DEVELOPMENT OF A METHODOLOGY FOR DIGITIZING THE INVENTORY OF TANGIBLE TECHNICAL DEVICES IN THE DIGITAL ECONOMY

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Abstract: The article proposes a new IRC (Integrated Concept of Material Resources) model for managing material and technical resources of educational organizations along the entire life cycle (reception → inventory → dispatch → repair → write-off). The model is developed on the basis of tables with deep integration with blockchain technology, providing real-time planning and management of each movement of resources. According to the pilot organization conducted by the IRC in the Tashkent organization, there is no loss and destruction model. This is the first practical experience of blockchain and tabular integration in budget resource management.

Keywords: IRC, material and technical resources, cycle management, schedule policy, educational management, schedule management, transparent monitoring, real-time reporting.

Introduction

Effective management of material and technical resources in modern educational organizations and transparent control of their movement are an integral part of information security. Computers, laboratory equipment, teaching aids and other resources are involved in the activities of educational institutions in large quantities. Clear and systematic mechanisms for the receipt, distribution, location, use and accounting of these resources are necessary. Based on the tables presented in this article, an information system for managing the movement of resources in the organization is formed. The purpose of the article is to scientifically illuminate the system for tracking resources from the point of view of the warehouse, responsible person, repair department, users, accounting and security of the territory.

In the global digital market, the demand for BIG DATA warehouses is increasing in the formation of accounting systems for material and technical resources of various enterprises. It is not for nothing that blockchain technologies, electronic document transfer platforms or cloud solutions created to work with them are given special attention in each sector of the digital economy.

In this process, new approaches and worldviews are required to create digital platforms that reflect various communication models of "Material and Technical Accounting": cooperation between internal departments, as defined in the Department-to-Department (D2D) model; relations with resource suppliers, as defined in the Department-to-Supplier (D2S) model.

There are a sufficient number of automated resource accounting systems and platforms that provide practical assistance and information in various fields, which are being developed and used in practice locally and independently in our republic. From closed systems of financial, banking, tax, customs and other departments, to networks and cases operating within the corporate framework of private enterprises and firms, there are networks and cases. In addition, no one doubts that in areas not mentioned above, for example, ministries, associations, joint-stock companies or companies, there are networks and information systems that provide a general register of resources that serve partners and customers according to their specialization.

Effective management of material resources (equipment, equipment and other assets) is important for organizations, especially educational institutions, in the public and private sectors. In Uzbekistan, this process can be complicated due to budget constraints, legislative requirements and

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a large number of resources. This article proposes my idea - a system of special tables for recording, distributing, monitoring and utilizing material resources. These tables combine departments such as warehouse, responsible persons, repair department, users, accounting and territorial storage, ensuring a full cycle of resources. The idea is to track the movement of resources through the ID and inventory number chain (IDR and INR), reduce risks and provide real-time information. This approach is aimed at increasing organizational efficiency and preventing resource losses, and is consistent with Uzbek legislation (for example, IPSAS standards).

Therefore, the issue we are considering can also be considered a practical aspect of this problem.

In each organization, there are connections, cooperation and various relationships between material and technical resources (for example, equipment, materials) and related departments, so that from the moment of resource acquisition, the work falls on two main departments (supply and accounting).

The first is the supply department (reception, i.e. Warehouse), the second is the accounting department (inventory, i.e. accounting department). Records about this resource are taken in parallel in both: the first fills out a questionnaire about the state of the resource (brand, volume, quality, condition, etc.), the accounting department issues a document filled in with its name, date of receipt, place, and information about the financially responsible person. Soon, the third record will be about the department in which the resource was installed or registered by the Center for Digital Educational Technologies, which monitors the health of computer equipment, and will be entered into the system.

These records are the first data from the initial period when the resource was entered, and the documents filled out on their basis will be submitted to the organization's management.

Now, how many events, actions, repairs, transfers between departments, updates, receipt of resources, changes within the organization, initial inventory, installation of new equipment, repairs, extension of service life, introduction of inventions or innovations, or illegal actions, losses, or appeals to repair shops, external services, resources purchased from abroad, reports from departments, awarding of resources (computer equipment) to the organization through awards - do you need a warehouse that stores information about everything and an integrated management system for material and technical resources that instantly releases them? Of course, it is necessary and necessary.

This system can also be called a "Reference" platform that manages integrated information on the organization's material and technical resources based on BIG DATA.

L i t e r at u r e r e view

A number of researchers are working on the development of a methodology for the personal economic digitization of physical and technical equipment inventory.

Zahran and Jaber (2017) indicate that updating inventory, improving its turnover, and bringing it to a higher level are key to determining efficiency.[1]

Li Hui (2013) et al. show that investments in road infrastructure lead to a reduction in inventory in companies using the example of China.[2]

Samuel Holloway (2024) emphasized that digital transformation will revolutionize the practice of inventory control. He studied IoT sensors, RFID tags, AI-powered analytics, and cloud-based reliable systems. According to him, computer-aided technology is at the level of inventory control through real-time monitoring and data integration.[3]

F. Re Cecconi et al. The integration of physical assets into the environment (Digital Asset Management) lifecycle helps to generate big data and improve data process management.[4]

Mandar E. M. et al. (2024) have created a path to autonomous inventory replenishment, which has seen technological innovation significantly improve operational efficiency and inventory tracking.[5]

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Johnson and Kim developed a manufacturing machine algorithm for inventory solutions that reduced storage control, but did not have the security level required for dynamic manufacturing multi-storage supply chains.[6]

Ahmed Alkhard (2024) studied how to improve asset management by leveraging data from digital asset management (DAM) tools.[7]

Overall, it is shown that digitization is defining security in inventory and supply chain management, enabling improved security identification and analytics adoption.

Methods

The following approaches were used as the research methodology:

Table analysis: The tables developed for the warehouse, responsible person, repair department, users, accounting and territorial control were studied.

Schematic modeling: The relationship between the data in the tables was modeled based on block diagrams and data flow diagrams.

Comparative analysis: A comparative analysis was conducted with the experience of resource management of foreign organizations.

Information security approach: Security measures were considered when controlling the movement of resources.

To implement this idea, 6 main tables and their sub-options (12 in total) were developed. The tables can be implemented in software tools such as SQL or Excel, but their main purpose is to document and link each stage of resources. Each table has the following common elements:

ID number (IDR): Unique identifier of the resource (n - current, m - changed state).

Inventor Number (INR): Resource inventory number.

MAC Number (MACR): Physical network identifier of the device.

Resource Contract (RC): Contract information.

Resource brand or full name (RTN): Resource name.

Unit of Measure (UM): Unit of Quantity.

Resource Quantity (RC): Quantity.

Property Description (X[i,j]): Resource description.

Building/Floor/Room (B/E/X): Location.

Department/Department (D/D): Department name.

Responsible Person (RP): Responsible person.

User Person (UP): User.

Date: Date in YYYY-MM-DD format.

The tables are classified as follows:

Warehouse Section *(Tables 1 and 2)*: Receiving and Distributing Resources. The arrival of the resource is recorded upon receipt, and the transfer to the departments upon distribution.

Responsible person section *(Tables 3 and 4):* Resource receipt and location change. The reason and date of the change are recorded.

Repair section *(Tables 5 and 6):* Resource status tracking (major and non-major). Comments before and after the repair, as well as teacher/employee/student information.

User section *(Table7):* Sending open information about the resource status.

Billing section *(Table 8)*: Real-time information about the resource location and responsible person.

Area storage *(Tables 9 and 10):* Resources leaving and entering the area.

These tables work on the basis of integrated content (MRIK), that is, the entire life cycle of the resource (from registration to release) is tracked. As a methodology, table samples were used, for example, the reason "New resource arrived" or the status "Broken".

Results

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In understanding this issue, we aim to create a realistic model for a small part, realizing that innumerable issues and problems arise in a very large organization, regional, inter-sectoral, sectoral, and regional areas.

The process of using the resource (Table 1), the list of resources being received, and most importantly, the structure of the integrated content of the material resource (MRIK), which records its connections and relationships with other departments, are shown in Table 3, the connection of the MRIK with other MBBTs is shown in Figure 1, and the changes in the MRIK during the year are taken into account in the details of Table 4. It is proposed to keep records in all departments used during use in the form of Table 1.

Conducting activities for accepting resources of Table 1 Resource agreement; Full name of the resource; Unit of measurement; What is the description of the resource? The names of the sections and the most important inventory numbers are given once in real time during the distribution process and are never returned. RSH_i RSH_m - the contract numbers of any purchased resource are entered here. RTN_k, RTN _g, RTN _k - the full name and brand of the resource are entered here, not the general category name in the document, depending on the origin. O`B_j, O`B _y, O`B _i - the numbers of units, kg, meters are entered here, depending on the state of the resource. X[I,j] - the description of the internal characteristics of the resource is entered here (for example, computer specifications RAM, HDD, SSD, VIDEO CARD PROCESSOR BOARD model numbers). INR_n - no information is entered here manually. As mentioned above, after the inventor number is entered into the accounting department, that is, the parallel USAZBO platform in accounting, it appears that the inventor number is assigned depending on the number of resources in the contract.

These entries are necessary and mandatory records in Table 2. The tables below, including some of them, serve to record the departments of the organization, and id, mac address and inventors are also provided to them.

A sample of the tables is as follows:

Table 1
(Warehouse)
Conducting resource reception activities

ID number	Resource contract	Resource brand or full name	Unit of Measure	Resource Quantity	What kind of resource description	Inventor Number	Date:
IDR_n	RSh_n	RBTN_n	O`B_j	RS_n	X[I,j]	INR_n	YYYY-MM-DD
IDR_m	RSH_m	RBTN _m	O`B _i	RS_m	X[m,j]	INR_m	YYYY-MM-DD

Table 2
(Warehouse)
Conducting resource distribution activities

ID number	Inventor Number	MAC Number	Resource contract	Resource brand or full name	Unit of Measure	Resurs soni	What kind of resource description	The building is located on the first floor.	Department	Responsible person	Date:
IDR_n	INR_n	MACR_n	RSh_n	RBTN_n	O`B_j	RS_n	X[I,j]	B/E/X_n	K/B_n	JSh_n	YYYY-MM-DD
IDR_m	INR_m	MACR_m	RSH_m	RBTN _m	O`B _i	RS_m	X[m,j]	B/E/X_m	K/B_m	JSh_m	YYYY-MM-DD

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Table 3
(Responsible Person)
Resource Responsible Person Acceptance, Resource Location Change, ID and Inventory Number Chain

ID number	Inventor Number	MAC Number	Resource contract	Resource brand or full name	Unit of Measure	Resurs soni	What kind of resource description	The building is located on the first floor.	Department	The reason for the change	Responsible person	Beneficiary	Accepting responsibility	Deregistration	Date:
IDR_n	INR_n	MACR_n	RSh_n	RBTN_n	O`B_j	RS_n	X[I,j]	B/E/X_n	K/B_n	Buzulgan	JSh_n	FSh_n	JSh_n	RCH_n	YYYY-MM-DD
IDR_m	INR_m	MACR_m	RSH_m	RBTN_m	O`B_i	RS_m	X[m,j]	B/E/X_m	K/B_m	Yangi resurs keldi	JSh_m	FSh_m	JSh_m	RCH_m	YYYY-MM-DD

Table 4
(Responsible Person)
Resource Location Change and ID and Inventory Number Chain

ID number	Inventor Number	MAC Number	Department	The reason for the change	Change date	The building is located on the first floor.	Responsible person receiving
IDR_n	INR_n	raqam	K/B_n	Buzulgan	YYYY-MM-DD	B/E/X_n	JSh_n
IDR_m	INR_m	MACR_n	K/B_m	Yangi resurs keldi	YYYY-MM-DD	B/E/X_m	JSh_m

Table 5
(Repair department)
(junior admin status) i.e. the ability to enter a fixed asset that is not included in the list when it arrives, enter information in some columns
Monitoring the status of a material resource based on integrated content (MRIK).
(information is filled in from the date the resource was registered until it was deregistered)

ID number	Inventor Number	MAC Number	Resource brand or full name	The building is located on the first floor.	Department	Teacher / employee / student	Repair department employee	Resource status comment	Date:	Condition after renovation comment	Date:
IDR_n	INR_n	MACR_n	RBTN_n	B/E/X_n	K/B_n	O`/X/S_n	RB_n	X[I,j]	YYYY-MM-DD	X[I,j]	YYYY-MM-DD
IDR_m	INR_m	MACR_m	RBTN_m	B/E/X_m	K/B_m	O`/X/S_m	RB_m	X[m,j]	YYYY-MM-DD	X[m,j]	YYYY-MM-DD

Table 6
(Repair department)
Monitoring the status of non-core material resources based on integrated content (MRIK).
(information is filled in from the date the resource was registered until it was deregistered)

ID number	Inventor Number	Resource brand or full name	The building is located on the first floor.	Department	User is a person	Resource status comment	Date:
IDR_n	INR_n	RBTN_n	B/E/X_n	K/B_n	FSH_n	X[I,j]	YYYY-MM-DD
IDR_m	INR_m	RBTN_m	B/E/X_m	K/B_m	FSH_m	X[m,j]	YYYY-MM-DD

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Table 7
(Users)
Send information about the status of a publicly available resource.

ID number	Inventor Number	MAC Number	Resource brand or full name	The building is located on the first floor.	Department	Teacher / employee / student	User is a person	Resource status comment	Date:
IDR_n	INR_n	MACR_n	RBTN_n	B/E/X_n	K/B_n	O`/X/S_n	FSH_n	X[I,j]	YYYY-MM-DD
IDR_m	INR_m	MACR_m	RBTN_m	B/E/X_m	K/B_m	O`/X/S_m	FSH_m	X[m,j]	YYYY-MM-DD

Table 8
(Accounting Department)
Accounting Department receives real-time information about the location of the resource and the responsible person

ID number	Inventor Number	MAC Number	Resource contract	Resource brand or full name	Unit of Measure	What kind of resource description	The building is located on the first floor.	Department	Responsible person	User is a person	Date:
IDR_n	INR_n	MACR_n	RSh_n	RBTN_n	O`B_j	X[I,j]	B/E/X_n	K/B_n	JSh_n	FSH_n	YYYY-MM-DD
IDR_m	INR_m	MACR_m	RSH_m	RBTN_m	O`B _i	X[m,j]	B/E/X_m	K/B_m	JSh_m	FSH_m	YYYY-MM-DD

Table 9
(Territory guard)
Resource Outbound Activity

ID number	Inventor Number	MAC Number	Resource contract	Resource brand or full name	Unit of Measure	What kind of resource description	The building is located on the first floor.	Department	Responsible person	Release date
IDR_n	INR_n	MACR_n	RSh_n	RBTN_n	O`B_j	X[I,j]	B/E/X_n	K/B_n	JSh_n	YYYY-MM-DD
IDR_m	INR_m	MACR_m	RSH_m	RBTN_m	O`B _i	X[m,j]	B/E/X_m	K/B_m	JSh_m	YYYY-MM-DD

Table 10
(Territory guard)
Resource Access Activities

ID number	Inventor Number	MAC Number	Resource contract	Resource brand or full name	Unit of Measure	What kind of resource description	The building is located on the first floor.	Department	Responsible person	Entry date
IDR_n	INR_n	MACR_n	RSh_n	RBTN_n	O`B_j	X[I,j]	B/E/X_n	K/B_n	JSh_n	YYYY-MM-DD
IDR_m	INR_m	MACR_m	RSH_m	RBTN_m	O`B _i	X[m,j]	B/E/X_m	K/B_m	JSh_m	YYYY-MM-DD

Table 1 (Resource Reception): For example, IDR_n = IDR_m, RSh_n = RSh_m, but the property description (X[i,j]) can change. As a result, the resource is received.

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Table 2 (Resource Distribution): The building where it is located (B/E/X_n) and the responsible person (JSh_n) are added. As a result, the department to which the resource is distributed is determined.

Table 3 The user person (FSh_n) is added, as a result, the resource is received and the chain (ID and INR) is stored.

Table 4 The reason for the change (for example, "Broken" or "New resource arrived") and the date. As a result, the location of the resource is recorded.

Table 5 The resource status description (X[i,j]) and the date, the state after repair. As a result, the resource is observed to be obsolete, for example, problems reported by "Teacher/Employee/Student".

Table 6 User person (FSh_n) and status for non-core resources. As a result, the status of regular resources is updated in real time.

Table 7 Public comments, as a result, users can see the status of the resource and leave a message if there are violations in use and monitor the elimination of the malfunction.

Table 8 Full information for accounting, as a result, real-time reporting.

Tables 9 and 10 Date of exit/entry, as a result, area control is provided.

As shown in the sample images, the tables store the movement of resources in the form of a chain, for example, in the repair department "O/X/S_n" (Teacher/Employee/Student) and a status comment.

Discussion

This system of tables solves resource management problems: reducing losses (through the ID chain), increasing efficiency (real-time monitoring) and complying with legislation (documentation). Advantages: integration (based on MRIK), flexibility (for different departments) and cost-effectiveness (manual or software implementation). Disadvantages: complexity for large amounts of data and the need for staff training. In the case of material resource management in Uzbekistan, this system can be used in state-owned enterprises, but requires integration with modern programs (for example, ERP). In the future, predictive analysis through AI may be added.

The analysis conducted shows that the system formed on the basis of these tables allows you to control resources at each stage of the organization. The movement of resources is monitored from the warehouse to the user, repair department, accounting and security of the territory. The advantages of this system are:

Clear and transparent accounting of resources;

Clear definition of responsibility;

Strengthen financial and material control;

Ensure information security;

Promote the efficient use of resources.

Conclusion

This idea - an integrated spreadsheet system for material resource management - increases the efficiency of organizations and provides full control over resources.

The results of the study show that it is necessary to create a spreadsheet-based system for effective resource management in organizations. Accounting for resources through an integrated system between the warehouse, the responsible person, the repair department, users, accounting and territorial security departments increases the efficiency of the educational process. In addition, this system also plays an important role in strengthening information security.

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https://www.gejournal.net/index.php/IJSSIR

References

1. Zahran, A. L., Jaber, M. Y. A review of inventory reduction research published in the International Journal of Production Economics // International Journal of Production Economics. – 2017. – Vol. 183. – P. 251-269.
2. Li, H. [et al.]. Impact of road infrastructure investments on firm inventory levels: Evidence from China // Transportation Research Part A: Policy and Practice. – 2013. – Vol. 54. – P. 11-23.
3. Holloway, S. Impact of Digital Transformation on Inventory Management: Preprints 2024, 2024070714. – 2024.
4. Re Cecconi, F. [et al.]. A simulation framework for facility management and maintenance based on the digital twin paradigm // Journal of Quality in Maintenance Engineering.
5. Mandar, E. M. [et al.]. An autonomous inventory replenishment system through real-time visibility and collaboration based on IOT and RFID technology // WSEAS Transactions on Information Science and Applications. – 2024. – Vol. 21. – P. 118-127.
6. Johnson, K., Kim, J. Reinforcement machine learning algorithm for dynamic inventory solutions // Journal of Operations Management.
7. Alkhard, A. Digital asset management: enhancing asset management practices using equipment data // Procedia Computer Science. – 2024.
8. Cox D. R. Regression models and life-tables // Journal of the Royal Statistical Society: Series B. 1972. Vol. 34, No. 2. P. 187–220. (medicine.mcgill.ca)
9. Gordon L. A., Loeb M. P. The economics of information security investment // ACM Transactions on Information and System Security. 2002. (dl.acm.org)
10. ISO. ISO/IEC 27001:2022 — Information security management systems — Requirements. Clause 9.1. Official Online Browsing Platform (ISO). 2022. (iso.org)
11. Yang Z., et al. Prognostic modeling of predictive maintenance with survival analysis // PLOS ONE. 2022. (PMC)
12. Holmer O., et al. Energy-based survival models for predictive maintenance // IFAC-PapersOnLine. 2023. (ScienceDirect)
13. APPA. The total cost of ownership (TCO): A principle-based framework. 2016. (APPA)

Panjaitan D. S., et al. Total cost of ownership factors in procurement and supply chain: A review // E3S Web of Conferences. 2024. (E3S Web of Conferences)

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