction of staff role and responsibilities in the implementation and usage of the perpetual inventory control system in UEW (mean = 4.51, standard error of mean = 0.037, skewness = 0.148).
iii. The least relevant item influencing the implementation and usage of ICS types in UEW that was averagely agreed with was the ICS awareness, implementation and usage in UEW (mean = 4.01, standard error of mean = 0.065, skewness = -1.137).

To accomplish the second research objective, interviews were performed on the effectiveness of inventory control systems in UEW. The interview results were buttressed quantitatively using multiple linear regression statistical technique. The dependent variable was effectiveness of inventory control systems (EICS). The independent variables include type of inventory control system (TICS), components of inventory control system (CICS), inventory control system actors (ICSA), inventory control system challenges (ICSC) and solutions to inventory control system challenges (SICSC). Outstanding summaries from the findings include:

i. Effective inventory control system reduces material resources and inventory items wastage in UEW.

ii. Effective inventory control system engages in inventory items cost reduction through appropriate supplies of material resources in UEW.

iii. For effective inventory control system, there is an effective and efficient utilisation of capital resources in funding inventory operations and activities in order to realise the effectiveness of inventory control system in UEW.

iv. The findings revealed that the outstanding influential element for ICS effectiveness in UEW was the ICS actors with significant value of 0.000 ($P < 0.05$). This led to the acceptance of the third research hypothesis stating that ICS actors impact ICS effectiveness in UEW.

v. The research result exposed components of inventory control system as an influential element of ICS effectiveness in UEW with a significant value of 0.001 ($p < 0.05$). This directed the acceptance of the second research hypothesis stipulating that inventory control system components affect the effectiveness of ICS in UEW in a positive manner.

vi. Another discovery was inventory control system types influencing inventory control systems effectiveness in UEW with a significant value of 0.031 ($p < 0.05$). Again, this led to the acceptance of the first research hypothesis stating that inventory control systems type affect the effectiveness of ICS in UEW.

To attain the third objective of this study, interviews were conducted on the inventory control systems challenges. The results were buttressed quantitatively utilising descriptive

analysis concerning means, standard errors of means and skewness. Key summaries on the inventory control challenges include:

i. The ultimate challenge antagonizing the inventory control system operations in UEW was the manual processes existing within the inventory control system in UEW (mean = 4.21, standard error of mean = 0.066, skewness = 0.346).

ii. The second most challenging element was interruption in inventory items supplies in the UEW's inventory control systems (mean = 4.16, standard error of mean = 0.057, skewness = 0.217)

iii. The third most challenging element was unexpected changes in parameters and processes of the UEW's inventory control systems (mean = 4.11, standard error of mean = 0.047, skewness = 0.211).

5.2 Conclusions

Concluding for the first research objective, it is clear that UEW uses a perpetual inventory control systems to manage inventory operations and activities. Moreover, it is an essential concern to distinguish the roles and responsibilities of employees in the implementation and usage of the inventory control system in UEW. According to the research participants, they averagely agreed on the aforementioned necessity in the operations of the inventory control system type in UEW. Nonetheless, awareness regarding the implementation and usage of inventory control type received the least attention in terms respondents agreements on the elements influencing the implementation and usage of inventory control types in UEW.

Conclusion on the findings concerning the second objective of the study portrays the inventory control system effectiveness in the context of resources wastage

minimization, inventory items cost reduction and judicious use of financial resource in the management of the UEW inventory and stores facility. Further, the effectiveness of ICS in UEW was elaborated using inventory control system actors, inventory control systems components, inventory control systems challenges and solutions to inventory control systems challenges. All the considered elements positively influence the ICS effectiveness in UEW except inventory control system challenges. The ICS challenges are said to hinder the operations of the entire inventory control systems in UEW.

Concluding on the research outcome concentrating on the third objective, the most observed inventory control systems challenges in UEW were the frustrating manual processes within the ICS in UEW, interruptions in inventory material supplies and unexpected amendments in the parameters and processes established within the inventory control systems settings in UEW.

5.3 Recommendations

Relying on the relevant research findings and conclusions in this study, this dissertation offer the following recommendation to the University of Education, public universities in Ghana and other interested entities in developing and developed countries.

i. Increment in the awareness creation on the implementation and usage of the different inventory control system types for different inventory purposes in organisation. This originated form the findings concerning the average agreement provided by the respondents on ICS awareness, implementation and usage in UEW (mean = 4.01, standard error of mean = 0.065, skewness = -1.137)
ii. Strengthening of ICS documentation regarding processes, policies, rules and regulations on various inventory control systems types in organisations. This is

based on the average agreement provided by the research participant on documentation of ICS processes, policies, rules and regulations in UEW (mean = 4.05, standard error of mean = 0.068, skewness = -0.875)

iii. Fortifying of inventory control system components in the wake of making full ICS operations in order to produces effectiveness in organisation. This is emanating from the research findings suggesting that ICS components influence the effectiveness of ICS in institutions (B= 0.368, p = 0.001).

iv. Enhancement of regular human resource trainings on the new technologies and ways of handling modern inventory control systems in organisations. The results revealed that actor play major roles in ensuring inventory control system effectiveness in corporate entities (B= 0.611, p = 0.000).

v. Promotion of computerization and digitalization of inventory control systems to avoid frustrating manual processes of inventory operations in institutions. According to the findings, the topmost challenge confronting the inventory control system in UEW was the manual processes existing within the inventory control system in UEW (mean = 4.21, standard error of mean = 0.066, skewness = 0.346). This called for the above mentioned promotion.

vi. Constant and rigorous monitoring of the entire inventory control system to identify inventory items shortfalls, materials shortages and other challenges for rectifications. This is based on the findings focusing on the average agreement offered the respondents on the unexpected changes in parameters and processes of the UEW's inventory control systems (mean = 4.11, standard error of mean = 0.047, skewness = 0.211).

vii. Rapid solutions deployment to any challenge or difficulty in the operations of the inventory control systems in institutions. According to the research findings, the respondent averagely agreed that there were challenges in UEW's inventory control system storage facility (mean = 4.11, standard error of mean = 0.047, skewness = 0.211). Hence, solutions must be deployed to resolve the identified challenges in the institutional ICS.

5.4 Study Limitations

The study encountered resources and time constraints during the processes. This made the situation impossible to include all aspects of the inventory control systems. Chiefly, the study focused on the ICS types, components of ICS, inventory control systems effectiveness and the challenges of inventory control systems in UEW. This research work could not report any resources materials misuse, neglect and negligence in handling inventory issues at the UEW to the UEW management due to research data and information collection anonymity.

5.5 Directions for Future Research

This research work proposes that further scholarly work can be conducted focusing on inventory control systems effectiveness in other universities in Ghana and outside Ghana. Moreover, this research concepts and novel ideas can be applied in the mining sector, shipping and transportation industry, the health sector, the stores, supermarket and grocery selling industry, the ware housing industry and many more. The aforementioned industrial sectors deal with material resources storage and appropriated distributions to various interested entities. Hence, scholars and other researchers can direct their scholarly energies towards those areas. Furthermore, the research outcome of this dissertation is

expected to provide literature directions and searching strategies towards writing and publication of research papers in different field of organisational inventory management in developing and developed nation's contexts.

REFERENCES

Abdul, S., Khan, R., Qianli, D., & Zhang, Y. (2017). A Survey Study: Important Factors in Just-in-Time Implementation. *American Journal of Traffic and Transportation Engineering, 2(5),* 74-79. https://doi.org/10.11648/j.ajtte.20170205.13

Adegbie, F. F., Nwaobia, A. N., Ogundajo, G. O., & Olunuga, O. D. (2020). Inventory control and financial performance of listed conglomerate firms in Nigeria. *Journal of Management and Strategy, 11*(2), 56-61.

Akinleye, G. T., Akinleye, G. T., & Kolawole, A. D. (2020). Inventry controls and performance of selected tertiary institutions in Ekiti State: A committee of sponsoring organisations (COSO) framework approach. *International Journal of Financial Research, 11*(1) 10-16.

Aro-Gordon, S., & Gupte, J. (2016). Review of Modern Inventory Management Techniques. *Global Journal of Business & Management, 1, 1-6.*

Bhandari, H. B. (2017). Factors Affecting the Efficiency of Inventory Management of Janapriya Multiple Campus, Pokhara. *Janapriya Journal of Interdisciplinary Studies, 6(2), 78–84.*

Bhushan, D., Aserkar, D., & Nanda Kumar, K. (2017). Effectiveness of Just In Time Manufacturing Practices. *International Journal of Business Management and Economic Research, 8(6),* 1109–1114.

Chan, S. W., Tasmin, R., Aziati, A. N., Rasi, R. Z., Ismail, F. B., & Yaw, L. P. (2017).

ChFactors influencing the effectiveness of inventory management in manufacturing SMEs. In IOP Conference Series: *Materials Science and Engineering* (pp. 2-12) IOP Publishers

Cohen, L., Manion, L., & Morison, K. (2007). *Research Methods in Education.* London: Routledge.

Cooper, D. R., & Schindler, P. S. (2011). *Business Research Methods* (11th ed.) McgrawHill/Irwin.

Costantino, F., Di Gravio, G., Shaban, A., & Tronci, M. (2014). Inventory control system based on control charts to improve supply chain performances. *International Journal of Simulation Modelling, 3(17),* 2-7

Creswell, J. W. (2003). *Research design: qualitative, quantitative, and mixed method approaches* . SAGE publication.

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* SAGE publication.

Dange, S., Shende, P. P., & Sethia, C. S. (2014). A Systematic Review on Just in Time (JIT). *Journal of Emerging Technologies and Innovative Research, 1*(5), 300–304.

Demissie, D. (2015). *An Assessment of the Factors Influencin Inventory Control: The Case of Population Services International Ethiopia.* [Masters dissertation, St Mary's University]. St Mary's University, Faculty of Business.

Dörnyei, Z. (2007). *Research Methods in Applied Linguistics: Quantitative Qualitative, and Mixed Methodologies.* Oxford: Oxford University Press.

Emory, C. W. (2011). *Business Research Methods* (3rd ed.). New Delhi: Irwin.

Ghafour, K. M., & Rashid, R. H. (2016). Optimizing Multi-Item EOQ when the Constraint of Annual Number of Orders is Active. *Modern Applied Science, 11(1), 55*. https://doi.org/10.5539/mas.v11n1p55

Girma, L. (2016). *Assessment of Inventory Management and Stock Control Practices: The Case of Ethiopian Electric Utility*. [Masters dissertation, The St. Mary's University]. The St. Mary's School of Graduate Studies.

Godana, B. E., & Ngugi, K. (2014). Determinants of Effective Inventory Management at Kenol Kobil Limited. *European Journal of Business Management, 1 (11), 341-361.*

Hidayat, R., Zamri, S. N., & Zulnaidi, H. (2018). Exploratory and confirmatory factor analysis of achievement goals for indonesian students in mathematics education programmes. *Journal of Mathematics, Science and Technology Education, 14(12),* 34-42.

Ishaku, A. A., Kakanda, M. M., & Danladi, S. (2020). Assessment of the effectiveness of inventory control systems of Adamawa State ministries, department and agencies in Adamawa State, Nigeria. *Asian Journal of Economics, Business and Accounting, 18*(1), 57-62.

Israel, G. (2003). *Determining Sample Size.* University of Florida. Florida: IFAS Extention.

Javadian Kootanaee, A., Babu, K. N., & Talari, H. F. (2013). Just-In-Time Manufacturing System: From Introduction to Implement. *SSRN Electronic Journal, 1(2), 7–14*. https://doi.org/10.2139/ssrn.2253243

Jelagat, K. M., & Paul, S. N. (2020). Effect of inventory management on the performance of state corporations in Kenya. *International Journal of Supply Chain and Logistics, 4*(2), 27-34.

John, G., & Johnson, P. (2012). *Research methods for Managers.* Sage Publications.

Kairu, K. M. (2015). Role of strategic inventory management on performance of manufacturing firms in Kenya: A case of Diversey Eastern and Central Africa Limited. *International Academic Journal of Procurement and Supply Chain Management, 1(4), 26-33*.

Kamau, L., & Kagiri, A. (2015). Influence of inventory management practices on organizational competitiveness: A case of Safaricom Kenya Ltd. . International Academic *Journal of Procurement and Supply Chain Management, 1(5),* 72–81.

Katushabe, P. (2016). *Internal Controls and Oranisational Performance of United Nations Organisation Stabilisation Mission in the Democratic Republic of the Congo, Entebbe Base.* [Masters dissertation, The Uganda Management Institute]. The Uganda Management Institute Entebbe Base.

Kaudunde, M. (2013). *An Assesssment of Effectiveness of Inventory Control System in the Public Sector in Tanzania: A Case of Kilwa District Council.* [Unpublished MSc dissertation]. Mzumbe University, Mzumbe.

Kipkemoi, M. A. (2019). Effect of inventory management practices on liquidity of public technical training institutions in Rift valley region, Kenya. *American Journal of Humanities and Social Science Research, 3*(8), 81-87.

Klebed, D. (2008). *Evaluation of Caribbean Summit Report on Higher Education Institutions, Inventory Management: The Empirical Evidence.* Oslo: The Kunt Press.

Koin, R., Cheruiyot, K., & Mwangangi, P. (2014). Effect of Inventory Management on The Supply Chain Effectiveness in The Manufacturing Industry in Kenya: A Case Study of Tata Chemicals Magadi. *International Journal of Social Sciences Management and Entrepreneurship, 1(2), 189– 206.*

Kumar, M., Tali, S., & Ramayah, T. (2015). *Business Research Methods.* London: Oxford Press.

Kyalo, N. C., Iravo, A. M., & Maurice, S. (2019). The Effect of Stock Control Management Procedures on Inventory Management Performance in Government ministries in Kenya. *International Journal of Business Management and Finance, 2(1), 6-12.*

Luwumba, D. (2013). *Influence of ICT on Effectiveness of Inventory Control in Tanzania Missing Industry: A Case of Bulyanhulu Gold Mine Limited.* [Unpublished MSc. PSCM dissertation]. Mzumbe University, Mzumbe.

Lwiki, T., Ojera, P. B., Mugenda, N. G., & Wachira, V. K. (2013). The Impact of Inventory Management Practices on Financial Performance of sugar manufacturing firms in Kenya. *International Journal of Business, Humanities and Technology, 3(5),* 75–83.

Makombe, P. (2015). *Inventory Control in the Changing World: The Technology Perspective. Procurement and Supply Chain Summit.* Kericho.

Makori, J. K., & Muturi, W. (2018). Influence of inventory management practices on performance of procurement function in health institutions in Kenya. *International Journal of Social Sciences and Information Technology, 4*(10), 6-13.

Malhotra, N. K., Nunan, D., & Birks, D. F. (2017). *Marketing Research: An applied Approach* (5th ed.). London: Pearson Education Limited.

Mbugi, I. O., & Lutego, D. (2022). Effects of inventory control management systems on organization performance in Tanzania manufacturing industry. A case study of food and beverage manufacturing company in Mwanza city. *International Journal of Engineering, Business and Management,* 6(2), 19-26.

Mili, N., Davidovi, M., & Stefanovi, M. (2012). Financial Effects of Inventory Management in Trading Companies - *Eoq Model. 9(31),* 507–514.

Mohamed, R. A., & Kibet, Y. (2019). Effect of inventory management on customer satisfaction in public institutions of higher learning in Kenya. *Internaltional Academic Journal of Procurement and Supply Chain Management,* 3(1), 198-206.

Mohammaditabar, D., Hassan Ghodsypour, S., & Obrien, C. (2012). Inventory control system design by integrating inventory classification and policy selection. *International Journal of Production Economics, 4(27),* 77-83. https://doi.org/10.1016/j.ijpe.2011.03.012

Mubiru, K. P. (2015). Optimization of Economic Production Quantity and Profits under Markovian Demand. *International Journal of Engineering Research, 4(1),* 18–21. https://doi.org/10.17950/ijer/v4s1/105

Mugenda, O., & Mugenda, A. (2003). *Research Methods; Quantitative and Qualitative Approaches.* ACTS.

Muhande, R., & Iravo, A. (2017). Effect of inventory control management of the operational performance of sugar manufacturing industries in Kenya: A case of Nzoia sugar company. *Internaltional Journal of Social Sciences and Information Technology,* 3(13), 46-52.

Muturi, W. (2016). Factors affecting The Efficiency of Inventory Management in Organizations in Kenya. *International Journal Of Economics, Commerce And Management, 4(4),* 5-12.

Mwele, I. I., & Gichure, J. M. (2017). Effects of inventory maonitoring techniques on distribution service performance of essential drugs in public health facilities: A case of Kenya medical supplies authority. *International Journal of Social Sciences and Information Technology, 8(10),* 57-66.

Mwikwabe, F. (2020). *Factors Influencing Inventory Control System in Public Organisations: A case of Tanesco Head Office.* [Masters dissertation, The Mzumbe University]. The Mzumbe University Library.

Namazi, M. (2013). Role of the agency theory in implementing managements control. *Journal of Accounting and Taxation, 5*(2), 38-47. doi:https://doi.org/10.5897/jat11.032

Nishad, I. (2018). Analysis of Inventory Management by Using Economic Order Quantity

Model - A Case Study. *International Journal for Research in Applied Science and Engineering Technology, 6(6),* 309–315. https://doi.org/10.22214/ijraset.2018.6049

Nur, M. H., & Koori, J. (2017). Inventory controls and financial performance of Garissa county government, Kenya. *International Journal of Accounting, 2*(6), 34-43.

Nzioka, J. M., & Were, S. (2017). Effect of inventory management on performance of the education sector in Kenya. *International Journal of Novel Researc in Education and Learning, 4*(6), 48-59.

Oballah, D., Waiganjo, E., & Wachiuri, W. E. (2015). Effect of Inventory Management Practices on Organizational performance in Public health institutions in Kenya: A case study of Kenyatta national hospital. . *International Journal of Education and Research, 3(3),* 703–714.

Ogbo, A. I., & Ukpere, W. I. (2014). The Impact of Effective Inventory Control Management on Organisational Performance: A study of 7up bottling company nile mile enugu, nigeria. *Mediterranean Journal of Social Sciences*, 5(10), 109-125.

Okosso, H. (2008). *Evaluation of Issues Influencing the Management of Inventories in Higher Institution in Ghana.* Abjoike Press.

Ondyeki, Y. (2019). *An analysis of the Management of Inventory Control Systems in Tanzania Higher Education Institutions: A Case of the Open University of Tanzania Headquators.* [Masters dissertation, The University of Tanzania]. The University of Tanzania Research Library.

Orodho, A. J. (2012). *Essentials of Educational and Social Sciences Research Methods.* Masola Publishers.

Qu, Y., Obimpeh-Quayson, A., & Sarpong, P. B. (2013). The impact of inventory management practices on the performance of Ghanaian Technical Universities: A quantitative approach. *Australian Journal of Economics and Management Science, 8*(1), 67-79.

Ringo, G. N. (2013). *Examining the Effectiveness of Inventory control systems in Ensuring Good Corporate Governance at Ngorongoro District Council Factors Affecting Implementation of Training Programme at Dar Es Salaam City Council, Tanzania.* [Masters dissertation, The University of Mzumbe]. The University of Mzumbe Research Commons.

Rubin, A., & Babbie, E. R. (2013). *Research Methods for Social Work* (7th ed.). Texas: University of Texas at Austin Chapman University.

Sanfelix, G. N., & Puig, F. (2018). New challenges in franchisor-franchisee relationship. An analysis from agency theory perspective. *Cuadernos de Gestion, 18(1), 85–93.* https://doi.org/10.5295/cdg.150610gn

Sekaran, U., & Bougie, R. (2010). *Research Methods for Business, a Skill Building Approach.* (5th ed.). Hoboken: John Wiley and Sons.

Sohail, N., & Sheikh, T. H. (2018). A study of inventory management system case study. *Journal of Advanced Research in Dynamical and Control Systems, 12(4),* 78-84.

Talet, M. Z. (2014). *An Analysis of the Determinants of Internal Control Disclosure by Multinational Corporations.* University of Ottawa, Telfer School of Management, Ottawa.

Tharuna, V. (2017). *To study the Impact of Effective inventory control management of financial performance.* [Masters dissertation, The New Horizon College of Engineering]. The New Horizon College of Engineering Electronic Library.

Thomopoulos, N. T. (2015). Demand Forecasting for Inventory Control. In Demand Forecasting for Inventory Control. https://doi.org/10.1007/978-3-319-11976-2

Tundura, L., & Wanyoike, D. (2016). Effect of Inventory Control Strategies on Inventory Record Accuracy in Kenya Power Company, Nakuru. *Journal of Investment and Management. 5(13), 82–92.*

UEW. (2007). *Financial and Stores Regulations for University of Education, Winneba.* University of Education, Winneba.

Wauna, S., & Obwogi, J. (2015). An Assessment of the Effects of Inventory Management Procedures on Performance of Kengen. *International Journal of Scientific and Research Publications, 5(10),* 1–15.

Yinyeh, M., & Alhassan, S. (2013). Inventory management system software for public universities in Ghana. *International Journal of Advanced Research in Computer Engineering & Technology, 2*(8). 91-97.

Zaferullah, K. Z., & Kumar, S. (2013). Manufacturing Excellence through JIT Approach-

A Review. *International Journal of Application or Innovation in Engineering & Management, 2(12), 302–305.*

Ziukov, S. (2015). A literature review on models of inventory management under uncertainty. *Business Systems & Economics,* *5*(1), 26-39. doi:https://doi.org/10.13165/vse-15-5-1-03

APPENDICES

APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA

SCHOOL OF BUSINESS, DEPARTMENT OF MANAGEMENT SCIENCES

QUESTIONNAIRE ON INVENTORY CONTROL SYSTEMS

Dear respondent,

This questionnaire is designed to collect data on the effectiveness of inventory control systems in the University of Education, Winneba for academic purposes. I would be grateful if you provide response to the question statements on this questionnaire. Strict anonymity and confidentiality are assured. Thank you for your time.

SECTION A

RESPONDENT BACKGROUND INFORMATION

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

2. Staff Category. (a) Junior Staff [ ] (b) Senior Staff [ ] (b) Management Staff [ ]

3. Position in UEW's inventory control system command. (a) Stores ledgers clerk [ ]

(b) Storekeeper [ ] (c) Purchasing personnel [ ]

(d) Finance/Account personnel [ ] (e) Stores superintendent [ ]

(f) Departmental / sectional administrator [ ](g) Departmental / sectional head [ ]

4. Active years in UEW's inventory control system usage. (a) Below 1 year [ ]

(b) 1-5 years [ ] (c) 6-15 years [ ] (d) Above 15 years [ ]

5. Highest educational level. (a) Diploma certificate (b) First Degree [ ]

(c) Masters [ ] (d) PhD [ ] (e) Professional [ ] (f) Other, specify……..

SECTION B

TYPES OF INVENTORY CONTROL SYSTEMS

Please specify the level to which you agree or disagree with the following statements by thicking (√) using the Scale 1 to 5 where **1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree.**

S/N	STATEMENT	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
		1	2	3	4	5
6	There is an awareness of periodic inventory systems implementation and usage in UEW.					
7	Processes, policies, rules and regulations on periodic inventory					

	control systems are documented in UEW					
8	There is a clear organisational structure concerning the flow of periodic inventory systems in UEW					
9	There is a vivid reporting structure integrated in the periodic inventory control systems in UEW					
10	Employees perform their duties and roles according to the rules and regulations of the periodic inventory control systems to achieve its objectives in UEW.					
11	There is a clear distinction among the roles and responsibilities employees using the					

	periodic inventory control systems in UEW					

SECTION C

COMPONENTS OF INVENTORY CONTROL SYSTEMS

Please specify the level to which you agree or disagree with the following statements by thicking (√) using the Scale 1 to 5 where **1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree.**

S/N	STATEMENT	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
		1	2	3	4	5
12	Items are ordered based on the financial outlook of periodic inventory systems in UEW.					
13	There is an automatic calculative mechanism for maximum number of ordered items in UEW's periodic inventory systems.					

14	There is a prearranged amount of items to be ordered automatically embedded in UEW's periodic inventory systems.					
15	The prearranged ordered items component turns to reduce inventory mistakes and excess inventory cost in UEW's periodic inventory systems.					
16	There is a component for constant check on inventory activities in the UEW's periodic inventory systems.					
17	There is a component for periodic inspection on inventory activities in the UEW's periodic inventory systems.					

SECTION D

INVENTORY CONTROL SYSTEMS ACTORS

Please specify the level to which you agree or disagree with the following statements by thicking (√) using the Scale 1 to 5 where **1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree.**

S/N	STATEMENT	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
		1	2	3	4	5
18	There are skilled staff using the periodic inventory control system in UEW					
19	UEW always consider highly skilled employees in the implementation and usage of the UEW's periodic inventory control system					
20	There are unskilled workers using UEW's					

	periodic inventory control systems					
21	Trainings and workshops are organised to develop staff capability in using the UEW's periodic inventory control systems					
22	Staff use the periodic inventory control systems to avoid inventory irregularities, damages and excess cost to inventory items in UEW					
23	Staff used the periodic inventory system to impact in UEW					

SECTION E

INVENTORY CONTROL SYSTEMS CHALLENGES

Please specify the level to which you agree or disagree with the following statements by thicking (√) using the Scale 1 to 5 where **1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree.**

S/N	STATEMENT	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
		1	2	3	4	5
24	The inventory control system in UEW has challenges					
25	Implementation and usage of only periodic inventory control system poses challenges to inventory practices in UEW					
26	The periodic inventory control systems users do not have intelligence on inventory items availability					

27	There are interrupted inventory items supplies in the UEW's periodic inventory control system.					
28	There are unexpected changes in parameters and processes of the UEW's periodic inventory control systems.					
29	The manual processes hinder effective and efficient operations of the periodic inventory control system in UEW					

SECTION F

RECOMMENDED SOLUTIONS TO THE CHALLENGES OF THE INVENTORY CONTROL SYSTEMS

Please specify the level to which you agree or disagree with the following statements by thicking (√) using the Scale 1 to 5 where **1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree.**

S/N	STATEMENT	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
		1	2	3	4	5
30	Management of UEW should provide solution to periodic inventory control systems in UEW.					
31	Users of UEW's periodic inventory control system should have enough knowledge on the availability of					
32	There should be regular supplies of inventory items to avoid shortages					

33	Management should regularly inform users of UEW's periodic inventory control systems about the unexpected changes within the system					
34	The UEW should adopt modern technologies to handle issues of inventory control systems.					
36	UEW management should provide enough funds for inventory control activities in the university					

SECTION G

EFFECTIVENESS OF INVENTORY CONTROL SYSTEMS

Please specify the level to which you agree or disagree with the following statements by thicking (√) using the Scale 1 to 5 where **1= Strongly Disagree; 2= Disagree; 3= Not Sure 4= Agree; 5= Strongly Agree.**

S/N	STATEMENT	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
		1	2	3	4	5
37	The periodic inventory systems in UEW monitors and tracks inventory items wastage					
38	The periodic inventory systems in UEW assist in reducing inventory items wastage.					
39	The periodic inventory systems in UEW monitors and tracks cost of inventory items					
40	The periodic inventory systems creates facilitate					

	the purchase of lower priced inventory items in order to reduce cost for UEW.					
41	The periodic inventory control system has constant funding allocation from UEW management.					
42	Additional funding are provided to ensure smooth operations of the periodic inventory control systems in UEW					

APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA

SCHOOL OF BUSINESS, DEPARTMENT OF MANAGEMENT SCIENCES

INTERVIEW GUIDE ON INVENTORY CONTROL SYSTEM

SECTION A

TYPES OF INVENTORY CONTROL SYSTEMS

1. What type (s) is/are inventory control system(s) being implemented and used in the University of Education, Winneba (UEW)?

2. How does this type of inventory control system ensure effectiveness in UEW inventory control practices?

3. Does the operation of the inventory control systems in UEW conforms to the rules, regulations and laws on inventory control systems practice in UEW and the public financial management act, 2016 (Act 921)?

SECTION B

COMPONENTS OF INVENTORY CONTROL SYSTEMS

4. How do the following components influence effectiveness in UEW inventory control practices?

a. Combined requisition and issuance voucher (C.R & I.V) forms

b. Asset Register

c. Central stores ledgers and tally cards

d. Computer systems and their functionalities

e. Storage facilities (eg. Rooms, shelves, containers, and many others)

f. Transport vehicles, motors and machineries

SECTION C

INVENTORY CONTROL SYSTEMS ACTORS

5. What are the skills requirements needed by employees in order to engage in the implementation and usage of the inventory control systems in UEW?

6. How do these skills affect the effectiveness of the inventory control systems in UEW?

SECTION D

INVENTORY CONTROL SYSTEMS CHALLENGES

7. What the UEW's inventory control systems challenges?

8. How do these challenges influence the UEW's inventory control systems?

SECTION E

RECOMMENDED SOLUTIONS TO THE CHALLENGES OF THE INVENTORY CONTROL SYSTEMS

9. What are the recommended solutions to the UEW's inventory control system challenges?

10. How do these solutions impact inventory control systems in UEW?

SECTION F

EFFECTIVENESS OF INVENTORY CONTROL SYSTEMS

11. How does wastage reduction of inventory items contribute to the inventory control systems effectiveness in UEW?

12. How does cost reduction of inventory items impact the inventory control systems effectiveness in UEW?

13. How does ICS funds management influence the inventory control systems effectiveness in UEW?