УДК 004.4

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COMBINING RFID & BLOCKCHAIN TECHNOLOGY FOR INVENTORY MANAGEMENT

Abstract:
Information technology (IT) works in inventory management system as a tool to increase productivity and reduce costs. Those companies or organizations that use IT in inventory management are successful, while other companies' dose not. The object of this study is to establish the role of IT in the inventory management system, to show the new strategies and implementation technics, that deal with the day-to-day requirement of any organization, and to introduce an easy, secure, and reliable system to making stock management and simplify the use of inventory, and finally, to modernize the Inventory Management System (IMS).

Keywords:
Inventory management, RFID, Blockchain, MRP, JIT.

Introduction

By implementing Information Technology (IT) in inventory management, we can reduce costs and increase efficiency. Those organizations that have implemented IT in inventory management have succeeded while others have failed [1]. Nowadays, technologies are created very fast. One technology used in the inventory management is called Radio Frequency Identification (RFID). RFID tags are small transmitters that wirelessly respond to reader requests and transfer serial number or similar ID. They are widely used to track manufactured items in environments and labeling items in supermarkets [2]. The next technology used for inventory management is Blockchain, that helps to solve excessive problems and simplifies the process of managing the inventories. It is used beyond budget and is suitable for existing management. Any transaction recorded in blockchain is immutable (there is no possibility of deletion) and there is no possibility of fraud. A denaturation record keeping system can do everything in a transparent network as long as the parties involved in poor management work honestly [3]. In this study we are going to merge these two technologies to show the more efficient combined technology of RFID and Blockchain.

Inventory management

The process of ordering, storing, and using a company's inventory is called Inventory management. These include the management of raw materials, components, and final products, also the maintenance and processing of such items. It is difficult for companies with complex supply chains and production processes to balance inventory risks and inventory shortages. To achieve this balance, two main methods for managing inventories have developed: Timely planning and materials required - Time required just –in – time (JIT) and materials requirement planning (MRP). Some firms, such as financial services companies, do not have physical inventory and therefore must rely on service process management.

A company's inventory is one of its valuable assets. In retail, manufacturing, food service, and other sectors, a company's inputs and end products are at the core of its activities. Lack of

inventory in any place and time can be very harmful. But large inventories carry risks such as corruption, theft, damage, or changes in demand. Inventory must be insured, and if not sold on time, you may have to clear or simply destroy it at high customs clearance prices. Inventory management is important for businesses of any size. One can easily make a decision by knowing that to buy certain items, purchase amount or production amount, payment amount, and resale time [4].

Inventory management requires continuous and accurate evaluation of external and internal factors and it should control through planning and review. Most organizations have a separate department called inventory planners who constantly monitor, control, and review inventory and liaise with manufacturing, logistics, and asset departments [5].

Inventory Management System

The inventory management system (IMS) is a combination of technology, procedures and processes that monitor and maintenance of products in warehouses, these products demand, the company assets, materials and supplies or final products ready for sale to sellers.

A complete inventory management system includes the following: System for identifying inventory items and related information (barcode labels or asset tags); Hardware for reading barcode labels (handheld barcode scanners or smartphones with barcode scanning programs); Inventory management application or software, which has a database and point of reference for all inventory, coupled with the ability to generate reports, analyze data, forecast future demand, etc.; Labeling Processes and policies, documentation, and reporting.

One of the main functions of inventory management is to keep a detailed record of each new or returned product when it entering or leaving the warehouse or point of sale [6].

Inventory Management Techniques

Always Better Control Analysis (ABC Analysis): This is a method in which inventory items are divided into three categories A, B and C. Items in category A are closely monitored because they consist of high-priced inventories that may be smaller but very expensive. Items in category B have relatively less inventory than in category A, the number of items in category B is average, so the level of control is average. Category C includes many inventories that require less investment, so the level of control is minimal.

Just In Time Method (JIT): In this method, the company maintains only the same amount of inventory in the production process. The company saves on storage and insurance costs without additional inventory. When the old inventory is about to run out, the company orders new inventory. This method is a bit risky because a slight delay in ordering new inventory can lead to stock status. Therefore, this method requires proper planning so that new orders can be registered in due time.

Material Requirements Planning Method (MRP): This is a method in which producers order inventory after considering deal forecasts. The MRP system coordinating data from different areas of the business where inventory is available. Based on the data and demand in the market, the manager carefully orders the new inventory to the material suppliers [7].

Blockchain and Inventory management

Blockchain helps each side of the supply chain to communicate with others and leads to fewer errors. Blockchain helps simplify workflows and maintain a hassle-free and accurate system because data is available in real time. It is a decentralized account that ensures complete security and transparency of all transactions. Transaction records are stored and accessible to everyone on the network. When registered, data cannot be changed without the approval of any of the parties involved, and any transaction and change in the blockchain can be tracked. This helps reduce employee fraud and provides a trackable way to save time in the event of fraud. Also, it can help the inventory management team plan for restocking instead of simply reacting to the existing stock [8].

Previous Studies

Internet Of Things Assisted inventory Management System For A Smart Warehouse.
It was suggested by Samir Yerpude and Tarun Kumar Singhal. It is not that much secure as we want and can be used in inventory management in a smart warehouse [9].

Use Radio Frequency Identification (RFID) for inventory & warehouse management. It was suggested by Christoph Jechlitschek. RFID tags are small transmitters that wirelessly respond to reader requests and transfer serial number or similar ID. They are widely used to track manufactured items in environments and labeling items in supermarkets [2].
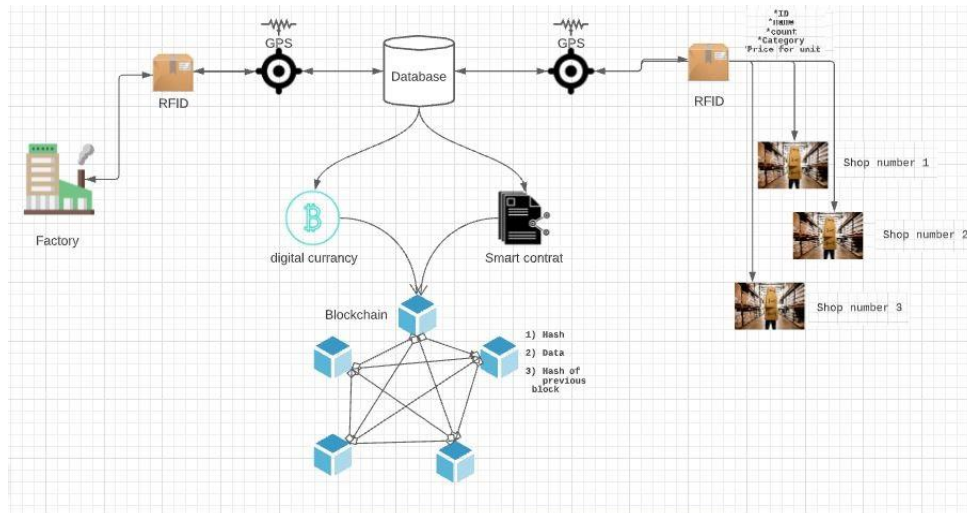
Proposed Method

Fugure 1 – Sheme of Proposed Method

We propose to use a combined technology of RFID and Blockchain (Fig. 1), which can make the inventory more efficient and secure.

Conclusion

In this study we found out that IT works in inventory management system as a tool to increase productivity and reduce costs. After considering different techniques to controlling and mentoring inventory management, we suggested the combination of two new technologies of RFID and Blockchain that can lead to creating a very safe and secure inventory management system.

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