jamk.fi

Implementation of Enterprise Resource Planning service: 1C Logistics system in the warehouse processes in construction companies.

Valeriya Titova

Bachelor's thesis

March 2016

Technology, communication and transport

Degree Programme in Logistics Engineering

jamk.fi

Description

Author(s) Titova, Valeriya	Type of publication Bachelor's thesis	Date March 2016
	Number of pages 46	Language of publication: English
		Permission for web publication: x

Title of publication Implementation of Enterprise Resource Planning service: 1C Logistics system in the warehouse processes in construction companies.

Degree programme Degree Programme in Logistics Engineering

Supervisor(s) Franssila, Tommi/Titov, Evgenii

Assigned by Franssila, Tommi

Description

The main aim of the research is to show the importance of Enterprise Resource Planning service implementation for warehouse department of the company was described with close connection to theoretical background of warehousing and inventory management.

Most of background for the research was taken from actual working process in the company. All results of the process were calculated and analyzed by both analytical and marketing departments of the company.

The implementation process of Enterprise Resource Planning service took almost a year and about 3 million rubles of investments. Deep integration process that consisted not only of technical changes, but also of personnel trainings, space reorganizing and many other things made it possible for the company to highly develop its potential in the future and ability to gain a bigger market share.

Results have shown that all investments and integration processes were worth spending time and money. Company has reorganized all aspects of working process of the company and provided ability for future development of the company.

In overall enormous amount of work has resulted in a positive way with several critical point during the implementation project. Results of research concluded in the end of the work can help same kind of companies in Russia to make decision for upgrading existing working process and see all positive and negative aspects that might appear.

Miscellanous

Contents

Tables

Figures

1. Introduction

Rapid development in Russian economy in last few years shows that logistics play one of the main roles in forming effective materials flow inside and outside the country. Modern logistics concept is the following: "needed cargo in perfect conditions at particular time with the lowest possible costs". The main element of logistics supply chain is warehouse. Warehousing costs are usually as high as transportation costs, materials turnover costs and many others and sometimes even higher. Especially for wholesales, companies warehousing can cause big financial losses and lowering of customer satisfaction. Nowadays companies should have well developed and technically updated warehouse to follow market needs. For sure, that means good information000 share and software in the company and I the warehouse in particular.

Choosing a good ERP system and implementation of it is one of the main component of expenses of every nowadays company. It is not obvious for managers in each company how important it is to have a proper ERP and if possible later a WMS system, as warehouse itself is a big part of company's financial turnover and has lots of possibilities for modification and improvement. Although the company can take a huge advantage of latest technologies all the benefits of ERP should be determined carefully before implementation. Only correctly chosen and implemented system can help the company to benefit from it.

1.1. Target of the thesis work

The main aims of this thesis project are to consider the importance of ERP integration in the company and analyse advisability of implementing 1C Logistics system for other companies on the basis on results of its integration in PK Veteran Company and show how proper choosing of the system may affect small companies like PK Veteran Company. Also further development projects for the company will be introduced and calculated to show that other improvements can be done after first technological innovations in PK Veteran Company are made.

1.2. Research questions and research methods

Furthermore, following questions will be discussed and answered: What the ERP system is? How to choose the proper ERP system depending on the type of the company? What are the basic types and components of ERP systems? What are the basics of inventory and warehouse management?

One of the crucial questions of this thesis work "how warehousing of PK Veteran Company can benefit from integration of 1C Logistics system?" will be also answered.

During this project, it is planned to combine theoretical background and personal practical experience gained during working period in PK Veteran Company. Quantitative and qualitative research methods have been fully used to make the research more full and productive. Moreover, theoretical and working experience will help with choosing further steps of development for PK Veteran Company. Each of possible future development strategies will be fully discussed from theoretical point of view and introduced to the company as beneficial possibilities from practical point of view. In addition, different ways for controlling the system and future ways of using it will be proposed and explained.

2. Introduction to PK Veteran Company

2.1. History of creation and development of PK Veteran Company

PK Veteran Company was established in year 1991 in Moscow region, in Balashikha town. The main business of PK Veteran Company is wood processing, sawing of wood, production of lumber and distribution and reselling of materials bought from other companies. All production work is done in Kirov city, but the main office, the warehouse and the sales department are located in Moscow region. All materials are usually delivered by truck to the warehouse for storage and for future sales.

Warehousing is nowadays tending to become the core business of PK Veteran Company, moving production from the leading position of company's business.

The situation is changing because of modern market trends that companies should have a wide range of product specifications available for sales to meet customer needs and to improve customer satisfaction. As well, crisis makes the companies to lower percentage of selling materials produced by the company itself but widening the range of materials also produced by different companies.

PK Veteran has a B class warehouse (due to Knight Frank classification, which means it is a warm 8-meters high warehouse) that is located on 4500 square meters and open space warehouse for lumber and other wood products storage of 8000 square meters. Warehouse is fully equipped with machines needed for proper loading and unloading processes.

Nowadays there are 42 people working in both warehouses (Figure 4) and organizational structure is poor. In this thesis, project ways and benefits of personnel reduction and reorganization will be provided and discussed. The personnel structure of the warehouse is organized based on the personal experience and level of knowledge of each employee. This system is badly affecting on risk management of warehouse operations, as it was hard for the company to hire new employees, to retire existing employees and to affect and to control from the management point of view. There is one top manager in the warehouse – Logistics Manager. He is controlling all other warehouse personnel. Existing situation is so that there are eleven warehouse workers are working at loading/ unloading processes, which is quite a lot. That is why reorganization in the warehouse personnel structure is crucial for the company.

PK Veteran Company is specializing its business on processing of round wood needles and lumber. That kind of production provides a wide variety of final products that could be later sold to the customers. Also PK Veteran Company is working as reselling center of other building materials such as cement, bricks, concrete blocks and others. Diversification of building materials inside the company is represented in Graph one and made by analytical department of PK Veteran Company.

Figure 1. Open space warehouse of PK Veteran Company

Figure 2. Warm warehouse of PK Veteran Company

PK Veteran Company has three main operational processes:

- Production process

PK Veteran Company is producing full range of round wood needles, lumber and other wooden materials that are distributed not only to the companies but also to individual customers.

- Distribution process

Company is buying various amount of materials from big production companies such as cement, concrete and bricks and resell it adding some extra value to it.

- Logistics and warehousing processes

For customers PK Veteran Company provides different services: selling, storing and delivery of materials. Each customer of the company is not only able to order materials and delivery of it, but store materials that are already bought if the customer does not have proper place for keeping the goods.

This kind of service diversification allows to reach the highest possible level of existing customers' satisfaction and to gain new customers. In addition, future development is considered in a way that wider range of products will be provided for sales and storage to the customers by PK Veteran Company.

PK Veteran Company has great developing possibilities but unfortunately, nowadays technological level of the company is very poor and needs continuous improvement. Yet all the work is done using paper and manual data entry and control.

Integration of the software will help future development of PK Veteran Company. As the most proper ERP System 1C Logistics system will be proposed, integrated and analyzed. 1C Logistics will allow to get statistics and analyze what kind of materials and what amount of them are needed may be range of them could be shortened or enlarged due to statistics collected with high accuracy from all departments.

To consider all factors existing in PK Veteran Company nowadays SWOT analysis will be put together:

Table 1. SWOT analysis of the company before ERP system integration

Strengths:	Weaknesses:
- Good position on the market - High experienced personnel	- Poor information share - Poor materials flow control - High percentage of losses
Opportunities:	Threats:
- Ability to gain new suppliers - Ability to gain new customers - Improve inside company operations	- Not being able to compete with other companies with high IT development - No possibilities for quick information share inside the supply chain
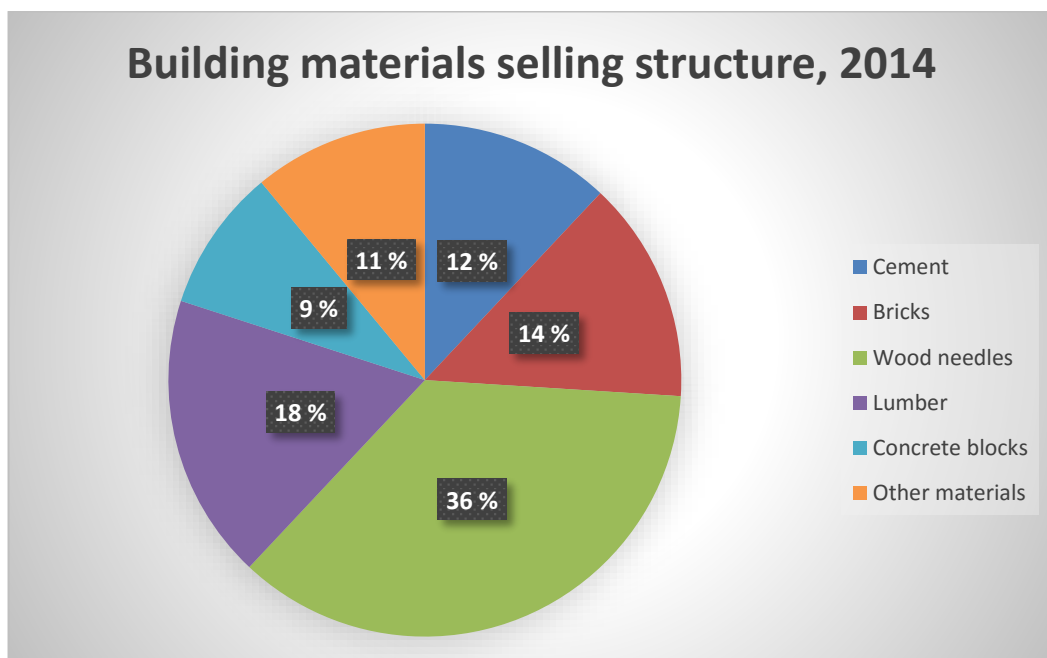
Figure 3. Building materials selling structure in PK Veteran Company in 2014

```
            ┌─────────────────────────┐
            │    Logistics Manager    │
            └───────────┬─────────────┘
                        │
                        ▼
            ┌─────────────────────────┐
            │  Warehouse manager (1)  │
            └──┬───────────┬───────┬──┘
               │           │       │
               ▼           │       ▼
  ┌──────────────────────┐ │  ┌──────────────────────┐
  │ Warehouse workers (3)│ │  │ Warehouse workers (8)│
  └──────────┬───────────┘ │  └──────┬──────────┬────┘
             │             │         │          │
             ▼             │         ▼          ▼
  ┌──────────────────────┐ │ ┌──────────────────┐
  │ Unloading personnel  │ │ │ Loading personnel│
  │         (6)          │ │ │       (6)        │
  └──────────────────────┘ │ └──────────────────┘
                           │        ┌────────────────────┐
   ┌──────────────┐        │        │ Goods pickers (10) │
   │ Security (4) │        │        └────────────────────┘
   └──────────────┘        │
                           ▼
              ┌──────────────────┐
              │  Operators (3)   │
              └──────────────────┘
```
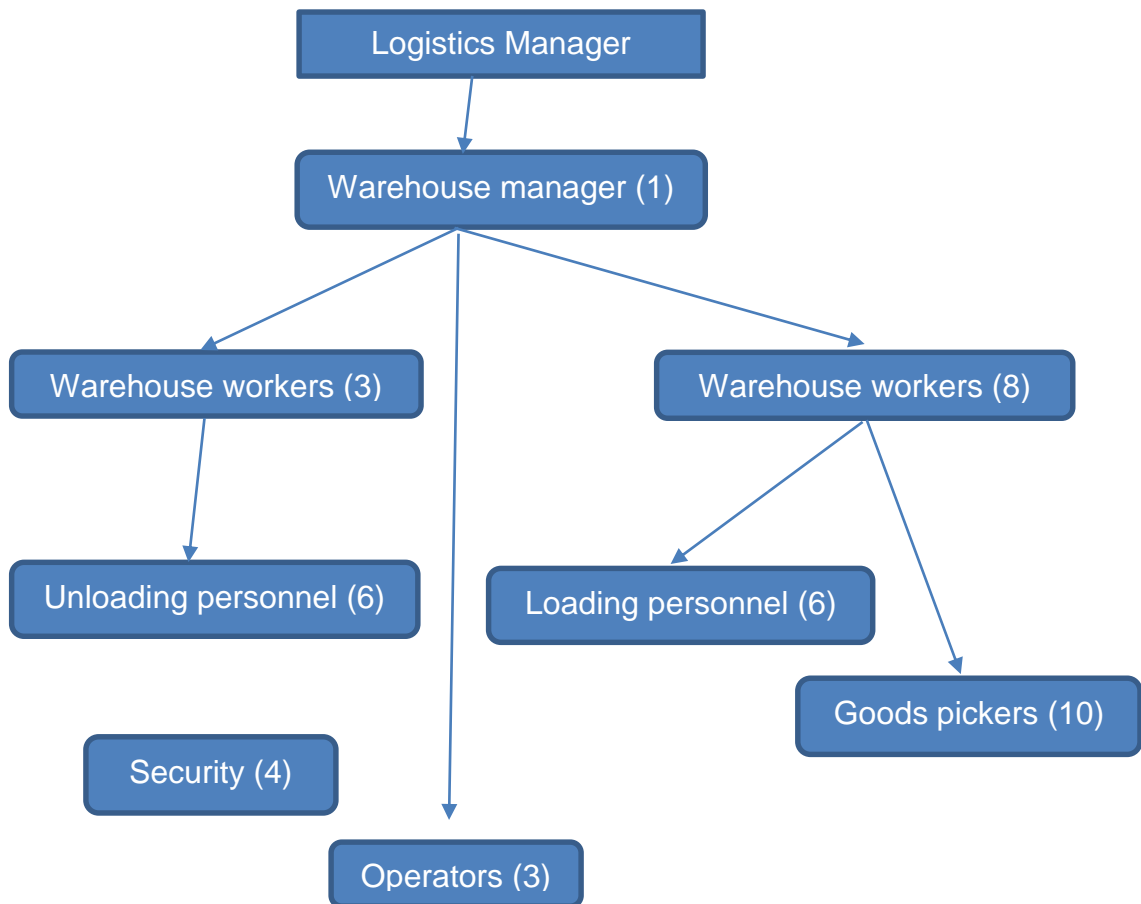
Figure 4. Organizational structure of warehouses in PK Veteran Company before ERP system implementation

2.2. Market research of building materials in Moscow and Moscow region

In the construction market of any type of housing building in which PK Veteran is operating in there are many types of materials that are produced, used and distributed. All these materials can be divided into three main groups:

- First group – materials that are using in the first phase of construction such as cement, bricks, insulation materials, etc.

- Second group – materials used when trimming inside and outside.

- Third group – paintwork materials.

As PK Veteran Company tends to get bigger and bigger market share in the region the company needs to have possibilities to provide to the customer full range of products in perfect conditions at any time of the year. That is why

market research is done not based on production position, but also on position of the distribution center and reselling company.

Market of Moscow and Moscow region is very specific. The main specification is that the peak of demand is usually starting in early spring season and lowering of demand is in the end of autumn season. However, this demand fluctuation does not affect only paintwork materials group. Fluctuation of demand is caused by the reason that most of the customers want to finish their construction work before the low temperature season.

Market share between the companies is shown in Table 2 and provided by the marketing department of the company. Biggest market share is covered by big building materials producers and distributors, but small companies also have quite a big market share because they can compete in process times and prices with big companies. The market is divided for small and big companies depending on their yearly turnover and profitability.

Table 2. Market share between building materials producers and distributors

Type of company	Market share, %
Big building materials production companies and distributors	60
Small companies	40

PK Veteran Company refers to small companies market but have one of leading position in the market. As PK Veteran Company only produces goods made of wood, all other materials are bought and resold from the warehouse.

Market share between small companies is shown in the graph below and is based on market research of marketing department of PK Veteran Company:
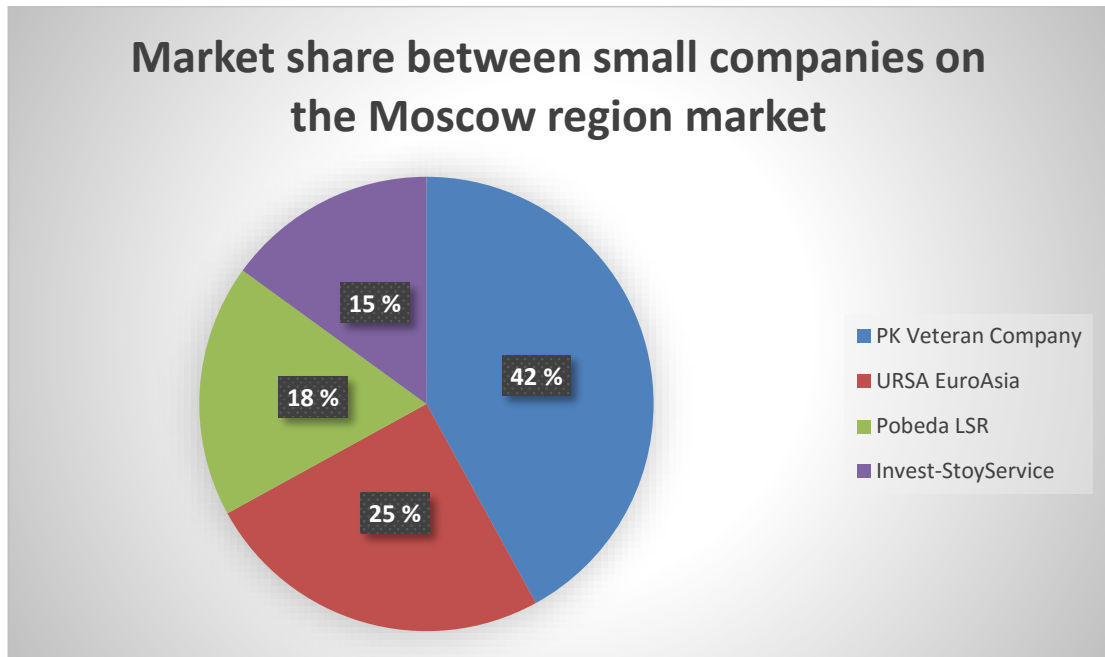
Figure 5. Market share between small companies on Moscow region market

The main competitive advantage of PK Veteran Company on the market is having good relationships with EuroCement Company that has a contract on providing cement for future reselling of it in Moscow region. With the contract with PK Veteran Company is able to buy a cement by wholesale prices that are lower than the market prices and have ability to sell it on average market prices, not only as wholesales but also to individual customers.

This is a good strategy of investments as market of cement sales is growing every year because of rapid development on construction market and is planned to continue growing in the nearest future.
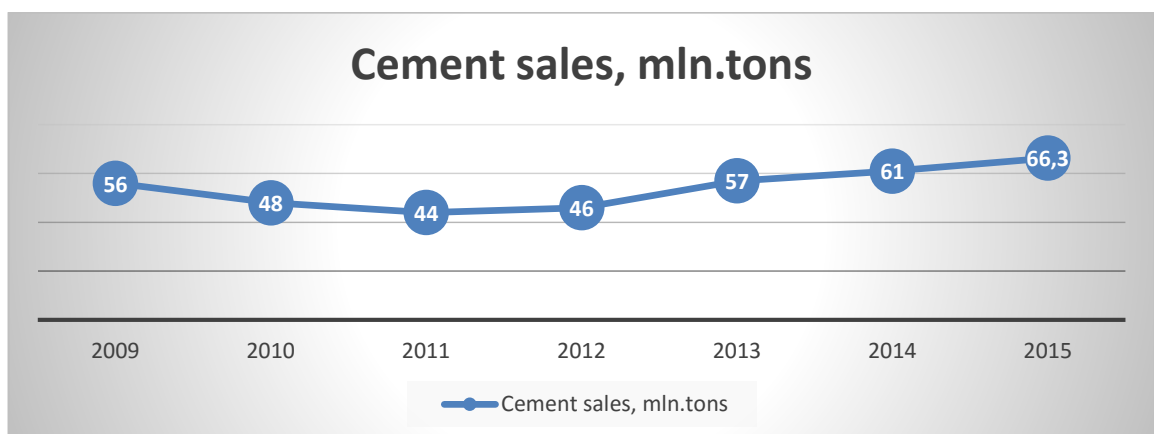
Figure 6. Cement sales, mln of tones

After the market research and analysis of sales PK Veteran Company, managers came to conclusion that the same strategy should be implemented for bricks reselling.

As the bricks' demand is continuously growing PK Veteran Company will be able to gain bigger customer market share in the future.
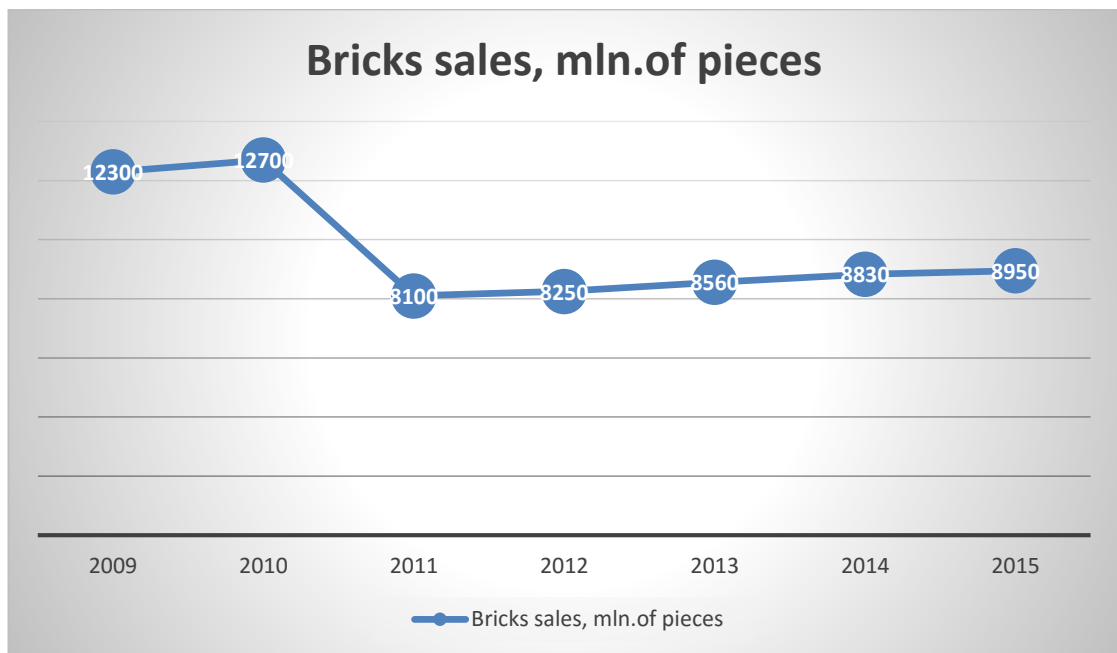
Figure 7. Sales of bricks, mln of pieces

Market researches done by marketing department of PK Veteran Company shows that in the future amount of products bought and stored by PK Veteran Company will only grow due to the rapidly changing market situation.

3. Theoretical background of warehousing process

Warehousing is a very important part of supply chain in every company whatever materials it is operating with. Effectiveness of warehousing can affect the overall business of the company and cause reorganisation in the company. Nowadays warehousing processes are rapidly changing due to information systems development. New technologies such as ERP systems, barcodes, computerized equipment and many others have made warehousing more

efficient and precise in its operations. Also educational level of human resources has grown a lot, as personnel needs to be educated enough for computer-operated processes.

According to Неруш Ю.М/ Nerush U.M., (2007) all warehouses can be divided by different functions and operation processes:

- Depending on different basic functions in logistics such as supply logistics, production logistics and diversification logistics.
- Depending on types of production: Semi-finished products, finished goods and others.
- Depending on types of ownership: company's own warehouse, suppliers' warehouse, rented warehouse and municipality owned warehouses.
- Depending on types of functional processes: sorting warehouses, diversification warehouses, transit warehouses, customs warehouses and seasonal storing warehouses.
- Depending on types of cargo specification: specialized warehouses, non-specialized warehouses, common warehouses and mixed warehouses.
- Depending on types of external transport ways: incoming railways, auto transport ways and others.

To understand importance of the warehouse in the company and logistics system all the operating functions should be identified and considered:

- Stockpiling (use of warehouse to handle production overflow)
- Product mixing (use for combining items in the entire line)
- Consolidation (use of warehousing to collect goods that are planned for the nearest-time final shipping to the customer)
- Distribution (the opposite definition of consolidation. it involves the push of finished product by manufacturer to the market)
- Customer Satisfaction(improvement of customer satisfaction of the company is the only motivation for establishing and analyzing inventory).

Theoretically, best possible organizational way is when warehousing logistics is closely connected with purchasing department and marketing and sales department. Schematically this connections and operation looks as following:

```
                    ┌─────────────────────────────────┐
                    │       Purchasing department       │
                    └─────────────────────────────────┘
                                    │
                                    ▼
```

- Calculation of stock

- Delivery and shipping control

- Loading and unloading processes

- Inside the warehouse cargo transportation

- Transportation and expedition of cargo

- Completing and packing of customers' orders

- Control of customers' orders

- Information control in the company

- Creating new customer services

- Storing of cargo

```
                                    ▲
                                    │
                    ┌─────────────────────────────────┐
                    │    Marketing and sales department │
                    └─────────────────────────────────┘
```

Figure 8. Scheme of connection between departments in the companies

According to Kenneth B.Ackerman, (2000) warehouse is big part of a larger logistics system, communications in which is assumed as critical importance. Sometimes the warehouse serves as a buffer between manufacturer and customer, sometimes between manufacturer and supplier, and sometimes between wholesaler and retailer.

Warehousing processes is a huge possibility of various development for the company. So many parts of the process that can be taken into consideration when thinking about development. As for PK Veteran Company one of the future development possibility is integration of cross-docking technology.

Cross docking is a procedure when product from supplier of manufacturer are distributed directly to customer or retailer with shortening of storage time or completely reducing it.

Main advantages of cross docking are:

- Reduction in labour costs

- Lowering the risks of inventory handling

- Reduction of inventory costs

Main disadvantages of cross docking are:

- Not every customer could afford direct distributions, they might not just have enough of storing place or storing conditions in their company.

- Control of transport modules increases rapidly, that might involve higher human and financial investments

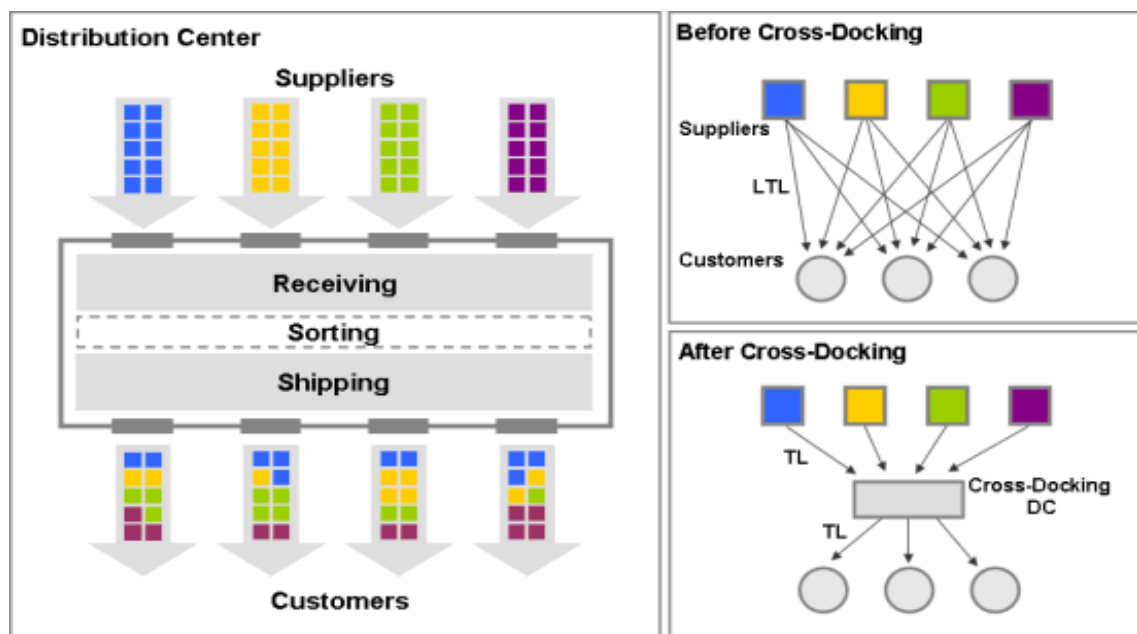Schematically cross docking process and development is shown in the picture below.

Figure 9. Implementation of cross docking

Cross docking helps reorganizing the warehouse in a more efficient way. Correct cross docking implementation considers not only system reorganization in the warehouse but sometimes also changes and modifications in layout and space usage of the warehouse. With the help of cross docking PK Veteran Company will be able to free some space in warm warehouse to provide service of storing of bought materials to the customers.

4. Theoretical background of ERP systems

According toTodd Medlin and Andras Hoc (2010), enterprise resource planning is a term for activities that managers use to run the important parts of an organization such as purchasing, human resources, accounting, production, and sales. ERP services have started rapid development in the beginning of 1990s and many companies started integration processes. With development of ERP services, more options and different types of software started to be available for the companies. Even though different software have different interfaces, they have common options available in each ERP system:

- Operations (includes supply chain planning, purchasing, scheduling, quality control, inventory, demand management and other)

- Financials (accounts receivable, cash management, accounts payable, controlling and other)

- Projects (activity management, project billing, project contracts and other)

- Human Resources (time and attendance, trainings, payroll, recruiting and other)

- Customer Relationship Management (call center support, service, analytics, sales and marketing and other).

Before integration of the ERP system the company should think what kind of system is the most suitable for it. There are three main different versions of ERP systems:

- Basic level systems:

Basic level systems support only basic functions of ERP and contain minimum amount of modifications available. Usually have a limited number of transactions and users.

- Middle level systems:

Systems of middle level also have only basic functions in the beginning, but there is a possibility for future customization. Have higher number of transactions and users than basic level systems.

- Complex systems:

Complex systems enable the customer to have various amount of modifications and precise customization for each particular need. Huge amount of transactions and quite a big amount of users is available and can also be modified by the customer need. Unfortunately, complex systems need last version of computer operational system, so that all transactions could be quickly operated and analyzed.

When the company starts thinking about implementing the ERP system also market of vendors should be analyzed and the best possible vendor should be determined. After choosing proper vendor information about capabilities of its system should be identified. Then current functionality should be gathered and analyzed.

Examples of criteria and steps that may be used by different companies to identify best proper solution are shown in a picture below (James Sutter, 2013):

Figure 10. ERP Selection criteria and steps

5. Theoretical background of Warehouse Management System

One of the main part of possible ERP system further development is WMS – warehouse management system. According to Todd Medlin, and Andras Hock, (2010) WMS automates the flow of materials into, through and out of the warehouse. Processes automated by the WMS include receiving, put away, order picking, shipping, and inventory control. Each company should carefully study its inventory and warehouse operations to be available to implement proper warehousing strategy. Warehouse Management System includes many different aspects, all of them should be analysed for further proper organisedwarehousing process in the company.

Table 3. Warehouse Management System basic functions in warehouse

Function	Content of the function
Informational database	Contains information about what kind of materials and in what amount is available at particular moment in the warehouse. Shows all available

	types of orders, all possible packaging, and places of material's storage.
Description of storing places and conditions of storage	Identify place of storage: in which warehouse, which zone in the warehouse, which rack and in which pallet (or not pallet) each item is located.
Materials description	Classification of materials available in the warehouse. Shows detailed information about each stored item: serial number, identification code, type of the pallet used for storing, pricing and amount of material available for sales in the warehouse.
Bookkeeping of stored items	Contain information about conditions of item stored in the warehouse. Enables to block/unblock all operation with each particular item: loading, unloading, special storing conditions, etc. Shows movement and routing of each product inside the warehouse.
Recipiency and shipping of materials	Proceeding with orders for each particular material on particular date. Automated reservation of materials for loading of it and further shipping to the customer. Controlling of material distribution from production to the warehouse and between warehouses of the company. Summarizing results of operations for analysis.
Document turnover	Operation for creation and printing of needed documentation for the company.
Reporting	Forming, sending and printing of different report for operations
Extra	Integration with Excel, with different software, modifications for codes identifications, collecting information from scanners and readers.

On the basis of basic function warehouse management system can be variously developed in the future to meet need of continuously developing and growing warehousing processes and operations in the company. Each company should

carefully think when implementing ERP system. The company should choose the system based also on planned development strategy of the company, as many further technologies can be integrated to the system in the future. According to Dybskaya V.V, (2014) following technologies can be integrated for warehouse development if they are tend to be needed for possible future operations in the company:

Table 4. Technologies available in warehouse management system

Technology	Meaning of technology
SCCP – Supply Chain Collaborative Planning; VW – Virtual Warehouse; VIM – Virtual Inventory Management	Common operations planning in whole supply chain in the company. Developing of virtual warehousing companies. Controlling of virtual inventories.
JIS – Just In Sequence	Planning of shipments in precise order planned in advanced.
EMS – Event Management System	Managing of different events based on monitoring of technological processes.
IMS – Inventory Management System	Managing of materials inventory in the company. Control and analysis of stock levels of all materials available in the warehouse.
VMI – Vendor Managed Inventory	Inventory controlled by supplier who provides materials to the warehouse of the company. Through the system the company can outsource and delegate responsibility of control of stock level to its suppliers.
FRS – Forecasting and Replenishment System	Forecast of needs of materials and stock levels that is synchronized with customer orders.
OMS – Order Management System	Control and analysis of materials shipping processes.
TMS – Transport Management System	Transportation management. Planning of shipping process, control of vehicles and transport operations. Monitoring of delivery processes.
YMS – Yard Management System	Controlling of yard and warehouse space. Organizing of movement of

	vehicles inside the warehouse. Monitoring of transport and personnel in the warehouse. Monitoring of materials handling and delivery.
LMS – Labour Management System	Controlling of personnel. Monitoring and analyzing of effectiveness of work of people, space and vehicles. Optimizing of time of operations and working conditions of personnel in the company.
SCIV – Supply Chain Inventory Visibility	Visualization of inventory in supply chain of the company, including information available from all warehouses in the company.
LDS – Load Designer System	Planning, organizing and optimization of loading and unloading of transport modules: trucks, containers and etc.
Billing Management System	Audit of materials and accounting operations.

Implementation of any kind of ERP system (also WMS) can bring the company many benefits:

- Improving of effectiveness of warehouse space, technology and human resource usage
- Widening the range of warehouse operations
- Improving level of customer satisfaction
- Creating database for further management decisions
- Enlarging the possibilities of information share inside the company
- Unification of the reporting system inside the company
- Moreover, many other benefits that can be measured and analyzed on basis of each company's starting situation.

6. ERP systems implementation project in PK Veteran Company

6.1. General information about 1C System

1C Logistics System is an ERP system specially developed for small and middle-sized companies to help and to develop their automatization processes.

The first edition of the system was established in year 2006. For the last nine years there has been eight editions of the software on the market: 1C Logistics 6.0, 6.5, 7.0, 7.5, 7.7, 8.0 and 8.2. Of course, PK Veteran Company is planning to implement 1C Logistics 8.2, as it contains last editions of all interfaces and functions available in the system. PK Veteran Company is implementing not only 1C Logistics System, but also 1C Accounting system, 1C Sales system and possibly 1C Human Resource system so that all data can be stored and shared between the departments of PK Veteran Company and could be easy accessible for managers.

1C Logistics enable the following processes:

- Automatization of data entry and output

- Automatization of organizational processes

- Developing and summarizing planning process

- Other fields of implementations

Each edition of 1C Logistics System nowadays has two variations:

- For smaller warehouses, where not so much automatization of the process is needed, system is connected with paperwork.

- For bigger warehouses where barcodes are defined and connected to the system.

1C Logistics System also contains software for controlling warehousing processes: 1C Logistics System: Warehouse Control 3.0. This software enables the following functions and operations for the company:

- Planning and acceptance of the goods

  As company has different ways of receiving goods to the warehouse: suppliers, customers, other warehouses and production information from all the sources should be collected and stored in one system for better access and analysis in the future. The system enables not only manual input of the information but also receiving of information from barcodes and RFID readers in the same system. The system enables downloading of different forms in Excel files for easier and better communication with all

parts of supply chain, even with companies that still does not have any ERP system.

- Materials placement in the warehouse

    After receiving of the goods in the warehouse, all materials are being placed in the warehouse by the system. The system controls free spaces and material flow in the warehouse.

- Packing and shipping of goods

    System contain full information about orders that are planned for precise period and also about packing conditions of each material.

- Inside warehouse operation

    Control and monitoring of current activities in the warehouse

- Stock-tacking

    The system enables to do the stock-tacking in the warehouses partly, so that not all warehouse operations would be stopped. That makes warehouse control economically more effective.

1C Logistics System is very flexible. After implementation process further personalization is possible. It is organized by 1C Company itself and takes to consideration smallest needs of each customer.

In general, 1C Company is very big with a wide range of products available to satisfy all needs of every company.

The following types of software are yet available in the company:

- CRM (Customer relationship management)

    To control and optimize relationships between the company and its customers.

- HRM (Human resource management)

    Control of employees and salary/bonuses financial flow.

- TMS (Transport Management System)

System allowing controlling traffic flow in the company and see locations of transport modules.

- CMM (Centralized maintenance management)

System enabling to control maintenance operations in the company to minimize breakdown costs in the company.

- Many other platforms enabling to control each small part of the company.

PK Veteran Company has a long way of developing of its information system. Nowadays only some parts of 1C System is planned to be implemented in PK Veteran Company. With development of the company and growing turnover of materials more ways of controlling and data storage and share will be needed for PK Veteran Company.

Interface of the program is very simple, that will help PK Veteran to make teaching of personnel much easier and effective. All operations have description button if something small is unclear. But, if any bigger problems are occurring then the representative of the company is visiting and explaining everything. 1C Company provides free consulting services to the company for one year after the implementation, which is concerned to be quite a big advantage when choosing a proper system for PK Veteran Company.
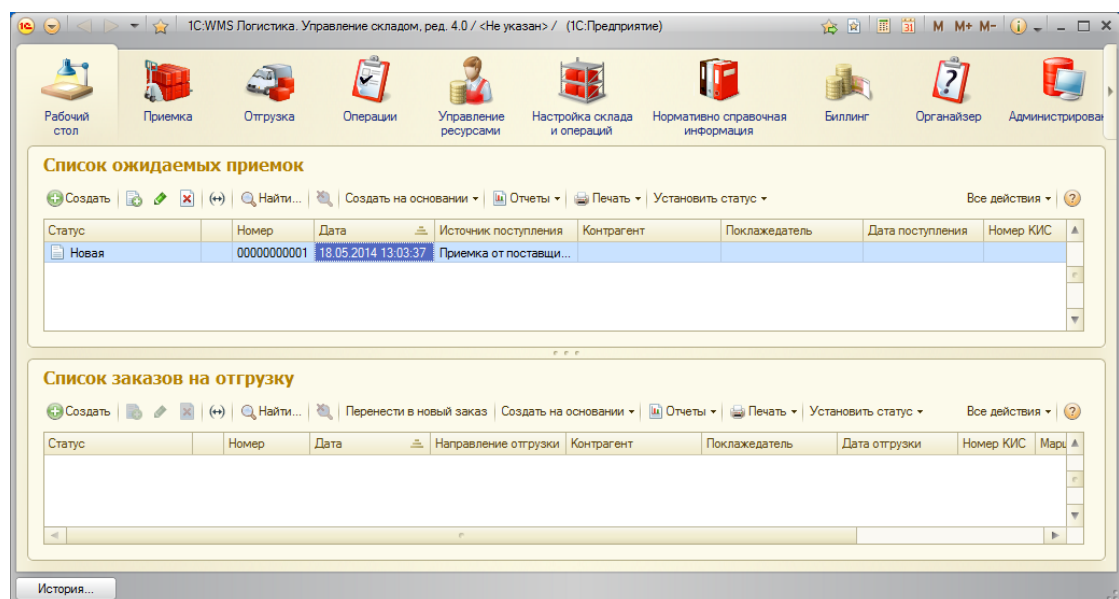

Figure 11. Interface example of 1C Logistics System

In general, 1C System is the best possibility from the wide range of different systems available on the market for PK Veteran Company. Also one of the main reason of 1C Logistics integration is that 1C Logistics is specially developed for Russian market: it follows Russian specifications in reporting, taxation system, realization of goods and others.

The system is itself being continuously developed through years that will enable to update the system in the company whenever the new edition will be needed. To update the system not many operations will have to be done by the Company. When PK Veteran Company will need a new edition of the system simple, downloading of updates from the official website will be possible. Downloads could be done at any time, for any software department (logistics or accounting or sales) with no external helps or trainings.

All factors discussed makes 1C logistics a perfectly fitting system for PK Veteran Company.

6.2. Implementation project of 1C Logistics in PK Veteran Company

The situation of information share in PK Veteran Company nowadays is bad. All data is collected and stored on papers. This is the main reason of such a big amount of human errors that are happening during the working process in the company. In addition, usage of paper is quite high which is bad for financial situation in the company because paper costs are getting higher and higher and for ecological image of the company. PK Veteran Company really cares about its image on the market. The company has to think of becoming green company on the market.

Also nowadays information share and control in PK Veteran Company is operation in an old-fashioned way of organization. This cause a huge amount of errors and data loss. The situation of poor information share in the company is not possible to be in the modern and rapidly developing company that is why PK Veteran Company has decided to invest in implementing of ERP System.

Implementation process will not only take place in logistics department and warehouses in particular, but also sales and accounting parts of 1C software are planned to be integrated in the nearest future. The estimated time of implementation is about five-six month until PK Veteran Company will get the first results to achieve and analyze.

Integration operations steps will be the following:

- Make contract with 1C Company. Decide on conditions and costs of implementation.

- Define edition of the software that is needed for PK Veteran Company

- Prepare schedule for software implementation

- Introduce Project team of specialists

- Prepare schedule for personnel training

- Define needs for extra trainings

- Summarize results achieved

- Controlling of working process

After all steps will be clearly defined implementation process in the company can be started.

For future development of production and warehousing processes, it is important to improve technical and technological level of the company. In the situation of rapidly growing market of building materials improvement of customer level and optimization of warehousing working process and structure will enable PK Veteran to gain a huge competitive advantage and win new customers. In this situation, PK Veteran Company needs to think about implementing Warehousing Management System, 1C Logistics ERP system in particular. This system will allow to computerize all the data that is already available in the company, improve automatization processes and help to higher the level of customer service.

1C Logistics System will allow to achieve the following results in the nearest future:

- To enlarge warehouse turnover for at least 20%

- To lower personnel costs for 30%

- To lower costs of machinery usage for 25%

- To higher warehouse space usage for at least 30%

- To have return of investments of implementing the system in 6-18 months. Time for ROI is meant to be calculated for returning to usual financial turnover of the Company.

- Improving bookkeeping and data failure correction to 99.9%

Main factors why PK Veteran Company needs 1C Logistics System implementation are the following:

Lowering costs of goods turnover and costs for using special warehousing machinery needed for transporting and storing materials. And PK Veteran Company will need to lower the personnel costs. The main benefit of 1C Logistics System is that each department, such as human resource, warehousing or sales department can enter the data separately and the system will combine it together. All the information would be available at any time, for each department. That makes data flow easier to control and all operations in departments will be visible 24/7.

Having all data collected in one place makes knowledge of each employee not so significant and will enable the company to optimize its' human resources. When having employees with special and significant knowledges it will be hard for the company to reorganize warehousing process but also almost not possible to remove the employee. If this particular employee would be fired or retired the company will need to spend lots of time and money for finding and teaching new employee. That is why we need to spread the knowledge between the employees and teach them to get data from the system easily. In this case PK Veteran Company will have specialist with wide varieties of working abilities that could be moved from one department of the company to another that will enable the company to have well-educated personnel.

Collected data could not only afford to know nowadays situation but also to get statistics from several years of working processes. That could help to correct

future strategy of the company due the results of statistical research. 1C Logistics System also have a function of informing the manager about failures in working process, such as production downtime, lack of personnel working hours and also see why that happens. This information is crucial for motivation of managers: it is a basis for future strategical modeling situation that can help counting what kind of resources and how much of those resources will be needed in a situation with fluctuating demand.

1C Logistics System will enable to higher the effectiveness of warehouse space usage. Different warehouse departments (for example warm warehouse and open space warehouse) have different usage costs, they need different employees, different machinery and different controlling strategy that will show ways of future development and cost saving ways.

Dynamical allocation of goods is one of the concepts that will allow to choose ERP system properly and see all benefits if it. The main point of dynamical allocation of goods is to find proper placement for each type of materials at particular time of the year, manage intensity of loading and unloading of the materials and its storing time.

During the implementation process, PK Veteran Company is planning to have two implementation teams: one which is specialized on warehousing processes and the other one that is specialized on 1C Logistics System. Differential knowledge of different aspect of storing materials will allow better integration of the system. Two teams will try to combine main questions of each team for gaining the best results of implementation.

One main factor should be taken into consideration: ERP system should be flexible to time and demand fluctuation. Organizational principles should be set in the beginning and oriented not only to nowadays warehouse working process but also to the future.

The integration process will have to change all the existing paperwork in the company and develop proper working ERP System in the company. For integration, PK Veteran Company will have to buy not only the information system, but also different equipment needed for proper work of the equipment.

In overall all needed cost can be calculated using the following formula:

$$\sum \text{(total costs)} = K \text{ (integration costs)} + C \text{ (usage costs)} + D \text{ (depreciation costs)}$$

In the following two tables, all costs will be listed and calculated. Prices for software, integration and training are defined with 1C Company and are the subject to each particular contract.

Electricity costs are average in Moscow region and defined by wholesale tariffs. Costs are defined and calculated for the first year of usage and working. Future costs are subject of changes, but will be close to the existing nowadays prices.

Amount of equipment needed is calculated from amount of workers whose working process is connected with computer work. All workers are trained and able to use computers and software in proper way.

Depreciation costs are also average on the market of computer equipment after one year of usage and advised by the specialists.

Table 5. Short-term investments in integration of 1C Logistics System

Equipment needed	Amount	Cost of one piece, ruble	Total costs, ruble
Software	1	1,500,000	1,500,000
Integration	1	250,000	250,000
Computers	15	26,500	397,500
Monitors	15	10,384	155,760
Printers	10	8,500	85,000
Keyboards	15	650	9,750
Computer mouse	15	295	4,425
Personnel teaching costs	1	450,000	450,000
Total			**2,852,435**

Table 6. Costs of usage 1C Logistics System for one year

Cost elements	Expenses	Total costs, ruble
Electricity costs for printers (15 h work a day, 365 days a year)	100*15*365*10/1000=8212,5 kW	
Electricity costs for monitors (15 hours work a day, 365 days a year)	150*15*365*15/1000=12319 kW	
Electricity costs for computers (15 hours work a day, 365 days a year)	300*15*365*15/1000=24637,5 kW	
Total electricity costs	(8212,5+12319+24637,5)*2,25=101,630	101,630
Paper expenses	320*365/500*125= 29,200	29,200
Ink expenses for printers	120*580=69,600	69,600
Maintenance costs	2*3500*12= 84,000	84,000
Total		**284,430**

Calculating using the formula given before we will get the following result:

∑ = 2,852,435 + 284,430 + 2,402,435*0, 2 = 3,617,352 rubles

In overall we get a bit more than 3,5mln rubles needed for 1C Logistics System integration. That is quite a big investment, but PK Veteran Company can gain a lot more from the integration.

7. Results of implementation of 1C Logistics Company

As the starting situation of PK Veteran company is poor, results of implementation are clear to see and easy to measure.

Most countable results are:

- Improvement of warehouse space usage

- Lowering warehousing personnel costs

- Lowering number of material losses

- Lowering amount of paper documents in the company that leads to lowering of documentation losses in the company

- Lowering amount of mistakes during picking, loading/unloading, inside warehouse distribution and others.

- Higher the speed of operations

- Improvement of customer service of the company

- Widening the range of warehouse operations

- Shortening of time of information share between the company and its suppliers or customers.

- Improving customer satisfaction level

- Share responsibility between the workers of the same level equally

Nevertheless, most impressive results that were possible to achieve during the process of implementation of 1C Logistics System are the following:

- Human factor failures are reduced by 99.9%

- Working process can be divided between all workers equally and depending on their qualifications.

- Automatization process can help to reduce personnel amount by 20 people. Workers are not any more divided for loading/unloading personnel, as everything is controlled and operated by computerized system. Employees are divided into two warehouses depending on their knowledge and work experience. Warehouse organizational structure becomes clearer and better organized. That enables the company to change warehouse personnel structure and plan it for the future with perspectives of developing and further enlarging of the warehouse. PK Veteran Company can put this people for future enlargement of the company from warehouse to management positions. New organizational structure is shown in the following flowchart (Figure 13)

In addition, these are only the first results that can be seen right after the integration process is done. Furthermore, development of the system itself will be possible. PK Veteran Company not only plans to implement 1C Logistics System and 1C Accounting and 1C Sales systems but to connect all of them and upgrade to warehouse management system in the future.

Comparison of two systems (paperwork that was used before and new software that has been implemented during the last period) is shown in the graph below:
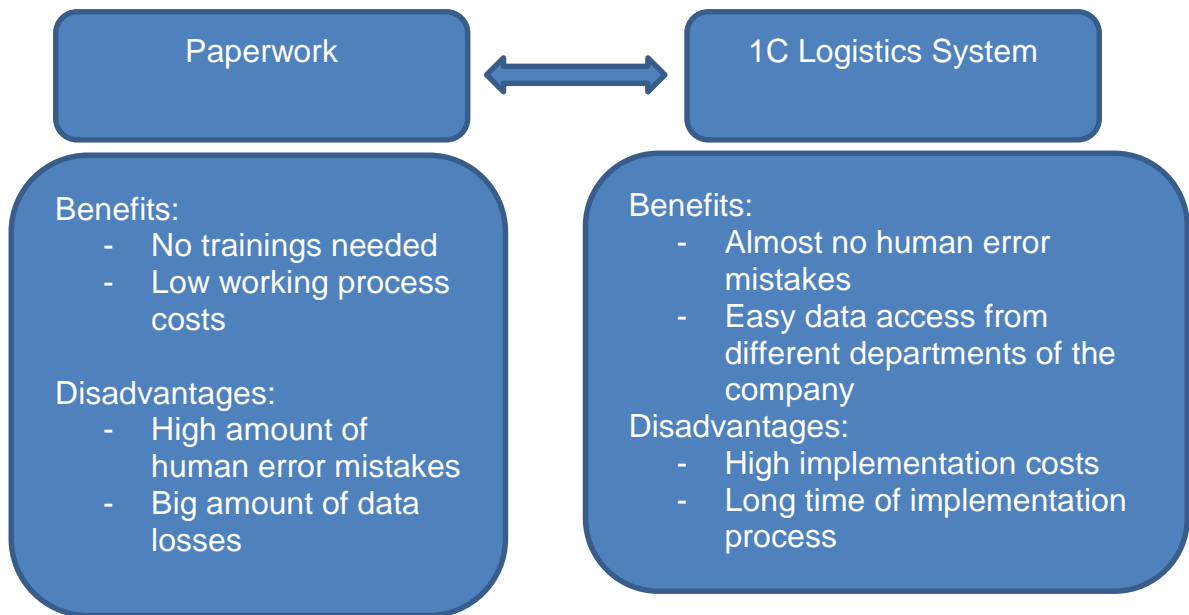

Paperwork ⟷ **1C Logistics System**

Benefits:
- No trainings needed
- Low working process costs

Disadvantages:
- High amount of human error mistakes
- Big amount of data losses

Benefits:
- Almost no human error mistakes
- Easy data access from different departments of the company

Disadvantages:
- High implementation costs
- Long time of implementation process

Figure 12. Comparison of two working systems

With the help of 1C Logistics system all materials will be stored in a better structured way that will help to make faster materials turnover and guarantee safety of materials stored in the warehouse.
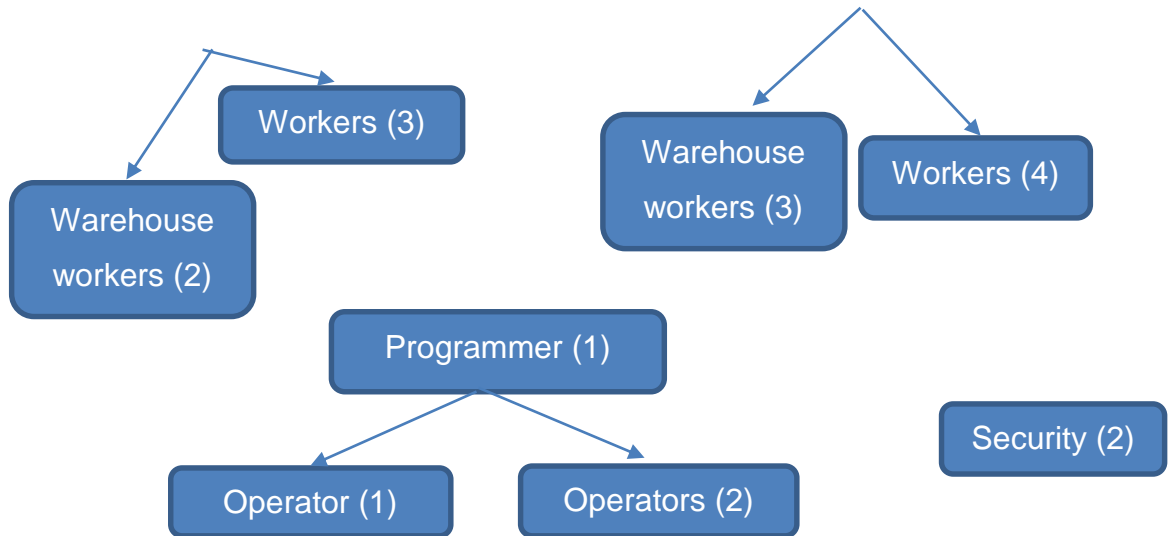

Logistics Manager

Open Space Warehouse manager (1)

Engineer (1)

Warm Warehouse manager (1)
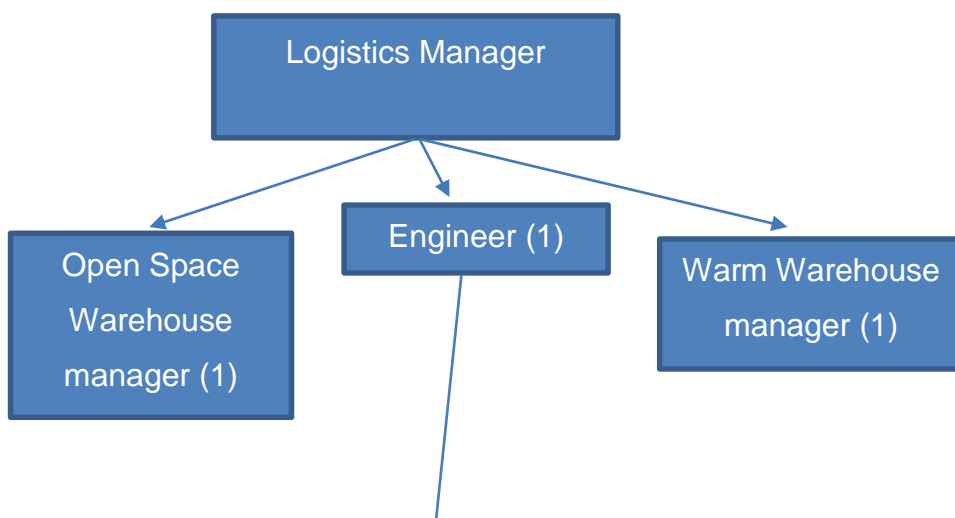
Figure 13. Organizational structure of warehouses in PK Veteran Company after ERP system implementation

Unfortunately PK Veteran Company faced many critical points during the implementation period:

- Some specialists quitted the job because they were not able to use computer and did not want to study the system

- Operational time got bigger because employees needed to get used to the new working procedure and process

In the future PK Veteran Company plans to get back to normal operational procedures and enable to use most of benefits provided by the ERP system.

8. Future perspectives of company development

With implementation of 1C Logistics System and its continuous improvement PK Veteran Company will afford not only to control all the data and personnel costs but also enable the future development of the company.

PK Veteran Company will be able to implement cross-docking system and to count and keep safety stock level of cement. Main aspects of steps of

improvement are shown in the table below and financial benefits are roughly calculated to show possible benefits for the company.

This will enable PK Veteran Company to change its position on the market and gain bigger market share as analyzed by marketing department of PK Veteran Company:
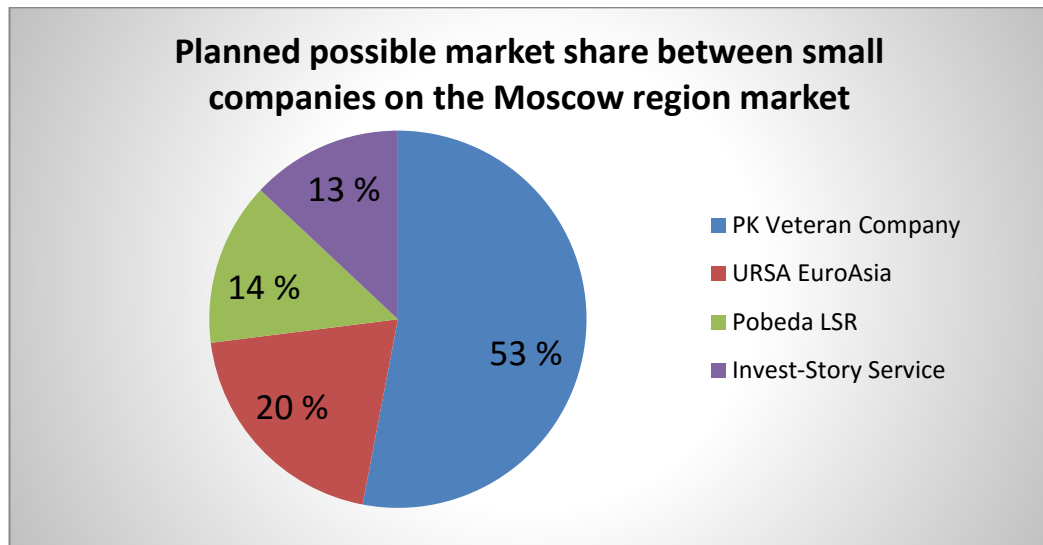

Figure 14. Planned possible market share between small companies on the Moscow region market.

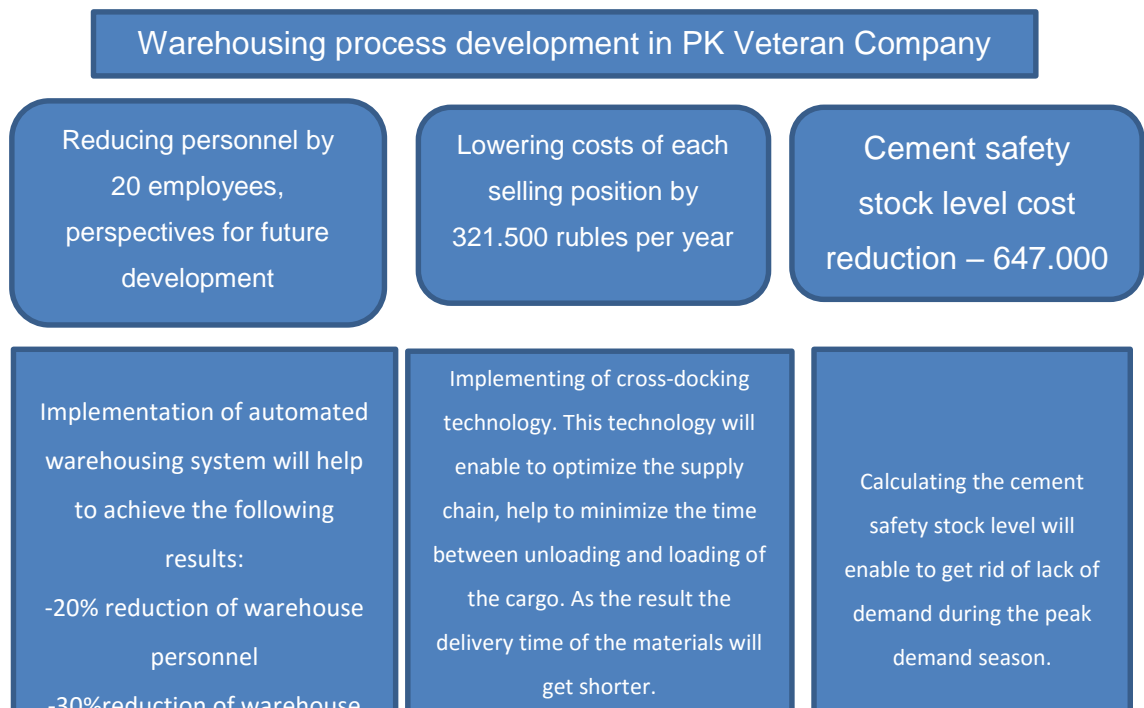| Warehousing process development in PK Veteran Company		
Reducing personnel by 20 employees, perspectives for future development	Lowering costs of each selling position by 321.500 rubles per year	Cement safety stock level cost reduction – 647.000
Implementation of automated warehousing system will help to achieve the following results: -20% reduction of warehouse personnel -30%reduction of warehouse	Implementing of cross-docking technology. This technology will enable to optimize the supply chain, help to minimize the time between unloading and loading of the cargo. As the result the delivery time of the materials will get shorter.	Calculating the cement safety stock level will enable to get rid of lack of demand during the peak demand season.

Figure 15. Impact of warehousing process improvement proposals

Not only basic ways of stock levels and safety stock levels calculations are planned to be used for strategic planning of the company but also modern ways are needed to be implemented. For better safety stock amount calculation and its control the company will implement Method of quick reacting. Method of quick reacting is an immediate reaction of the whole supply chain of the company to changes of surrounding environment. Warehouse should be able to react to the market situation and repack materials or reorganize shipping processes.

To have this kind of system in the company should have a quickly reacting information system that would display operation situation analysis whenever needed. Logistics and warehouse managers should have 24/7 control of all happening situations in the company.

This method is only able to be created in the company when having the following three technologies:

- Automated barcode readers information identification. That helps to collect all needed information quickly and accurately.

- Quick electronic information share. That includes not only ERP systems but also Internet connection.

- Automated identification of each material item.

Method of quick reacting will help to control general stock and safety stock levels of all materials available in the warehouse, not only based on general calculations and predictions but also dependent on surrounding environment.
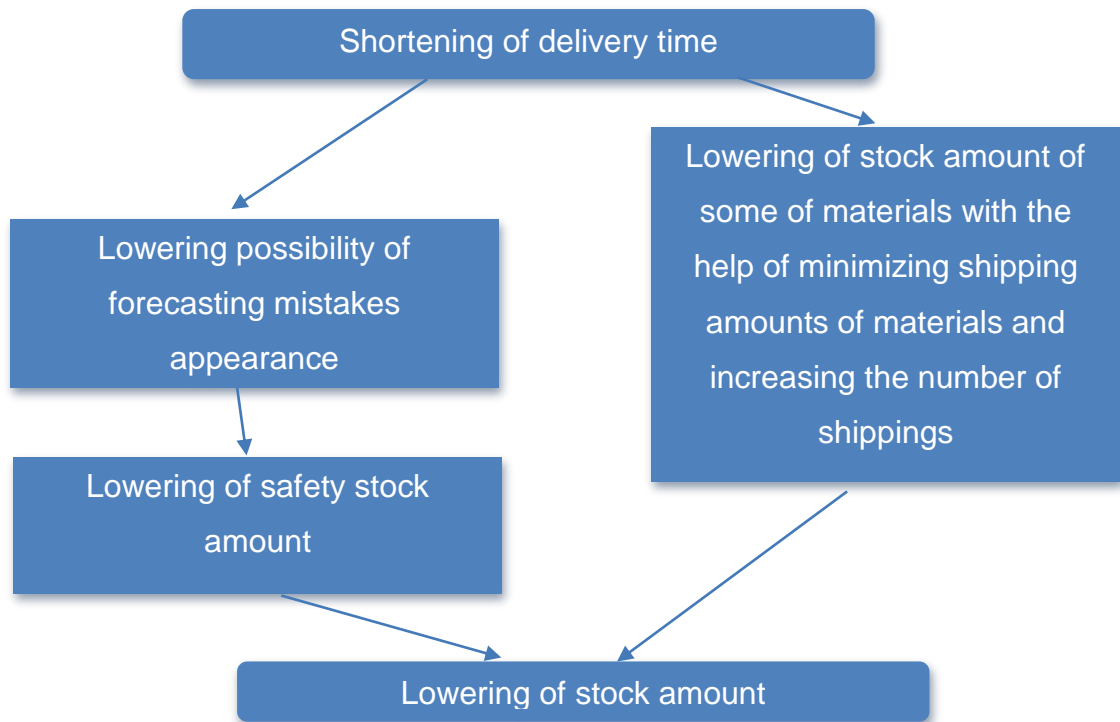

Figure 16. Method of quick reacting in the company

As there are many ways of future development proposed to PK Veteran Company analytical department first have to analyze situation in the company using again SWOT analysis.

Table 7. SWOT analysis of the company after ERP system

Strength:	Weaknesses:
- Good position on the market - Highly developed information system	- Loss of personnel - Slower operation time due to operating with new system
Opportunities:	Threats:
- Many ways for future development - Cost saving possibilities	- Poor information connection between suppliers because of ERP system differences

For controlling and optimizing all those project the company should implement Key Performance Indicators system. According to Dybskaya V.V., (2014) key performance indicators, KPI is a system used for controlling of logistics, productions and warehousing operations in the company. Each department of the company has its own KPI. Main KPIs that are needed to be implemented in PK Veteran Company are represented in the following table:

Table 8. Main KPIs of logistics and warehousing operations in the company

Name of indicator	Ways of reporting	Description	Additional accountings needed	Operations controlled with use of KPI system
Incoming flow of materials per day	Report, diagrams	KPIs are representing the number and amount of metric volumes of materials received per day	Total amount of cargo. Total amount of personnel working hours	Characteristics of process of receiving of goods. Dynamics of incoming material flow (can be viewed and compared by every date)
Time needed from receiving till storing of goods in the warehouse	Report, diagrams	KPIs are representing time intervals between receiving of goods till storing in particular place in the warehouse	Total receiving time. All information and documents are uploaded to the database	Time of goods transfer. Dynamics of storing process (can be viewed and compared by every date)
Time of storage of the order at the warehouse	Report, diagrams	KPIs are representing the average storage time of each group of materials	Amount of transfers done in the warehouse by each operator. Total amount of transfers in	Storage time bleach group of materials

			the warehouse	
Amount of transactions done by each operator	Diagrams	KPIs are representing the average amount of transactions done by each operator working in the warehouse		Work efficiency analysis of all warehouse workers. Dynamics of working process efficiency (should be able to be compared from day to day)
Amount of warehouse operations done per hour	Report, diagrams	KPIs are representing the amount of operations that are done on time and that are done with delays	Amount of operations done in time. Total amount of operations done in each day.	Perfectly calculated time needed for one particular operation. Level of customer satisfaction.
Shippings' effectiveness	Diagrams	KPIs are representing amount of orders shipped on time compared to amount of delayed shippings.	Amount of shippings done on time. Total amount of shipments done in each day.	
Time of order operation	Diagrams	KPIs are representing the time of processing of every order counted from the time of receiving of goods to the warehouse until the time of shipping.	Total amount of delayed orders. Amount of orders per day.	Percentage of shippings done on time. Level of customer satisfaction.
Amount of delays per day	Report, diagrams	KPIs are representing amount of orders that have not been shipped during	Amount of delayed orders. Amount of orders per day.	Percentage of shippings done on time. Level of customer satisfaction.

		the planned day.		

All listed KPIs will help to better organize working process and improve working conditions.

Each of development steps are meant to bring higher financial and materials turnover in PK Veteran Company.

All of the following improvement projects are not only enabling the company to get the highest result in organizational-management structure, but also provides wider range of future company strategical development ways.

9. Conclusion

Practical importance of the ERP system implementation results is that these results can be used by different companies to higher the importance of effective production, warehousing and sales processes.

Before implementation of 1C Logistics system there was no think like diversification logistics in PK Veteran Company. But nowadays it becomes obvious that differentiation in logistics methods should be used to fully reorganise and develop production, warehousing and logistics processes. The main aim of this thesis report is to develop different ways of improving warehousing services on example and practical results of PK Veteran Company. One of the problems on which this report is focused is changing from paperwork process organisation to implementation of ERP system and after that to Warehouse Management System of warehouse management and 1C Logistics System in particular.

All in all different project of improvement are proposed, discussed and planned to be implemented in the future with help of basis of 1C Logistics System integration and forming of the full database. Each further project is fulfilling the previous one and needs deep research before implementation.

As calculated and predicted the company will in any case benefit from the whole complex of those projects. PK Veteran Company can gain higher materials turnover and better profitability in the future.

For further development PK Veteran Company is planning to gain bigger market share of sales and distributions in Moscow and Moscow region. For this continuous improvement PK Veteran Company will carry on existing projects and add modification when needed to meet market changes and development in customer service of the company.

For controlling and resulting of development KPI system will be used in the future.KPI system is not only planned to be implemented for controlling storing and production, but also for improving the level of working conditions in the company.

Existing good position on the market, different varieties of customers and technological implementations will allow PK Veteran Company to gain market share, enlarge selling materials range and probably go to the in-country Russian market in the nearest future.

10.   References

1C Logistics: Warehouse Management 3.0 Accessed 18 December 2015. Retrieved from http://solutions.1c.ru/catalog/wms/features

1CLogistics: Warehouse Management, 2011-2014, n.d URL Accessed 18 December 2015. Retrieved from http://solutions.1c.ru/catalog/wms/features

Classification warehouse, 2014 n.d URL Accessed 19 December 2015. Retrieved from http://bachfest-leipzig.com/classification-warehouse/

Cross docking process Accessed 22 December 2015. Retrieved from https://upload.wikimedia.org/wikipedia/de/6/6f/Crossdocking.gif

ERP-Supported Business Processes Accessed 22 December 2015. Retrieved from http://image.slidesharecdn.com/modernerpselectimplementandusetodaysadvancedbusinesssystemsauthormariannebradford-140930002550-phpapp01/95/modern-erp-select-implement-and-use-todays-advanced-business-systems-author-marianne-bradford-5-638.jpg?cb=1412036968

Implementation of cross docking Accessed 22 December 2015. Retrieved from http://1.bp.blogspot.com/-zycTvOq2py8/UJOlzeRZNEI/AAAAAAAAAB4/YEFmg8NGpjM/s1600/Cross+Dock.PNG

Warehouse Management System Accessed 22 December 2015, Retrieved from http://www.improsys.in/images/warehouse-management-system.jpg

Дыбская В.В., 2014 Управление складированием в цепях поставок, Издательство «Альфа-Пресс» / Dybskaya V.V., 2014 Managing warehouses in supply chain, Publishing office "Alpha-Press",

Дыбская В.В., 2005 Логистика складирования. Для практиков., АЛЬФА-ПРЕСС, / Dybskaya V.V., 2005 Warehousing Logistics. Practical view., ALPHA-PRESS,

Дыбская В.В., 2014 Логистика складирования. Учебник, ИНФРА-М,/ Dybskaya V.V., 2014 Warehousing Logistics. Course book., INFRA-M,

Егоров В.Ф., 2012 Организация, технология и проектирование предприятий торговли, Издательство «Первый класс», / Yegorov V.F., 2012 ,Organization, technology and projecting of sales companies., Publishing office "First class",

Неруш Ю.М., 2007 Коммерческая логистика, ЮНИТИ,/ Nerush U.M., 2007 Commercial Logistics, UNITI,

Пересветов Ю.В., 2007 Управление материальными ресурсами. Логистические принципы., ГОУ «Учебно-методический центр по образованию на железнодорожном транспорте»,/ Peresvetov U.V., 2007, Materials resources management. Logistics principles., GOU "Learning-methodological teaching center on railway transportation.,

Шаш Н.Н., Азимов К.А., Шепелёва А.Ю., 2006, Логистика, Юрайт Москва,/ Shash N.N., Azimov K.A., Shepelev A.U., 2006, Logistics, Uraight Moscow,.