Automation of warehouse accounting processes as an integral part of digital company

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Abstract. The object of the study is the company "UP!" - a large advertising Agency. With the arrival of the company on the Russian market and the beginning of its work in the retail sector, a significant change in existing business processes was required. In particular, the company requires automation of warehouse accounting processes, which will improve the efficiency of supply, logistics and sales departments. Methods of the system analysis of the purpose are applied for formation of the correct structure of the tasks which are subject to automation. An iterative model and elements of the Prince2 methodology were used to manage the implementation project. At the end of the introduction of information systems management of storage resources are marked significant effect - increased productivity by optimizing the time spent on documentation, there is a possibility of control over the movement of goods and materials in the company on the basis of the tracking flow, accounting, sales and write-offs in retail outlets, the opportunity to analyze sales.

1. Introduction

The increase and consolidation of retail chains, the growth of competition and the decline in profitability of retail business causes the need for better management systems. One of the key tasks is obtaining relevant and complete information about the state of affairs at the enterprise. In addition, the active introduction of automation tools causes intensive data growth, and it is becoming increasingly difficult to extract management information from them. Automated management systems should be equipped with powerful business intelligence tools that allow you to predict the activities of the enterprise, track trends and identify patterns. In this case, monitoring, data collection and analysis systems come to the fore in modern management systems. In particular, one of the most significant areas for improving retail activities is the automation of warehouse accounting processes, which can improve the efficiency of the supply, logistics and sales departments [1].

The object of the study was the «UP!» Agency, which is a large advertising agency conducting marketing campaigns and providing promotional and advertising services. The «UP!» exists in Europe for more than 40 years, the headquarters is in Milan. During its development, the Agency opened several branches in Europe, formed a group of companies, which includes the following organizations:

- «DONE» SRL - the company is involved in the development of events and conventions.
«UP! Freeway & associati» - consumer, customer, and stakeholder engagement company.

«UP! digital» - web agency for technical and digital solutions.

«Up! media & health» – it is a structure designed for institutional communication and media relations management.

«Up! Intermedia» – Italy's leading agency in the field of integrated communications in the field of healthcare, medicine and wellness, the concept of a healthy lifestyle.

In 2012, the Italian agency formed the company “Up! Russia” in the Russian Federation. The Italian company "UP!" opened offices in St. Petersburg, Moscow and Nizhny Novgorod.

The launch of the business in Russia began with a consulting project that allows to create a benchmark of quality standards of local agencies of marketing services in Russia in accordance with the best international practices. Currently, one of the main trends in optimizing the company's activities is the use of information technology for business process reengineering.

Today “Up!” is a recognized BTL-agency on the Russian market. The key success factor was the knowledge of how to combine European experience with knowledge of the culture and peculiarities of the Russian market. The Agency provides a complex of marketing communications, which differs from direct advertising in the way of influencing the target audience. The main activities of the company in the field of marketing are:

- organization and participation in special events;
- promotion of sales aimed at consumers and potential customers of the product;
- distribution of promotional products [2].

The agency discovers new areas of activity and actively collaborates with new clients, applying the experience of past projects.

At the moment, the main customer of "Up" in Russia is the company Philip Morris sales & marketing (PMSM). In addition to the company PMSM «UP!» agency organized and conducted projects for Campari, Elica, Del Mare. These projects were temporary in terms of attracting potential customers, increasing brand awareness. In turn, the Elica road show and Aperol Spritz projects were organized on a turn-key basis in several cities of Russia [3-5]. In turn, the projects "Elica road show" and "Aperol Spritz" were organized turnkey in several cities of Russia. With the development of IQOS product by PMI in 2016, the «UP!» agency has engaged in retail trade.

With the emergence of new specifics of the work required a significant change in existing business processes. The main business processes that require automation are the accounting of materials and goods at points of sale, sales accounting and warehouse accounting. All information about the warehouse movement of goods from the central warehouse to points of sale was stored and processed in Excel online spreadsheets on One Drive cloud storage. Due to the increase in sales channels, the opening of new branches, projects, points of sale, the number of tables increased. This greatly complicated the work, leading to errors due to manual input, technical errors, and the lack of established communication processes. In such a reporting structure, it was difficult to get a general picture of sales, rental of devices and production costs, losses and shortages, as well as changes in the location of inventory items between outlets or branches [6,7]. It was impossible to conduct sales analysis and analytics in the context of the company, as well as to control the quality of service. Reflection of the movement of goods with subsequent write-off for tax and accounting purposes is carried out in the company using the document "invoice requirements" in the system "1C". However, this write-off method does not show a real picture of stock movements. The goal of the automation project was to transparently record inventory in all agencies of St. Petersburg, in central warehouses and at points of sale, to reflect the real picture of sales volumes, the presence of defects and shortages, to identify the most popular positions for correct analytics and the subsequent increase in sales [8,9].

2. Methods
In the presented work the technique of structuring of the purposes and functions based on the concept of activity was used. In the studied technique there are two main stages, which are detailed into sub-stages.
Performing the first stage, called "Formation of the initial version of the structure of goals and functions", two approaches are used simultaneously: target and morphological or linguistic (formation of the structure "from below").

At the stage of formation of the structure "from above", which is also called structuring, the number of levels of the hierarchy is selected.

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In the process of forming the structure from below, otherwise called the preparation of proposals, proposals are formed in parallel: they are proposed by employees of structural units of different levels of the management system and are obtained on the basis of the analysis of scientific and technical information. The proposals are then evaluated for completeness and the structures resulting from the parallel application of the "top" and "bottom" approaches are combined.

The second stage involves the analysis, evaluation and adjustment of the structure of goals and functions. Implemented structure of goals and functions for the sales and supply Department of "UP!", obtained using a methodology based on the concept of activity, is shown in the figure 1.

As a result of the structuring, key areas were identified that needed to be worked out to achieve the goal: increasing the efficiency of the sales department due to the information system for supporting stock management, and planning and implementing organizational changes. To implement a project with a gradual transition to the target process, it is necessary to choose the appropriate approach for project management.

In order to detail the implementation tasks, a structure of functions was formed, reflecting the totality of work to achieve the project goal.

![Figure 1. Structure of goals and functions](image-url)
Project management differs from the management of current operational activities and requires the use of special approaches to planning, monitoring, resource allocation, team building, risk management.

For companies in the modern world, it is important to ensure a balance between two such components as the maintenance of current business activities ("business as usual"), and the implementation of business changes (project activities), which should bring maximum returns to the organization.

The project does not imply only the introduction of an automated IT-system, it can also cover all the issues necessary for the successful implementation and further application in the company's activities, such as the revision of related systems, changes in business processes, it architecture, organizational issues.

According to the results of the pre-project survey, it was decided at «UP!» to develop an implementation plan structure using an iterative implementation model with the ability to return to an earlier stage, since the automation project itself was unique in retail. The company "Up!" during the pre-project survey, it was decided to develop the structure of the implementation plan using an iterative implementation model with the ability to return to an earlier stage, as the automation project itself was unique in retail due to the presence of some features. Firstly, the presence of sales and rental flow, which must be maintained separately and the issuance of electronic devices in the test period at zero cost, secondly, special offers and referral codes that must be taken into account in the cash register machine Evotor, thirdly, it is possible to sell devices in installments with the use of cash registers. The iterative model of the automation project management was chosen for several reasons related to the advantages of this approach:

• focus on the most important and critical areas of the project;
• continuous iterative testing, allowing to evaluate the success of the entire project as a whole;
• early detection of conflicts between requirements, models and project implementation;
• more uniform loading of project participants;
• effective use of experience.

3. Results and Discussion

The iterative model used takes into account the specifics of the project being implemented in the company «UP!». For the company-provider of it services for «UP!» and for FMSM this automation project is unique. It should take into account the peculiarities of business and retail sales of the company. Between partners in the process of the project of implementing the information system, constant work and communication was carried out.

Survey. At the first stage, a company survey was carried out, an analysis of current business processes was carried out, as well as diagrams of business processes related to the accounting and movement of inventory items before and after the implementation of the information system were built. During the study, some basic problems were identified such as: lack of accurate and transparent accounting of materials and goods and warehouse accounting; inability to keep track of sales of goods in retail; lack of information on the number of opened devices of other goods and materials that are subject to decommissioning; the inability to quickly analyze the sales volume of the agency as a whole; distortion in accounting and tax indicators associated with incomplete information. This allowed at the decision-making stage on the need for IP implementation to formulate the basic requirements for functional capabilities, as well as to choose the option that most fully provides useful effects with minimal resources.

Formation of functional requirements. The following requirements were imposed on the information system:

• Functionality and support of warehouse processes.
• Automation of the goods acceptance process.
• The ability to maintain two types of warehouses: warehouse sales and rental stock.
• Linking cash registers to the automation system.
• Compatibility and implementation in the corporate system of the customer.
• Scalability.
• Identification of shortages and the possibility of cancellation of marriage.
• The ability to record inventory items that were opened for display at the points of sale were presented to the client on a special offer.
• Inventory.
• Uploading analytical reports and setting up print forms.
• Data uploading to «1C: Enterprise Accounting».
• Location of the system on the cloud without involving the server side from users.

The choice of information system. The hierarchy analysis method was used to solve the problem of choosing an information system. The first step was a structured representation of the problem of choice in the form of a hierarchy, which contains three levels: goal, criteria, alternatives. The top of the hierarchy is the global goal - the choice of an information system, the selection criteria are presented at the next levels, and at the lowest level there are alternatives in the form of vendors [10]. The results of a pairwise comparison of the criteria and the obtained vector of priorities are presented in table 1. According to the results, the criterion of functional completeness is most preferred. After that, a priority vector was calculated for each of the criteria [11]. For this purpose matrices of pair comparisons for alternatives of vendors of information system were constructed. As an example, table 2 presents the results of pairwise comparison of alternatives by the criterion of functional completeness and the resulting vector of priorities. The final step was the calculation of global priorities by linear convolution, the resulting weights are presented in table 3. According to the final data, the best system for implementation is 1C “Integrated Automation”, because it has the highest global priority value, which means the most compliance with the requirements of the company [12-14].

Table 1. Matrix of pairwise comparisons of criteria

| Criteria                        | FC | SI | IE | IC | C | Vector of priorities |
|---------------------------------|----|----|----|----|---|---------------------|
| Functional completeness (FC)    | 1  | 3  | 3  | 1  | 2 | 0,32                |
| Simplicity of the interface (SI)| 1/3| 1  | 1/3| 1/3| 1/3| 0,08                |
| Introduction experience (IE)    | 1/3| 3  | 1  | ½  | ½ | 0,14                |
| Integration capability (IC)     | 1  | 3  | 2  | 1  | 1 | 0,25                |
| Cost (C)                        | 1/2| 3  | 2  | 1  | 1 | 0,21                |

Table 2. Matrix of pairwise comparisons of alternatives

| Functional completeness | 1C "Trade Management" | 1C Logistics: Warehouse Management | Information system "My warehouse" | 1C "Integrated Automation" | Priority Vector |
|-------------------------|-----------------------|-----------------------------------|----------------------------------|---------------------------|-----------------|
| 1C "Trade Management"  | 1                     | 1                                 | 2                                | 1                         | 0,27            |
| 1C Logistics: Warehouse Management | 1 | 1 | 3 | ½ | 0,26 |
| IS "My warehouse"      | 1/2                   | 1/3                               | 1                                | ½                         | 0,13            |
| 1C "Integrated Automation" | 1 | 2 | 2 | 1 | 0,33 |
Table 3. Final comparison table

| Information System Options       | FC  | SI  | IE  | IC  | C   | Global priorities |
|----------------------------------|-----|-----|-----|-----|-----|-------------------|
|                                 | 0.32| 0.08| 0.14| 0.25| 0.21|                   |
| 1C "Trade Management"           | 0.27| 0.36| 0.17| 0.22| 0.52| 0.30              |
| 1C Logistics: Warehouse Management| 0.26| 0.19| 0.33| 0.1  | 0.09| 0.19              |
| IS "My warehouse"               | 0.13| 0.13| 0.17| 0.15| 0.24| 0.16              |
| 1C "Integrated Automation"      | 0.33| 0.32| 0.33| 0.53| 0.15| 0.34              |

Formation of the project team. The Project Board consists of senior officials – the chief of Department on retail sales, head of procurement Department, specialist of financial-economic Department, lead Manager on the part of the supplier, IT-specialist, head of direction on the part of "PFSM", which provides guidance, coordination and unification of efforts of the project team [15]. The head of the supply Department can determine whether the system meets the requirements of the company from the users of the system. The Deputy head of the financial and economic Department can assess what budget should be allocated for the acquisition of the system, how the system meets the needs of the accounting Department. The Manager on the part of the supplier of the system provides people to work on the project. The main suppliers from 1C-Rarus and bridge Group are the Deputy implementation Department and the Executive Director, as they can react to changes in system requirements. Project control is carried out by the project Council. The project team is shown in figure 2. Solid lines indicate control actions, and dotted lines indicate information links [16-18].

The project Manager is the Director of development of work with key clients as he can plan performance of tasks on the project on time with the minimum expenses. The officials entitled to make changes are the head of the supply Department, senior warehouse specialist, senior logistician, since the employees of these departments will be the main users of the system. Team managers in the project are the head of the it Department, the specialist of the procurement Department, the analyst. Project teams: pre-project survey and requirements development team, system implementation and configuration team, change response team [10].

Formation of a risk response matrix. The use of any technology together with a positive effect entails the occurrence of risks associated with these technologies [18]. Risks associated with information technology have become an important part of all the business risks of the organization. In the event of any unwanted events without IT risk management, the organization is waiting for resource overruns and excess funding [8]. The risk response matrix for this project is presented in table 4.
Because the project often had to return to the previous iteration due to the emerging additions to the requirements of future automation systems, but also because of incidents when it is impossible to integrate cash registers Evotor and database 1C "Trade Management" and 1C "Integrated Automation" was chosen iterative model life cycle of the automation project for stock management in «UP!» [19]. Due to the constant feedback of the project team with the consumer, the creation of the product really meets the requirements of the client [15,20].

The main results of the implementation are:

- Reducing the time of collection of goods and materials for the point of sale and the time to search for goods.
- Reduction of losses of goods and materials.
- Possession of complete and accurate location information of each device or accessory.
- Control of storage conditions and the amount of use of rental runoff.
- Write-off of rental runoff from the warehouse when passing the allowable number of rental cycles.
- Analysis of the volume of purchases and sales.
- Optimization of warehouse space and safety stock.
- Exclusion of out of stock situations at points of sale.
- The ability to analyze changes in sales and purchases in the context of a specific time, outlet or branch.
- Simplification of the inventory procedure.
- Fixing changes in the location of goods and materials and moving between outlets.
- Reduction of time and labor for processing sales and procurement information.
- Identification of shortages at points of sale.

**Figure 2. Project team**
The ability to obtain relevant information on the number of goods and materials at points of sale at any given time.

Reduction of errors associated with manual input when selling goods, leasing or donating.

Identification of situations when employees incorrectly execute sales [21,22].

The scheme of improvement of qualitative and quantitative indicators of the company in the implementation of the information system is presented in figure 3 [18,19].

| Threats                                      | Type of risk                                 | Type of risk response | Risk response                                                                 |
|----------------------------------------------|----------------------------------------------|-----------------------|------------------------------------------------------------------------------|
| No connection, no sending of fiscal data     | Escape                                       | Checking the equipment of all cash registers for an unhindered connection to the Internet via mobile Internet or Wi-Fi. |
| operator data                                |                                              |                       |                                                                               |
| The report was not sent to the FDO due to the| Escape                                       | A periodic request from the supplier of registry FD with cash register machine, which requires a license update. |
| expiration of the fiscal storage license     |                                              |                       |                                                                               |
| Lack of inventory at points of sale          | Reduce                                       | Checking the availability of stock at points for uninterrupted supply and sending information to the head of the supply department or stock manager about the need to place an inventory with the supplier. |
| Lack of stock at points of sale              | Shrink                                       | The use of insurance stock in the warehouse; if it is impossible to appeal to other channels, the organization of pickup from the supplier's warehouse on their own. |
| Delivery Failure                             | Readdress                                    | The risk of lack of stock at the points caused by the inventory provider. Response: notify the customer that the points of sale are expected to lack the necessary stock due to the fault of the supplier. |
| Lack of stock at points of sale              | Take                                         | If there is a lack of stock, arrange delivery from a neighboring branch, which is significant for freight costs. |
| Lack of stock at points of sale              | Distribute                                   | Distribution of the threat in OOS is carried out between: financial Department, supply Department, Project managers. |
| Order Planning                               | Use                                          | Use the current report format to organize the delivery of goods to points of sale. |
| Availability of the required volume of goods | Increase                                     | Advance planning of cash requirements on prepaid and credit lines of the Distributor. |
| in the central warehouse                     |                                              |                       |                                                                               |
| Excess stock in the warehouse                | Reject                                       | Project managers provided inflated data on the needs of the stock, it was decided to place an order for the real need. |
Figure 3. Scheme of improvement of qualitative and quantitative indicators of the company
To quantify the effectiveness, a comparison of indicators before and after the introduction of the information system was carried out. As an example, table 5 shows changes in the time parameters of individual operations.

| Operation                             | Before the implementation, min. | After the implementation, min. |
|---------------------------------------|---------------------------------|---------------------------------|
| Sales at a point of sale               | 10                              | 3                               |
| Shift closing and sales reconciliation | 30                              | 15                              |
| Manager sales check                    | 90                              | 30                              |
| Inventory                             | 90                              | 60                              |
| Download information for analysis      | 30                              | 10                              |
| Posting goods                         | 60                              | 20                              |
| **TOTAL:**                            | **310**                         | **138**                         |

A financial study showed that after the introduction of the information system, net profit will increase by 1,050,950 rubles per year. One-time project costs 241,000 rubles. The amount of operating costs is 324,000 rubles annually. Based on these data, indicators of the commercial effectiveness of the project were calculated. Net present value, NPV = 1986120 rubles, a simple rate of return, SRR = 3, the payback period is about 4 months. These calculations suggest that the implementation of the information system is commercially effective [6-9].

4. Conclusions

After the implementation of the warehouse accounting automation system at «UP!», the following tasks were achieved: a unified database was created to eliminate duplication of documents; increased productivity by optimizing the time spent on maintaining documentation, it became possible to control the movement of goods and materials in the company based on tracking the flow of goods, accounting for sales and write-offs at points of sale, and it became possible to conduct sales analytics.

Currently, retail companies are striving to reduce costs as much as possible, therefore they cannot afford long-term storage of goods in the warehouse, as well as the lack of the necessary assortment at the peak of sales [21,22]. In the struggle for the consumer, to make informed decisions, you always need high-quality information to plan your pricing policy and determine the need for marketing campaigns. In this regard, it should be noted that there is a tendency for information systems to be in demand with powerful business intelligence tools that make it possible to solve demand forecasting tasks based on data on the consumption of various types of goods, and data mining systems that make it possible to plan deliveries and identify the absence of goods in demand.

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