Раздел 4. «Экономика. Общеобразовательные, социально-гуманитарные и фундаментальные дисциплины»

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Risk-oriented approach to inventory management of a processing enterprise: from accounting to strategic decisions (on the example of «qarmet llc recycling »)

In the context of increased instability of the market environment and increasing requirements for international reporting, the need to implement risk-oriented approaches to inventory management at processing enterprises is becoming more urgent. The need for a transition from traditional accounting to integrated inventory management based on IFRS principles, BI analytics and process automation is substantiated. The developed model takes into account internal and external risks, covering aspects of logistics, IT infrastructure, personnel and strategy. SWOT analysis, ABC analysis and visualization of flows based on Power BI became the basis for the implementation of a system aimed at reducing losses and enhancing strategic transparency. The object of the study is the inventory management system of «Qarmet LLC Recycling». The purpose of the work is to develop and test a model of risk-oriented inventory management (ROIMM), integrating IFRS (IAS 2) tools, ABC analysis, $P \times I$ risk assessment and digitalization elements. The methodological base includes methods of comparative analysis, visual modeling, factor classification of risks and strategic interpretation. The scientific novelty lies in the proposal of a structured model of ROUTMZ, which ensures the transition from accounting to a strategically sustainable inventory management system based on risks. The practical significance is manifested in the possibility of adapting the model to the specific conditions of processing enterprises in order to improve the accuracy of management decisions, reduce losses and ensure compliance with international reporting standards. The results of the study include a visualized model, a risk matrix and a SWOT analysis. The conclusion presents recommendations for digitalization and the implementation of automated inventory management systems as a tool for sustainable development.

Keywords: inventory management, risks, BI, SAP, 1C, automation, IFRS, ABC analysis, SWOT, processing enterprise.

Introduction

Inventory management remains one of the most important functions of manufacturing and processing enterprises. In the context of digitalization and complexity of supply chains, the importance of integrating inventory accounting, forecasting and analysis into a single decision-making system is increasing [1]. Using the example of Qarmet Recycling LLC, the authors consider the possibility of transforming the traditional approach to inventory management towards a risk -oriented model based on IFRS standards (IAS 2), SAP tools, 1C, Power BI and a system of key performance indicators (KPI).

Methodology

The methodological basis of the study includes an analysis of document flow and accounting policies of Qarmet LLC Recycling »; identification and classification of risks (internal and external); SWOT analysis of

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the current inventory management system; ABC analysis of inventory by importance; construction of a risk matrix (P × I); visualization of logistics flows in Power BI; calculation of economic effects of automation implementation.

Results

The SWOT analysis revealed the strengths and weaknesses of the internal environment, as well as external opportunities and threats to the development of the inventory management system (Table 1). The results of the ABC analysis (Table 2) indicated the need for strict control over category A stocks , which form the largest part of the cost. Table 3 shows the P × I risk matrix, demonstrating priority areas of risk management.

Table 1

SWOT analysis of inventory management in «Qarmet» LLP Recycling»:

Strong sides	Weaknesses
Access to stable supplies	Lack of predictive analytics
Experienced staff	Fragmented accounting
Availability of basic automation (1C)	Manual errors
Possibilities	Threats
BI and Power BI	Price fluctuations
WMS / ERP implementation	Logistical disruptions
Automation of logistics	Obsolete technologies

The enterprise has stable supplies of secondary raw materials, which reduces dependence on external market conditions. Qualified personnel and basic automation elements in 1C allow maintaining a minimum level of accounting and internal control. This creates the foundation for the implementation of more complex inventory management systems.

Among the internal limitations, the most critical are: the absence of a forecasting module, weak integration between accounting and warehouse accounting, and limited storage capacity. These factors increase operational risks and reduce data transparency, especially in the context of dynamic receipt and disposal of inventory items.

The external and internal environment opens up prospects for the enterprise to implement ERP/WMS systems, apply ABC/XYZ analysis, and gradually transition to IFRS accounting. These steps will allow the enterprise to reach a new level of controllability, automate key business processes, and increase inventory turnover. In addition, opportunities for staff training and warehouse digitalization allow for the rapid implementation of the potential for change [2].

External threats include: rising raw material prices, fluctuations in demand, disruptions in logistics, and the likelihood of errors due to equipment wear and tear or human error. These threats require the development of a predictive analysis and risk management system. The analysis showed that the company's strengths ensure sustainability, but realizing strategic opportunities is the key to reducing vulnerability to threats. Weaknesses need to be neutralized by moving from accounting to analytics and automation; implementing a risk monitoring and assessment system; and training personnel to work in a digital environment.

The SWOT analysis confirmed the feasibility of moving to risk -oriented inventory management as a direction capable of combining the internal resources and external capabilities of the enterprise.

The conducted SWOT analysis revealed not only the current state of the inventory management system at the enterprise, but also outlined the vector of strategic development in the context of increasing operational and market risks [3,4].

Strengths, such as stable supplies of secondary raw materials and the availability of experienced personnel, create a sustainable basis for transformation. However, weaknesses - fragmented accounting, lack

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of forecasting mechanisms, ineffective logistics - increase the need for systemic modernization [5]. The analysis clearly indicates the need to switch to inventory management in accordance with IFRS (IAS 2), which will ensure transparency, validity and comparability of financial data [2]. In the context of increasing external threats - price fluctuations, logistics failures, inventory depreciation - the model of risk -oriented inventory management (ROIMM), developed in this study, becomes especially relevant [6-8]. It offers a systematic sequence of actions from risk identification to the use of optimization tools (ABC / XYZ, FIFO, integration with IFRS).

Thus, the SWOT analysis sets the trajectory of the transition from traditional accounting to strategic management: accounting according to international standards (IFRS) [2], automation (ACS) [9] and the structural implementation of the ROUTMZ model become a logical and necessary development of the practice of Qarmet LLC Recycling ».

Digitalization opportunities also involve the implementation of an automated control system (ACS) , including ERP/WMS platforms capable of providing: operational inventory control; turnover calculation; integration with accounting and logistics [9]. It is this comprehensive approach proposed in the article that will allow Qarmet Recycling LLP to ensure sustainability, cost efficiency and international comparability of data in the field of inventory management. The SWOT analysis clearly indicates the need to transition to inventory management in accordance with the requirements of IFRS (IAS 2) , which will ensure uniformity and reliability of financial information; recognition of inventory impairment; objective assessment of cost [2]

IFRS (IAS) 2 "Inventories" regulates the accounting of inventories, including raw materials, work in progress and finished goods. In the context of Qarmet LLC Recycling ", this standard is especially relevant for the valuation of secondary materials, scrap metal and process raw materials. The main provisions of the standard include: cost or net realizable value; cost valuation methods: FIFO and average cost method; purchase price, transportation costs, processing and other costs directly related to the acquisition of inventory; inventory that has lost value is subject to impairment and write-off [2].

Qarmet LLC Recycling " it is recommended to implement a control system that complies with IFRS, taking into account the following measures: maintaining analytical records by batches and write-off methods (for example, FIFO); conducting regular revaluation of inventories for impairment; maintaining a uniform policy for accounting for inventories in financial and management reporting.

Digitalization of logistics and accounting processes requires the implementation of automated control systems (ACS) based on ERP / WMS , which allow tracking turnover, conducting inventory in real time and managing purchases [9]. To improve the efficiency of inventory management and reduce risks, it is advisable to implement an integrated ERP system with a warehouse management module (WMS), supporting the functions of forecasting, analytics and inventory planning.

Key steps in implementing automation: assessment of the current level of accounting and logistics (process audit); selection of a platform: 1C ERP , SAP Business One , Odoo And etc .; pilot launch in a raw materials warehouse; integration with accounting and production; staff training and transition to regular inventory analytics.

Automation will allow tracking inventory turnover, identifying "dead" stock, automatically generating requests and minimizing the human factor. This will also improve compliance with international accounting standards and increase the transparency of reporting [2].

Rising costs, instability of raw material prices and high dependence on the human factor increase the need for a systematic approach to inventory management. In these conditions, it becomes critically important to implement a risk -oriented management model that allows identifying key vulnerabilities; managing risks proactively rather than reactively; combining financial standards and logistical efficiency [5-10].

Table 2

ABC analysis by volume of warehouse stocks:

Category	Share reserves, %	Comment
A	20%	Critical stocks are subject to daily monitoring.

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B	30%	Medium turnover, weekly control
C	50%	Rarely used, can be written off

Table 2 illustrates the results of ABC classification of inventories at a processing plant. Distribution into categories A, B and C is based on the Pareto principle (80/20) and reflects the specific weight of each group in the total volume of inventories.

Category A (20%) — the most valuable and critical items that ensure key production processes. Despite their small number, they form the largest part of the inventory value. They require daily monitoring, timely replenishment and enhanced risk control (delivery failures, spoilage, shortages).

Category B (30%) — goods with medium turnover. They represent moderate value and are used regularly. Weekly monitoring using BI dashboards and demand forecasting algorithms is sufficient for them.

Category C (50%) — the least valuable and rarely used items. Despite their quantitative dominance, they form the smallest part of the total inventory value. They are often characterized by low turnover and a high proportion of hanging balances **subject** to inventory, optimization or write-off.

This distribution allows the management to focus resources and attention on category A, minimizing the management load on less significant categories. Within the ROUTMZ model, ABC analysis is used as a basis for a differentiated risk management and cost control strategy.

Analysis of the inventory structure using the ABC method allows you to rank the nomenclature by level of importance and focus control on the most resource-intensive items (group A). However, even high turnover and importance of inventory do not exclude the presence of significant risks, especially in conditions of limited accounting transparency, unstable supplies and imperfect automation.

It is at this stage that the need for a risk-oriented decomposition of the inventory management system arises, where ABC analysis serves only as a basis for subsequent in-depth control. To implement strategic inventory management, an analysis of key risks was conducted (Table 3), including their probabilistic assessment and the level of impact on the operating activities of the enterprise.

Table 3

P × I risk matrix:

Risk	Probability (P)	Influence (I)	Level risk (P×I)	Grade
Incorrect inventory accounting	Tall	High	9	Critical
Logistics disruptions	Average	High	6	Essential
Impairment stocks	Average	Average	4	Moderate
Damage at storage	Low	Average	2	Acceptable

Thus, the results of the ABC analysis, supplemented by the identification of key risks (Table 3), demonstrate the need to integrate a differentiated approach to inventory management with risk assessment and minimization mechanisms.

In response to the identified threats and with the aim of increasing the sustainability of the supply and accounting system, a model of risk-oriented inventory management was developed.

Risk-based inventory management model (ROIMM) is an integrated approach that combines the principles of IFRS (IAS 2), risk classification, business analytics tools (Power BI), accounting automation (1C, SAP) and the KPI system . It is built on the basis of identified risks and is aimed at minimizing losses, increasing accounting accuracy, accelerating turnover and reducing the level of frozen balances.

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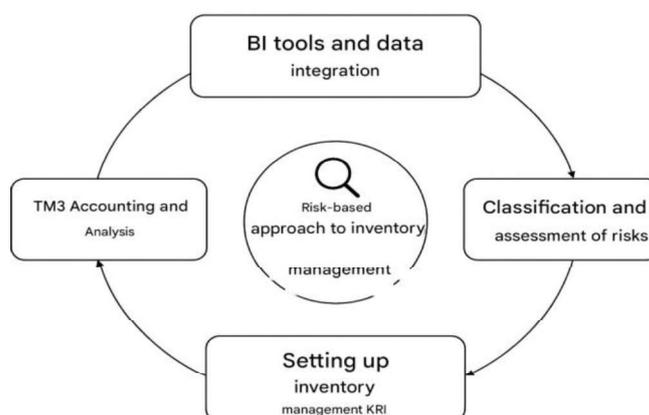

Figure 1- Model of risk -oriented approach to inventory management

Components of the ROUTMZ model:
1. Identification of risks by P × I (probability × impact).
2. Classification of stocks according to ABC and criticality.
3. Linking to KPI: turnover, forecast accuracy, loss rate.
4. Integration with 1C/SAP + visualization in Power BI.
5. Development of scenario strategies by risk levels (from critical to acceptable)

Unlike the traditional approach, the ROUTMZ model allows you to build flexible and manageable processes not only for accounting, but also for responding to changes in the external and internal environment. For example, when logistics risks increase, the system automatically initiates a transition to safe procurement and stock distribution scenarios, which allows you to avoid depreciation. Thus, ROUTMZ combines accounting, analytics and risk management into a single strategic system.

The model is implemented in the form of a closed cycle, reflecting the systemic and continuous nature of inventory management taking into account risks. We present a structured interpretation of the functional purpose of each of the key components of the model, ensuring its integrity and practical applicability in the context of risk-oriented inventory management. These components critically affect the implementation of the inventory management strategy taking into account risks:

Risk identification (P × I)

Purpose: the initial stage, during which potential threats in accounting, logistics, storage, and automation are analyzed.

Tools: expert assessment, risk matrix.

Result: prioritization of risks by levels: critical, significant, moderate, acceptable.

2. Classification of stocks (ABC analysis + criticality)

Purpose: structuring inventory items by level of importance and frequency of use.

Tools: ABC analysis, XYZ analysis.

Result: allocation of category A stocks and high/ low critical items for targeted monitoring.

3. KPIs and risk indicators

Purpose: To establish measurable metrics for inventory management and monitoring.

Examples of KPIs: turnover ratio, write-off level, forecast accuracy, time of deviation from storage standards.

Result: possibility of surgical intervention in case of negative dynamics.

4. Integration with accounting systems (1C, SAP)

Purpose: automation of reflection of inventory movement, reconciliation of balances, generation of analytics.

Result: reduction of the human factor, up-to-date data in real time.

5. Visualization and analytics (Power BI, Dashboard)

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Purpose: visual representation of the dynamics of inventory and risks, identification of bottlenecks.
Tools: dashboards, heat maps, trend charts.
Result: support for data- driven management decision making management).
6. Scenario planning (anti-crisis strategies)
Purpose: preparation of actions in case of risks realization.
Examples: doubling safety stock, switching suppliers, consolidating logistics.
Result: reduced vulnerability and increased resilience of the supply chain.
The ROUTMZ model combines the principles of risk management, logistics, digital accounting and BI analytics. It serves as a strategic tool for increasing the sustainability, transparency and efficiency of inventory management at a processing plant.

Discussion

Integration of inventory accounting with SAP, 1C and BI platforms allows achieving a new level of analytical maturity that meets the requirements of IFRS (IAS 2) [11]. The risks identified during the analysis require automation of control over turnover, spoilage and suspended balances. The developed ROUTMZ model forms the basis for management based on the principle of predictive analytics and scenario planning [12, 13]. Previously, the problems of accounting fragmentation were described; this article proposes a systemic solution with an emphasis on risk monitoring and strategic positioning. The ROUTMZ model presented in this study demonstrates the possibility of coupling accounting standards and risk control at the level of BI and scenario policies.

Conclusion

The proposed model of risk -oriented inventory management (ROIMM), developed on the example of Qarmet Recycling LLC, is an integration tool that combines approaches of international standards (IFRS, IAS 2), digital transformation of accounting (SAP, 1C, Power BI), scenario planning and risk assessment. It ensures the transition from the traditional accounting function to a strategically sustainable management system focused on minimizing losses, optimizing logistics operations and ensuring management transparency.
The practical implementation of the model helps to reduce losses from spoilage, shortages and excess balances by 15–25% (due to the introduction of ABC control and KPI monitoring) [11, 12]; reduce the average storage time of category C stocks by 30–40% (through automated analytics and a strategy for reducing rarely used items); increase the accuracy of procurement forecasts by up to 90% when using BI tools and integration with 1C/SAP ; reduce the time for preparing management reports from 5 days to 1 day (due to dashboards) Power BI); strengthening compliance with the IAS 2 (IFRS) standard - through automatic reporting and transparent cost calculation [13]. These data were obtained from a summary of foreign practice and analytical data , with subsequent adaptation to the conditions of the enterprise.
Thus, ROUTMZ transforms the approach to inventory management at a processing plant towards sustainability, digitalization and flexibility, which is especially relevant in the context of an unstable external environment and ESG reporting requirements.

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Қайта өңдеуші кәсіпорынның тауарлық-материалдық қорларын басқаруға тәуекелге бағдарланған тәсіл: есептен стратегиялық шешімдерге («Qarmet Recycling» АҚ мысалында)

Қайта өңдеуші кәсіпорынның тауарлық-материалдық қорларын басқаруға тәуекелге бағдарланған тәсіл: есептен стратегиялық шешімдерге ("qarmet recycling"ЖШС мысалында) Нарықтық ортаның жоғары тұрақсыздығы және халықаралық есептілікке қойылатын талаптардың күшеюі жағдайында қайта өңдеу кәсіпорындарында тауарлық-материалдық қорларды (ТМҚ) басқаруға тәуекелге бағдарланған тәсілдерді енгізу қажеттілігі өзектендіріледі. Дәстүрлі есептен ҚЕХС қағидаттарына, BI-аналитикаға және процестерді автоматтандыруға негізделген қорларды интеграциялық басқаруға көшу қажеттілігі негізделген. Әзірленген модель логистика, АТ инфрақұрылымы, персонал және стратегия аспектілерін қамтитын ішкі және сыртқы тәуекелдерді ескереді. Swot талдауы, ABC талдауы және Power BI негізіндегі ағындарды визуализациялау шығындарды азайтуға және стратегиялық ашықтықты арттыруға бағытталған жүйені жүзеге асыруға негіз болды. Зерттеу нысаны «Qarmet Recycling» ЖШС қорларын басқару жүйесі болып табылады. Жұмыстың мақсаты ҚЕХС (IAS 2), ABC-талдау, P×I-тәуекелдерді бағалау және цифрландыру элементтерін біріктіретін ТМҚ (ROUTMZ) тәуекелге бағдарланған басқару моделін әзірлеу және сынақтан өткізу болып табылады. Әдіснамалық база ретінде салыстырмалы талдау, визуалды модельдеу, тәуекелдерді факторлық жіктеу және стратегиялық түсіндіру әдістері қолданылды. Ғылыми жаңалық-тәуекелдерге сүйене отырып, бухгалтерлік есептен стратегиялық тұрақты қорларды басқару жүйесіне көшуді қамтамасыз ететін ROUTMZ құрылымдық моделін ұсыну. Практикалық маңыздылығы басқару шешімдерінің дәлдігін арттыру, шығындарды азайту және халықаралық есеп беру стандарттарына сәйкестігін қамтамасыз ету мақсатында қайта өңдеу кәсіпорындарының нақты жағдайларына модельді бейімдеу мүмкіндігінде көрінеді. Зерттеу нәтижелеріне бейнеленген модель, тәуекел матрицасы және SWOT талдауы кіреді. Қорытындыда тұрақты даму құралы ретінде қорларды басқарудың автоматтандырылған жүйелерін цифрландыру және енгізу бойынша ұсыныстар берілген.

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Риско - ориентированный подход к управлению товарно-материальными запасами перерабатывающего предприятия: от учета к стратегическим решениям (на примере АО «Qarmet Recycling»)

В условиях повышенной нестабильности рыночной среды и усиливающихся требований к международной отчётности актуализируется необходимость внедрения риск-ориентированных подходов к управлению товарно-материальными запасами (ТМЗ) на перерабатывающих предприятиях. Обоснована необходимость перехода от традиционного учета к интеграционному управлению запасами, основанному на принципах МСФО, BI-аналитике и автоматизации процессов. Разработанная модель учитывает внутренние и внешние риски, охватывая аспекты логистики, ИТ-инфраструктуры, персонала и стратегии. SWOT-анализ, АВС-анализ и визуализация потоков на базе Power BI стали основой для реализации системы, направленной на сокращение потерь и усиление стратегической прозрачности. Объектом исследования выступает система управления запасами ТОО «Qarmet Recycling». Цель работы заключается в разработке и апробации модели риск-ориентированного управления ТМЗ (РОУТМЗ), интегрирующей инструменты МСФО (IAS 2), АВС-анализа, P×I-оценки рисков и элементов цифровизации. В качестве методологической базы использованы методы сравнительного анализа, визуального моделирования, факторной классификации рисков и стратегической интерпретации. Научная новизна заключается в предложении структурированной модели РОУТМЗ, обеспечивающей переход от учета к стратегически устойчивой системе управления запасами с опорой на риски. Практическая значимость проявляется в возможности адаптации модели под конкретные условия перерабатывающих предприятий с целью повышения точности управленческих решений, снижения потерь и обеспечения соответствия международным стандартам отчётности. Результаты исследования включают визуализированную модель, матрицу рисков и SWOT-анализ. В заключении представлены рекомендации по цифровизации и внедрению автоматизированных систем управления запасами как инструмента устойчивого развития.

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