ANALYSIS OF PRODUCT FLOW DURING THE PROCESS OF WAREHOUSING

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ABSTRACT: Efficiency of flow of goods in pharmaceutical industry is essentially determined by efficient warehousing processes. This causes necessity of use of technologies for support of flow of pharmaceutical products, whose specific nature forces application of IT systems which perform, except for standard tasks, some auxiliary functions. This paper presents an overview of the IT systems used in chemistries and lists benefits which can be derived from application of electronic system of medicine ordering.

Key words: warehousing process, products flow, EDI

JEL Codes: L6

Introduction

Automated warehouses are becoming a routine of everyday life in large companies which use advance technologies in order to facilitate flow of materials and customer service. Warehouse areas closed for persons encompass warehousing processes controlled by special management systems tailored to customer needs, or else complex systems of shelves controlled by computers through automated stacker cranes. Warehouses comprise important elements of organizations, which essentially impact on efficiency of other parts of a company. Its efficient functioning should be a main goal during making decisions on investments in IT processes, which, in effect, lead to precise management of the whole company. Warehouse areas require properly designed IT systems which enable cost reduction and facilitate work while they have to be adapted to a tendencies within a particular branch. Pharmaceutics is a specific branch, which requires software for support of chemistry management with concurrent electronic data interchange with consideration of drug database and means of health protection (D. Tylczyński, 2007). Examples of such software include functional modules with the characteristics presented below.

Functional Modules

OWZA is software that supports work in almost all Polish chemistries, compatible with computer networks in order to facilitate electronic data interchange between chemistries and drug wholesalers. Standard software for chemistry management support consists of a few functional modules, while their classification and nomenclature differ depending on a manufacturer. The example of the diagram for such software is presented in Fig. 1.

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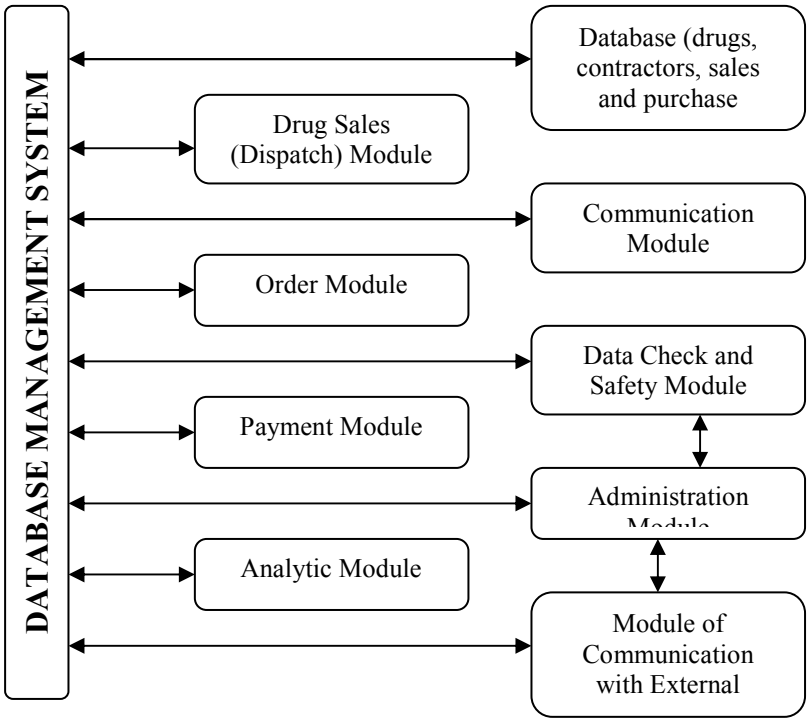

Fig. no. 1 - Chart for functional modules for drug management support software
Source: own study

Drug sales are possible through basic modules such as *Dispatch* or *Sales*. Module is compatible with drug database with information about availability of each item in the warehouse and it enables quick and convenient searching for a particular drug. The cooperation of the module with external devices is also important; they include drug barcode scanners or fiscal printer.

Another module is *Order* which, through availability of drug lists, enables placing drug orders as well as registration of purchase invoices in a conventional fax-based manner or telephone conversations or using electronic way through modem or broadband connections.

Warehouse is a module which enables operations concerning drug storage, connected with stocktaking, loss protocols, all corrections or inter-warehouse transfers.

Analytic Module is essential from the standpoint of the chemistry's owner and enables analysis concerning turnover, profitability of a particular drug or groups of goods. It also permits debiting each sales points with specification of time of a day. All the obtained results are presented in the form of tables and charts and for all the systems working in Windows environment, the 3D scaled charts presentation is also possible.

Settlements with suppliers and recipients is dealt with *Payment* module, which realizes a range of functions concerning proper settlements in a chemistry, relating to the cash register receipt and disbursement documents, transfer orders or cash settlements.

Administration Panel is a module that improves work within OWZA; its operation relates to adaptation of the software to requirement which result from users' needs. The module is responsible for data access safety and data storage and it controls authorisation assigned to individual users. It is also responsible for setting parameters of user interface.

This module makes up a whole with two other modules, i.e. compatibility with *Data Check and Safety* module, which makes it responsible for database service as well as for compatibility with the *Module for External Devices* (responsible for proper functioning of I/O devices) enabling determination of parameters for these devices (barcode scanners, printers).

Communication module generates refund specifications concerning sales of drugs on presentation of prescriptions from NFZ (National Health Fund) or sales of auxiliary means – for a part of programs using Internet network it is possible to send NFZ specifications automatically. Elements of the module also bring opportunities of communication with accounting software which includes Tax Register of Revenues and Expenses or Finance and Accounting Book.

OWZA is software which belongs to transactional and analytical software, using either relational or combined object and relational database. For functioning and flow of information in supply chains of pharmaceutical industry, supporting software is also used.

Supporting Software

The following software types for support of chemistry work can be distinguished:

KS-AOD – developed by Kamsoft Sp. z o.o. – computer system which is developed as tailored to newly appearing needs while any changes that relate to changes in regulations are implemented. The system is composed of a few tens of interrelated modules:

- ✓ Administrator
- ✓ Payments
- ✓ Analysis
- ✓ Specifications
- ✓ Warehouse
- ✓ Orders
- ✓ Purchases
- ✓ Sales

Electronic data interchange between wholesalers and automated periodical changes in government-imposed prices, limits, principles for payment or VAT rates are possible through part of the system integrated with the system of databases for drugs and means of health protection, KS-BLOZ, comprising the following modules: base module, prices, interactions, Infolek. For Windows platform a KS-AOW system has been designed – KSAOD successor – using SQL, Interbase and Oracle databases.

EuroSoft Apteka software – developed by EoroSoft Sp. z o.o. – which uses database which guarantees quick processing and data safety through application of Sybase Inc. technologies. The source of EuroSoft data is EuroSoft Bazyl software which contains information on articles accepted for pharmaceutical turnover. The software operates on a standard MS Windows interface and is compatible with KPiR (Tax Register of Revenues and Expenses or Finance), RAKS and SYMFONIA software.

Quick response is ensured through 32-bit application while the software works within client – server architecture and composes of the following interrelated modules:

- ✓ Administrator
- ✓ Payments
- ✓ Warehouse
- ✓ Sales
- ✓ Manufacturing
- ✓ Dispatch
- ✓ Purchase

SuperApteka 2000 software – developed by „Tradiss" Piotrowski – Iwaniuk Sp. J. – a package for the workstations encompassing the interrelated modules:

- ✓ Dispatch
- ✓ Office
- ✓ Warehouse

- ✓ Lab
- ✓ Administrator

The system is compatible with standardized BZAYL drug database and it is composed of ca. thirty separate programs grouped in several topic-based blocks. The system can be extended with next software which extend software functionalities. The requirements of the system: Novell network environment, Lantastic, MS Windows, DOS operating system and a PC computer. The software is used in chemistries, herb shops and other entities which sell pharmaceutics or parapharmaceutics.

CI-apteka software – developed by CI-Computer Instal Sp. z o.o. (former Farmsoft Sp. z o.o.) – operates under all systems by MS Windows, designed as keyboard-only data input system. The software encompasses the following modules:

- ✓ Register
- ✓ Supplies
- ✓ Sales
- ✓ Dispatch
- ✓ Contractors
- ✓ Refunds
- ✓ Formula
- ✓ Settings

Database source is Microsoft SQL Server 2000 – in free version of MSDE, delivered with the system – the system is compatible with Bazyl drug database.

InfoFarm Apteka software – developed by INFO-FARM Sp. z o.o. – the system is compatible with BAZYL drug database, older version operates within DOS environment, the newer one, APTEKA +, under Microsoft Windows environment, which works in customer – server architecture with application of database of SQL type, data can be transferred and processed in MS-Excel office packages or published in the Internet. The software comprises of the modules:

- ✓ Dispatch
- ✓ Formulas
- ✓ Warehouse
- ✓ Fiscal System Entry
- ✓ Accountancy
- ✓ Accounting
- ✓ Safety
- ✓ Electronic Information Interchange
- ✓ Auxiliary Options

The software is compatible with InfoFarm KP or InfoFarm FK accounting software and supports management of both small and bigger chemistries.

All the described software packages meet the requirements imposed by the Ministry of Health and the National Health Fund while the developers own a network of authorized service points which ensure updating of the systems as well as support in order to ensure proper IT system operation in a chemistry.

Drug Databases

The software for support of chemistry management must be compatible with standardized databases for drugs and means of health protection. Polish market is dominated by two leading drug databases:

1) Farmaceutyczna Baza Danych BAZYL – developed by IMS Poland Sp. z o.o. – the biggest pharmaceutical database in Poland, describing products using ca. 116 information fields,

including 109 text fields, 4 numerical fields, 3 memo-type fields and 23 auxiliary fields. On 23 August 2008, BAZYL contained 139,190 coded products.

2) Ogólnopolska Baza Leków i Środków Ochrony Zdrowia KS-BLOZ – developed by Przedsiębiorstwo Informatyczne Kamsoft – the base most often used in pharmaceutics due to major contribution to the chemistry software market; it contains around 125,000 records.

Both drug databases place the following information in 'Official Register of Medical Products Accepted to Be Used on the Territory of the Republic of Poland':

- specification of drugs, herbs and parapharmaceutics,
- pharmaceutics,
- biomedical materials,
- homeopathic and prescription-based drugs,
- foods
- cosmetics,
- diagnostic tests,
- medical equipment and auxiliary means

which are offered by pharmaceutical wholesalers and chemistries, while standardised product database enable electronic data interchange.

Assessment of Electronic Systems of Drug Ordering (ESZL)

This system enables automated communication between a drug wholesaler and a chemistry. In Poland, there are several systems available. Abonet is a software dedicated for electronic data interchange, other software including Kamsoft, Malicki, Farmsoft or Apteka 2000. ESZL system requires telephone line or Internet connection for interactions between the wholesaler and the chemistry (Fig.2).

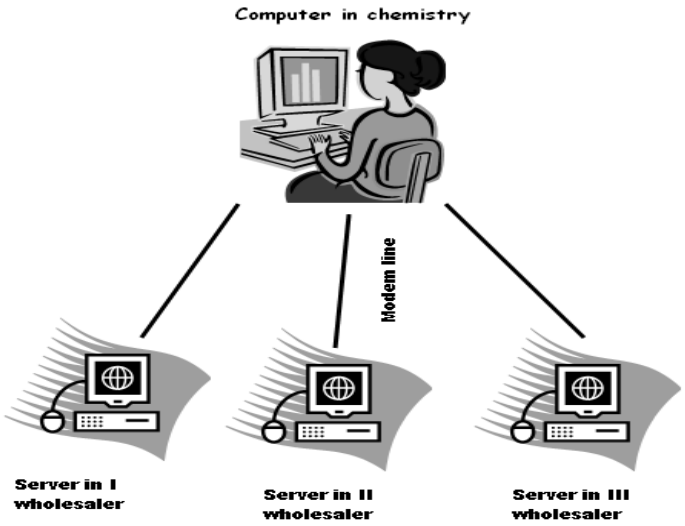

Fig. no. 2 - Communication between chemistry and wholesaler

Source: own study

ESZL process is divided into 7 stages of electronic data interchange (G. Chodak, E. Ropuszyńska-Surma, 'Gospodarka Materiałowa i Logistyka, No. 3/2007):

1. Drug ordering
2. Price lists from the wholesaler
3. Automated division of the order into individual wholesalers, according to the lowest prices

4. 'Manual' correction for order size
5. Sending of the ordered drug specification in an electronic way.
6. Reply from the wholesaler with the message on availability of the ordered drugs.
7. Sending of VAT invoice by the wholesaler.

Assessment of ESZL system obtained through pharmacists working in the investigated chemistries (results published by „Gospodarka Materiałowa i Logistyka" No. 10/2006 and 3 and 4/2007) was made in order to obtain the reply to the question of 'What are the benefits and disadvantages of application of electronic drug ordering systems?'. The results of the investigations can be divided using '*functionality criterion'* which focuses on convenience of lead times, level of safety and easiness of operation, errors that occur during orders as well as '*cost-based criterion'* from which inventory levels and order storage time result.

The obtained results, with consideration of the criteria might become a starting point for the distributors of the software used by chemistries, while functionality impacts on motivation to make use of ESZL. The cost are a factor which is of great impact on decision on software installation.

Table no. 1.

Threats and disadvantages related to using ESZL mentioned by the users

Inconveniencies and threats	**Contribution %**
Problems with connection at the wholesaler	62,9 %
Difficulties in filling in an order	2,2 %
Difficulties in sending an order	31,5 %
Possibility to data theft in a chemistry's computer	12,4 %
Chemistry's computer with viruses	29,2 %
Obtaining the drugs in contradiction to a prescription	42,7 %
Discrepancy of the prices between an invoice and an order	24,7 %
Lack of discounts/promotion opportunities	55,1 %
Others	4,5 %

Most pharmacists assess ESZL positively while all inconveniencies resulting from use of the systems are of technical nature, on which users do not have much influence. The other ones can be partially compensated through e.g. change of management in chemistries, updating of drug database or installation of high-class antivirus software as well as its current update.

Attempting to reply to the question asked during investigations, one can present the most important and the most often appearing replies.

The mentioned benefits include:

- ✓ favourable time of communication and placing an order
- ✓ possibility of current update of the offer
- ✓ beneficial impact on inventory levels and costs of drug purchase
- ✓ shortening of drug ordering time

The inconveniencies that result from use of the systems include the problems concerning (G. Chodak, E. Ropuszyńska-Surma, Gospodarka Materiałowa i Logistyka, No. 5/2007):

- ✓ communication with wholesaler server in the case of smaller wholesaler
- ✓ sending orders and making use of possible discounts and promotions
- ✓ viruses in chemistry computers.

Registration of a drug within ''Official Register of Medical Products Accepted to Be Used on the Territory of the Republic of Poland' obstruct quick turnover of goods, which is typical of

pharmaceutical market. Computerization of Polish chemistries has caused appearance of standardised databases for drugs and means of health protection, which, on the other hand, enabled electronic data interexchange between wholesalers and chemistries. Developers of software for support of chemistry management are improving their system making use of their know-how and experience. Functionality of software does not focus only on sales by also on adaptation of system usability to pharmacists' requirements and chemistry owners. Development of computer networks and free access to the Internet should, in the nearest future, lead to standardization of electronic system of drug ordering, hence to improved and faster communication between wholesalers and chemistries which occurs in each chemistry in Poland.

References

1. Chodak G., Ropuszyńska-Surma E., 2007, Analiza oprogramowania wspomagającego zarządzanie apteką i elektroniczną wymianę danych (Analysis of Software for Support of Chemistry Management and Electronic Data Interchange), Gospodarka Materiałowa i Logistyka, No. 3/2007.

2. Chodak G., Ropuszyńska-Surma E., 2007, Pracownicy aptek o korzyściach i niedogodnościach stosowania elektronicznego systemu zmawiania leków (Chemistry Employees on Benefits and Inconveniencies of Application of Electronic System of Drug Ordering), Gospodarka Materiałowa i Logistyka, No. 5/2007.

3. Tylczyński D., 2007, Leki w zautomatyzowanym magazynie (Drugs in Automated Warehouses), EuroLogistics, No. 5/2007.