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Felix Amoako Offei
PhD Student
Sumy State University (Sumy, Ukraine)
E-mail: f.amoako@aspd.sumdu.edu.ua. **ORCID:** http://orcid.org/0000-0003-3458-5185

Nataliia Letunovska
PhD, Associate Professor, Associate Professor of the Department of Marketing,
Sumy State University (Sumy, Ukraine)
E-mail: n.letunovska@kmm.sumdu.edu.ua. **ORCID:** https://orcid.org/0000-0001-8207-9178
ResearcherID: H-8582-2018. **SCOPUS:** 56437713300

INFLUENCE OF ICT ON EFFECTIVENESS OF INVENTORY CONTROL IN THE PUBLIC SECTOR ON THE WAY TO HEALTHY GREEN DEVELOPMENT IN CONDITIONS OF UNCERTAINTY

The study aimed at investigating the influence of Information and Communication Technology on effectiveness of inventory control in the public senior high schools on the way to healthy green development. Specific objectives were to determine the role of ICT on the effectiveness of Inventory Control in the schools of the study towards a healthy green development. Purposive sampling technique was employed to sample 100 staff from Senior High Schools in the Kumasi Metropolis. The study used questionnaires to gather primary data. All data collected was checked for completeness, coded and tabulated. The study revealed that, ICT influence the receipt of inventory, tracking the movements of stock within and outside the stores, inventory levels and update, buffer stock management. It appeared from the study that challenges facing Senior High Schools in Kumasi Metropolis on executing ICT on inventory control are high cost of training staff to use the system, frequent power outages making the use of the system uneasy, lot of time to learn the software, and complexity in the user interface. Management of the various Senior High Schools should attract and trained more personnel to use the ICT system in inventory control and increase its budget to meet the initial cost on purchasing, installing and application of ICT on inventory management control system.

Key words: *sustainability; green supply chain management (GSCM); deteminants of communication effectiveness; innovations in public sector; impact of uncertainty.*
Fig.: 1. References: 19.

Introduction. Inventory control is the means by which material of the correct quality and quantity is made available as and when required with due regard to the economy in storage and ordering cost, purchasing price and working capital. Inventory control is the function of planning, controlling, and maintaining the right quantity of materials using the minimum level of resources. Inventory control aims at efficient purchasing, storage and use of the materials. Inventory control activities such as demand forecast, stock status, receipt, issue, and the return of materials generations of data were done by using manual storage procedures [1]. Inventory costs are often the biggest costs in businesses and these costs if reduced would yield the greatest benefit in strengthening the firm's competitive edge. Effective inventory control which involves integrating modern ICT allows institutions to fulfill its expectations of product availability while achieving the golden balance of not holding too much stock or too less stock thus inventory costs. Public schools that hold inventories has been facing inventory problems, the schools carrying hundreds or even thousands of different parts of items are facing the impossible task of physically monitoring the inventory levels of each part. Green growth and green development are becoming imperative means for the sustainable process of helping the economy and societies in the world. countries are coming up with ground-breaking procedures, policies and practices to accomplish healthy green development. Mostly inventory control and inventory management are vital technologies for firms' management to make decisions. The gradually contaminated environment has made going green utilization of resources and environmental protection more urgent. Sustainable or green inventory management seeks to reduce the environmental and social impacts of an industry without affecting its profitability.

Ensuring effectiveness of inventory control is a key to success of an organization as it helps to reduce waste and enhance value creation in the supply chain. Inventory control can be made more effective with the introduction of Information and Communication Technology (ICT) and green development to ensure a cost-effective inventory operation and environmental protection. Innovations in information process, telecommunications, and related technologies are known collectively as “Information Technology (IT) are often credited with helping fuel strong growth in many economies. The use of computer technology and electronic data transfer characterized by fast, accurate and comprehensive collection, analysis and use of data, there has been a stepwise improvement in service levels, invent reduction, effective utilization of resource (such as storage space and handling of equipment cost), reduction or elimination of paperwork and clerical errors, helping in easy tracking of goods. Information Communication Technology (ICT) systems provide a supportive role for human resource activities to improve organizational (or personal) efficiency and effectiveness.

Literature review. Inventory management is regarded as a key element for the reduction and control of total costs and improvement of the level of service provided by the companies. For Roy 2012, this area plays very important role in the overall cost of operations and supply chain of any business big or small. Inventory is used as a cushion against the supply and demand uncertainties. In the same vein, inventory is a double-edged weapon, since the lack of inventory leads to loss of productivity, while excess inventory leads to loss of profitability. Thus, some authors argue that inventory management has direct and significant effects on operational efficiency (performance) and company finances and points out that an effective inventory management will always give a competitive advantage to a business over its competitors.

There are two types of inventory control systems: continuous (perpetual inventory) and periodic inventory system. Some of the more common areas in which inventory control is practiced are those that described in Figure 1. The ICT provides a single point of control to efficiently direct and manage automated material handling and order processing within the Warehouse. This will enable effective operations, and optimize current investment in software and material handling equipment. Implementing ICT software can be a cost-effective alternative to adding more efficiency operations of warehouse movement in the industrial area [2-4].

Modern inventory control systems often rely upon barcodes and radio-frequency identification (RFID) tags to provide automatic identification of inventory objects. To record an inventory transaction, the system uses a barcode scanner or RFID reader to automatically identify the inventory object, and then collects additional information from the operators via fixed terminals (workstations), or mobile computers. Efficient inventory management is based on an inventory management information system which is a database for storing and administering all types of data required for efficient and accurate inventory management. This may include modules or fields for keeping track of all items and locations, requisitions, back orders, required levels of inventory on hand, reorder points, lead times, inventory error tracking, and more. An ERP management information system integrates areas such as planning, purchasing, inventory, sales, marketing, finance, human resources, etc. (www.investopedia.com). ERP has been used extensively in inventory management with a varied of techniques applied innovatively ranging from Vendor Managed Inventory, Materials Resources planning and Distribution Resources Planning. An equally important system is a Warehouse Management System (WMS) which does not contain customer data or prices as ERP rather; a functioning inventory management system needs the continuous exchange between WMS and ERP.

The emphasis to integrate ICT tools in institutions serve as a vehicle for operational efficiency mid strategic management; the interest generated by researchers in this area has been a topic of interest and debate for a number of researchers. Common ICT tools that enable an efficient and effective management of inventory include: The Use of Bar Code and Bar code scanners/ Readers, Biometric Verification Systems, Warehouse Management System (WMS) and Electronic Data Interchange Systems (EDT).

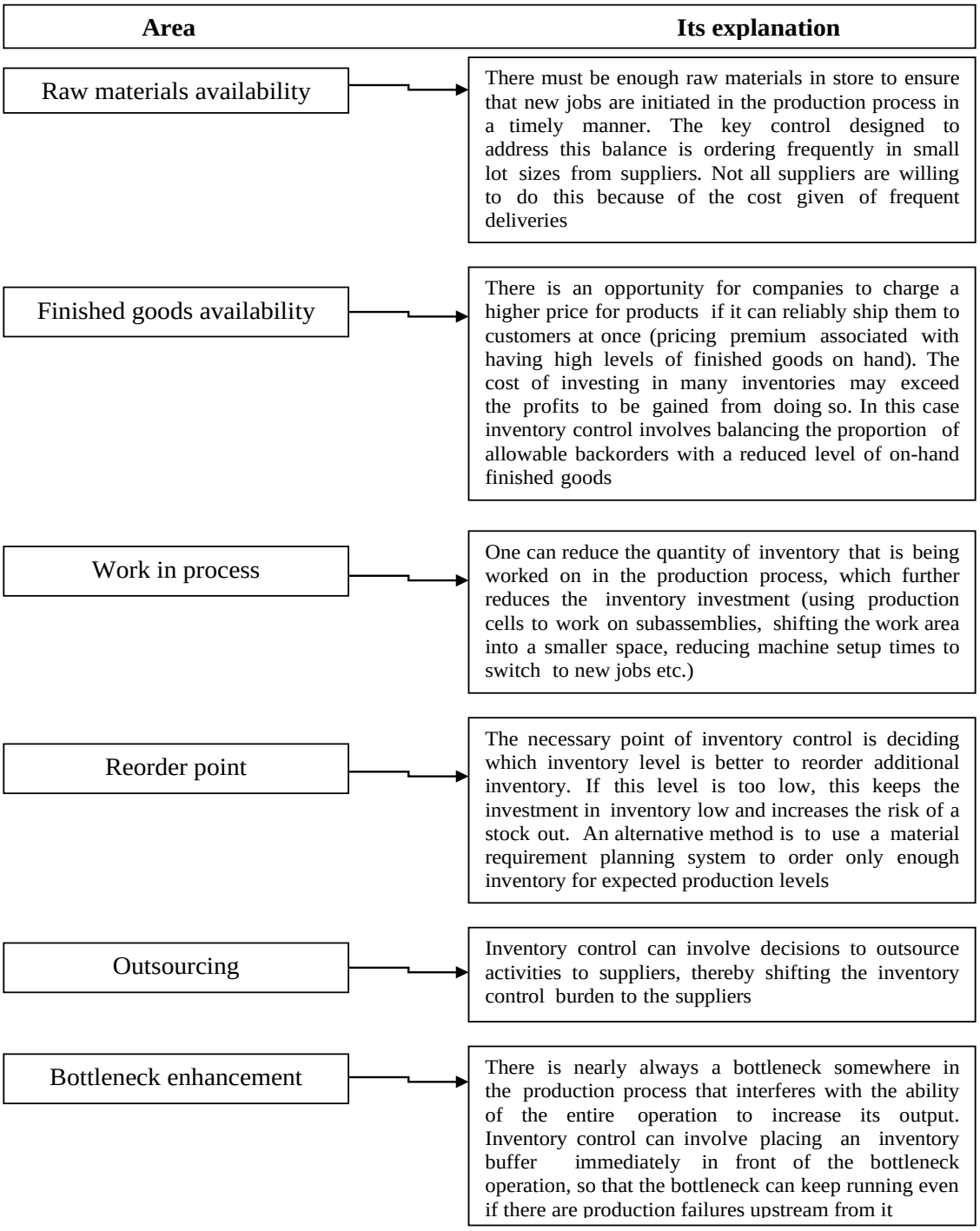

Fig. 1. Areas of control of healthy green development in the supply sector
Source: built using [5; 6].

Barcodes are “printed horizontal strips of vertical bars used for identifying specific items”. A “scanning device reads the barcode by moving a beam across the symbol”: The first barcode system was developed around the 1940s and 1950s, since then people have become very accustomed to their use, through common applications such as in retail and grocery markets. This tool permits inventory and warehouse managers to easily and quickly track stock levels, items going out of date, the price and quantity of items left in stock, etc.

Pilferage is one of the major challenges in the effective management of inventory. The Biometric Verification System (BVS) enables inventory managers to easily track the time of employee's arrival at the warehouse. The identification of individuals and the time at which they entered the warehouse are recorded and stored in the database of the system. It serves as a great security tool that helps to easily track items lost in inventory.

Warehousing Management System (WMS) are best described as the advanced technology and operating processes that optimizes all warehousing functions. These functions typically begin with receipts from suppliers and ends with delivering to the needed departments. Successful WMS solution are generally designed to merge computer hardware, software and peripheral equipment with improved operating practices for managing inventory, space, labor and equipment in warehousing and distribution centers. Application of Warehouse management system allows a company to increase its competitive advantage by reducing labor cost, improving customer service, increasing inventory accuracy, and improving flexibility and responsiveness.

Value added network serves as an intermediary between different departments in an institution. A VAN is an electronic service provider that receives, stores, and transmits EDI and other electronic messages for each department. This system helps to administer cross- department inventory on the basis of real-time information. This goes a long way to decrease the incidence of bullwhip effect which has ripple effects on value creation of the whole supply chain. The system is therefore a crucial element of the supply chain success.

Inventory signify the stock of anything or goods used in an organization. An inventory system is the set of procedures and controls that monitor levels of inventory and regulate what levels should be preserved, when stock should be restocked, and how large orders ought be. In distribution, inventory is classified as in-transit, meaning that it is being moved in the system and warehouse, which is inventory in a warehouse or distribution center. Retail sites carry inventory for immediate sale to customers. In services, inventory generally refers to the tangible goods to be sold and the supplies necessary to administer the service.

Inventory control is one of the most neglected areas of management in different organization. The entire manufacturing operations, for example can be brought to a standstill for lack of engineering spare these problems are due to the lack of right flow of information in the whole process of the supply chain management. Therefore, supporting Information and Communication technology is very necessary for effective and efficiency in Inventory control operations.

Conventionally, Inventory Control has been used as a safety valve between the separate components within the pipeline - thus leading to large and expensive stocks of products. There is so many softness in a manual system, for instance, it becomes relatively more expensive to operate an institution growth and its information requirements become more sophisticated. It is nearly impossible to efficiently and cost-effectively operate a large as there is an extension of warehouse storage management using a manual system. It has shown that warehouse under this manual system production is generally lower as activities involved simply take more time to be completed manually. It has been also observed on the warehouse that under manual system can sometimes impede the development of storage warehouse memory that historical knowledge base of policies and practices, and their results over the life of the warehouse key information tends to reside in the memory of the staff at the time, not in formal documents. As a result, important knowledge can be forgotten or lost over time [7-19].

Development of ICT technology has created new World whereby most of the activities such as Procurement activities, Warehouse Management, Human resources Development and Knowledge management are practiced electronically with sustainability/ environmental protection in mind. It is based on this, that the study seeks to investigate Influence of ICT on Effectiveness of Inventory Control on Public Senior High Schools on the way green development in the Kumasi Metropolis, Ashanti – Region).

The aim of the article. The goal of this study is to:

– determine the role of ICT on the effectiveness of Inventory Control in the schools of the study;

– investigate the influence of ICT on the effectiveness of Inventory Control;

– investigate the challenges faced by the institutions on the use of ICT during inventory control;

– determine the extent of usage of IT systems in inventory management in the schools of the study.

The study will be guided by the following research questions.

– What are roles of ICT on effective of Inventory Control in the schools of the study?

– What is the influence of ICT on the effectiveness of Inventory Control?

– What are challenges faced by the school on the use of ICT during inventory control?

– What are the extents of usage of IT systems in inventory control?

Results. The study aimed at investigating the influence of Information and Communication Technology on effectiveness of inventory control in the public senior high schools on the way to healthy green development. Specific objectives were to determine the role of ICT on the effectiveness of Inventory Control in the schools on the way to healthy green development. In this study, descriptive survey was used to explain the relationship between use of information technology systems in inventory management and control. This design is considered appropriate in this study since it describes what is happening at present and the researcher only reports the influence of ICT on effectiveness of inventory control on Senior High Schools in Kumasi Metropolis in the Ashanti Region, Ghana.

In this study, the population comprised all Senior High Schools in Kumasi Metropolis in the Ashanti Region of Ghana. The researcher choose Kumasi because that is where most of the High Schools are concentrated. There are 25 Senior High Schools in Kumasi Metropolis out 112 in the whole Ashanti Region.

In this study, purposive sampling technique was employed. Purposive method was appropriate to get the key staffs that are directly involved in controlling inventory at the various selected Senior High Schools. Considering the sample frame, a sample of one hundred (100) was used. Both open- ended and closed-ended questionnaire was distributed to the respondents and time was given to them to complete them. Follow-ups was also be made to ensure success of the procedure.

Out of the 100 questionnaires that were administered, 87 questionnaires were filled and returned successfully. This represents a response rate of 87.0% which was considered sufficient forming a good representation of the whole population. This response rate is well above the 50.0% recommended by (Mugenda & Mugenda, 2003).

The sample size was composed of males and females. A total of 61 respondents that is 70.1% of the total respondents participated in this study were males; while the other 26 respondents which is equal to 29.9% of the total respondents participated in this study were females.

The age distribution structure of respondents participated in this study was as follows. It was found that 18 respondents which is equal to 20.6% of the total respondents participated in this study were having the age of between 20 to 30 years. 49 respondents which is equal to 56.3% of the total respondents participated were having the age of between 30 to 40 years, and this was the largest age group in the sample. Moreover, 14 respondents who are equal to 16.1% of the total respondents participated were having the age of between 40 to 50 years, and the last group of age lying above 50 years was composed of 6 respondents which is equal to 7.0% of the total respondents participated.

The educational distribution structure for the respondents participated in this study were as follows; 23 respondents which is equal to 26.4% of the total respondents participated in the study were holders of diploma. Apart from that, 34 respondents which is equal to 39.0% of

the participants were university graduates at first degree level, 11 respondents which is equal to 12.6% of the total respondents participated in the study were having Master's Degree level. Others which comprise of Ph.D. holders, certificate and other level certificate below the Diploma level were 19 which is 22.0% of the total respondents. It was also found out that (80%) of Senior High Schools in the Kumasi Metropolis do use ICT in their various activities in the school. The adoption of ICT in the schools have a good influence on procurement activities (55.2%), managing suppliers' relationship (78%), customer relationship (79%), sharing of information and warehouse management (82%). The findings also realized that the application of ICT is helpful to the performance in the inventory management through effective management, accessibility of information, supplier performance management, easy information analysis (63%), easy information on stock levels (76%), proper record keeping at the schools (67%). Also it has been proved that the application of ICT is helpful in the provision of greater data accuracy on inventories (74%), performance and monitoring of inventory activities, Easy data analysis of materials received from suppliers (56%), improved security of data and enhance the disposal of inventory leaving the store (68%).

It was found that ICT influence the receipt of inventory (76%), tracking the movements of stock within and outside the stores (73%), inventory levels and update (62%), buffer stock management (56%), and other roles of inventory control and management at Senior High Schools in Kumasi Metropolis. They are also speeding up transactions, reducing human errors with regards to stock counting, reducing stock-out levels, enhancing the efficiency of inventory operation and serving as a monitoring system.

It appeared from the study that challenges facing Senior High Schools in Kumasi Metropolis on executing ICT on inventory control are high cost of training staff to use the system (63%), frequent power outages making the use of the system uneasy (66%), lot of time to learn the software (61%), and complexity in the user interface (69%). The most fundamental importance of this study, as explained in the research objectives, it is to investigate the influence of ICT on effectiveness of inventory control on the public schools on the way to a healthy green development in Kumasi Metropolis, Ashanti – Region. The results would help schools that hold inventory to plan, control and manage their inventory effectively taking into consideration environmental safety and friendliness. Furthermore, the study leads to a better understanding of the existing problems, as it paves way to other researchers on further investigation/research on the influence of ICT on the effectiveness of Inventory control.

Conclusions. The study has assessed the major roles of ICT on effectiveness of Inventory Control in the schools of the study towards green development, where it has been proved that Inventory control is significant for all the stakeholders. It has different meanings to the various stakeholders. Investing in inventory control can be a harm or loss, threat or challenge. Despite its complexity and costly of implementing of ICT in inventory control, the study concluded that ICT plays a great role in planning at the school, proper record keeping at the school, and analysis of materials received from suppliers, the movement of materials within and onward delivery. Furthermore, it can be concluded that ICT influences cost reduction through speeding up transactions, reducing human errors with regards to stock counting, reducing stock-out levels, enhancing the efficiency of inventory operation and serving as a monitoring system. The major challenges facing the Senior High Schools in Kumasi Metropolis on the use of ICT during inventory control are being identified and proved to be high cost of training staff to use the system, frequent power outages making the use of the system uneasy, lot of time to learn the software, and complexity in the user interface. The study suggest that management of the various Senior High Schools should consider embracing full use of information systems (ICT) this will help the institutions efficiency in operations, gain a cost advantage and thus help to streamline its operations. The study suggests that management of the various Senior High Schools should increase its budget to meet the initial

cost on purchasing, installing and application of ICT on inventory management control system. Government can also subsidize the cost of the software for the various Senior High Schools. It is recommended that management of the various Senior High Schools should attract and trained more personnel to use ICT system in inventory control. Lastly it is also suggested that management of the Senior High Schools have a backup system in place. This will solve the problem of frequent power outages in the school.

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ТЕОРЕТИЧНІ ПРОБЛЕМИ РОЗВИТКУ НАЦІОНАЛЬНОЇ ЕКОНОМІКИ

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Фелікс Амоако Оффей

аспірант
Сумський державний університет (Суми, Україна)
E-mail: f.amoako@aspd.sumdu.edu.ua. **ORCID:** http://orcid.org/0000-0003-3458-5185

Наталія Летуновська

канд. екон. наук, доцент, доцент кафедри маркетингу,
Сумський державний університет (Суми, Україна)
E-mail: n.letunovska@kmm.sumdu.edu.ua **ORCID:** https://orcid.org/0000-0001-8207-9178
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ВПЛИВ ІКТ НА ЕФЕКТИВНІСТЬ КОНТРОЛЮ ЗАПАСІВ У ДЕРЖАВНОМУ СЕКТОРІ НА ШЛЯХУ ДО ЗДОРОВОГО ЗЕЛЕНОГО РОЗВИТКУ В УМОВАХ НЕВИЗНАЧЕНОСТІ

Зелене зростання та зелений розвиток стають обов'язковими засобами для сталого процесу допомоги економіці та суспільству у світі. країни розробляють новаторські процедури, політику та практику для досягнення здорового зеленого розвитку. Переважно контроль запасів і управління запасами є життєво важливими технологіями для прийняття рішень керівництвом фірм. Поступове забруднення навколишнього середовища зробило екологічне використання ресурсів і охорону навколишнього середовища більш актуальними. Ефективний контроль запасів передбачає інтеграцію сучасного управління інформаційними технологіями (ІКТ), що дозволяє установам виправдати свої очікування щодо наявності продукції, одночасно досягаючи золотого балансу не утримуючи надто великі запаси, таким чином мінімізуючи витрати на запаси. Державні старші середні школи, які проводять інвентаризацію, стикаються з проблемами інвентаризації. Системи інформаційно-комунікаційних технологій (ІКТ) забезпечують допоміжну роль для діяльності людських ресурсів для підвищення організаційної (або особистої) ефективності та результативності. Складська еманація залежить від загального запасу та енергоспоживання складу на одиницю товару. Дослідження було спрямоване на вивчення впливу інформаційно-комунікаційних технологій на ефективність контролю запасів у державних старших школах на шляху до здорової зелені розвитку. Конкретні цілі полягали у визначенні ролі ІКТ в ефективності управління запасами в школах дослідження щодо здорового зеленого розвитку. Для вибірки 100 співробітників старших середніх шкіл у метрополісі Кумасі було використано методику цілеспрямованого відбору. Для збору первинних даних у дослідженні використовувалися анкети. Усі зібрані дані було перевірено на повноту, закодовано та зведено в таблиці. Дослідження показало, що ІКТ впливають на надходження запасів, відстеження руху запасів у магазинах і поза ними, рівень і оновлення запасів, управління буферними запасами. З дослідження виявилося, що проблеми, з якими стикаються старші середні школи в столиці Кумасі щодо застосування ІКТ для управління запасами, полягають у високій вартості навчання персоналу використанню системи, частих відключень електроенергії, що ускладнюють використання системи, багато часу на вивчення програмного забезпечення, і складність інтерфейсу користувача. Керівництво різних старших середніх шкіл має залучити та навчити більше персоналу для використання системи ІКТ у контролі запасів і збільшити свій бюджет, щоб покрити початкові витрати на придбання, встановлення та застосування ІКТ у системі контролю управління запасами.

Ключові слова: *стійкість; зелене управління ланцюгом поставок; детермінанти комунікаційної ефективності; інновації в державному секторі; вплив невизначеності.*

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