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**SOLUTIONS FOR A MODERN PHARMACEUTICAL COMPANY'S
FUTURE OBJECTIVES**

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INTRODUCTION

The pharmaceutical industry is one of the world's most profitable and efficient sectors. In the last few years there have been more and more merging, fusions or acquisitions in order to improve the efficiency or reduce costs. Due to these processes a lot of multinational companies were formed (like Novartis, Sanofi-Aventis).

The significance of the industry couldn't be defined more precisely as the Hungarian Pharmaceutical Manufacturers' Association did: *"Hungarian pharmaceutical industry has traditionally been playing important role in the generation of national income and domestic health provision. It is being characterized by continuous innovation, product and production development. Its innovative nature manifests not only in research and development, but also in the management and operation of the companies."*(Hungarian Pharmaceutical Manufacturers' Association 2011)

In order to satisfy the costumers' needs, the companies have to transport the medicines and other therapeutic equipment to hospitals and pharmacies in the most efficient way. The logistics join to the process. Nowadays, the importance of this science is even more increasing as competition is getting sharper. The quality of both products and connected services has become essential.

I had the opportunity to work with a pharmaceutical wholesaler; I took part in some meetings and observed the whole operation. Therefore in my essay – based on data gathered from the wholesaler - I would like to explain how a pharmaceutical company can develop its service level. The special features of the pharmaceutical industry have to be taken into account: as it deals with medicines, firms have to meet with numerous obligations. The customers are not the end users (patients) but the pharmacies and hospitals primarily. To satisfy their needs, the company has to know, in addition, what the end users require. According to these issues the firm aspires to comply with its environment, to develop.

There is a new challenge: to fulfil the aforementioned needs, the company's assets and capacities are not enough. These limits come from not only the fierce competition between the firms but also from the 2008-2009 world crisis' effects which are perceptible at the moment, too. In this demanding environment the company has to analyse its financial situation and processes continuously as well as implement the tools of management sciences into its operation to be able to react efficiently as soon as possible

to the new situations. Hence using logistics performance management, controlling and project management with IT background are indispensable.

LOGISTICS AND CONTROLLING

1.1. HISTORY OF LOGISTICS, DEFINITION, AIMS

To understand the operation of a pharmaceutical wholesaler, let's see the basics and main goals of logistics, a modern science with a great history.

According to Prezenszki (2006) the logistics – as a word – is originally Greek (logo = to think, logos = mind, logistikos = to think logically). The earliest references may have derived from BC 1st century, when an educator, Marcus Terentius Varro, who lived in the Roman Empire, dealt with 3 – 6 year old children, bringing up, with expression from that time 'care'. In his work, Logisticon, he analysed the children's full-scale care.

Later, in the roman army the 'logistas' took charge of the legionary's accommodation and food supply. After, the next important step was around 1830. The Swiss Baron de Jomini, the general of the French army, denominated logistics as *“those organizational measures which the general staff fulfil the concept of strategy and tactic.”* After the turn of the century the methods and principles of Jomini are started to be used by the American and European army.

In the advanced countries logistics has become strategically important from the 1950s. The starting country was the United States of America, and then started to spread in Western-Europe, Eastern-Asia and after the change of the Regime in the countries of Central and Eastern-Europe, such as Hungary. (Szegedi and Prezenszki 2008)

Over the years, the definitions have changed a lot. There are numerous definitions of logistics, being an emerging, interdisciplinary science. According to the Council of Supply Chain Management Professionals:

“[...] logistics management activities typically include:

- inbound and outbound transportation management,
- fleet management,
- warehousing,
- materials handling,
- order fulfilment,
- logistics network design,
- inventory management,
- supply/demand planning,

- and management of third party logistics services providers.

To varying degrees, the logistics function also includes

- sourcing and procurement,
- production planning and scheduling,
- packaging and assembly,
- and customer service.

It is involved in all levels of planning and execution-strategy, operations and tactical decisions. Logistics management has an integrating function, coordinates and optimizes all logistics activities.”

(Council of Supply Chain Management Professionals 2011)

The aim of the logistics has changed also. Based on Szegedi and Prezenszki (2008), in the 1950s the emphasis was on cost reduction, and then, from 1970s, on sales support. The customer service appeared in the middle of the 1980s as a new aim to reach. By that time, more and more people had discovered that only those firms can stay on their feet in the fierce competition, which fit to customers’ needs in the best possible way. This is unimaginable without the improvement of material-, goods-, and information flow, i.e. without increase of logistics service level. Logistics of nowadays concentrate on not only the individual needs but on the supply network, as well.

As it is a complex and emerging pattern of economics many companies are still in the process of defining specific scopes of responsibility of the logistics function, which depend on the type of the firm (is it producer or service provider) or the amount of resources available for this activity. In addition, they are trying to gear logistics into their service networks towards the customer needs, which is an enormous step to improve themselves. (Dr. Antoni 2012) Hence, in the case of small size companies usually there is not enough emphasis on logistics. The examined pharmaceutical company – as it has a distribution centre – is quite modern and has elaborated plans for distribution of pharmaceutical products and therapeutic equipments which main points will be mentioned below.

If we talk about logistics, we shouldn’t forget the notion of supply chain management. Hugos’ approach is the following:

“Supply chain management acknowledges all of traditional logistics and also includes activities such as marketing, new product development, finance, and customer service.”

(Hugos 2003, p 14)

According to Martin Christopher, supply chain management is

“the management of upstream and downstream relationships with suppliers and customers, in order to deliver superior customer value at less cost to the supply chain as a whole.”

(Christopher 2011, p 3)

The difference is derived from the concept of terms. Logistics mainly deal with activities within the borders of an organization or company while supply chains refer to a whole network in case of delivering a product to a market. As we can see from the definitions, supply chain management crosses the boundaries of firms and trying to coordinate the actions in order to pass the given good to the consumers.

1.2. HISTORY, DEFINITION AND AIMS OF CONTROLLING

Companies work with numerous data, information about production, output, etc., and they use different indicators assessing costs and profit making activity of employees, machines, etc. With performance measuring the management can inform especially the owners and the employees how the firm works. The philosophy of performance management appears in this level. Performance management is a process which deals with mainly motivating the employees in order to reach the strategic goal of the firm. Performance management is usually connected to controlling which is another essential tool for leading a company.

Let's see some information about the history of controlling. The expression, controlling origins from the Middle Age, in the French and English nobleman's estate the *comptoler*, *contrerolleur* denomination was used for treasurers, whose main task was to control the incomes and outgoings of money. Later, by the time of the industrial revolution in the United States, the English denomination, controllers were defined as heads or employers of firms who dealt with financial management and control.

It follows from the foregoing, the controlling method today as the organization management's subsystem came from the USA in the last century's first half with the name of Management Control System. (Dr Körmendi and Dr Tóth 2007)

The controlling (in Hungary) is a subsystem of management, coordinative function which analyzes the company's capital and liquidity, focuses on result planning as well as observes performances and expenses. Controlling is an information system for managers, helps the management in planning and represents control, too. On the other hand examines plan-fact differences. The controller is a partner of managers, shows variances and makes proposals. The controller is often a leader advisor inside the company. (Dr. Mészáros 2011)

As we can see the major aim of controlling is to give information for the top management about performances of the firm. Financial and accounting information is just as important as other ones, but they are focused on the past and not in the future as controlling and management accounting do. Introducing controlling leads to cost reduction and efficiency improvement, which shown and proved by the performance indicators. (Kellner and Keresztes 2010.) These indicators can be financial and non-financial as well. These tools has to be used not to control, but to improve and develop the operation of the company, and then lead to success, to achieve higher level of competitiveness. On the other hand, it has to imply the right to act. (Nilsson, és mtsai. 2011) The approach of regulation theory perfectly fits to controlling. The regulation theory works with the PDCA circle: Plan, Do, Control and Act. First, every aspects has to be defined in order to run efficiently a system, then during the operation (do), continuous control is needed, and if there is any problem, one has to act. (Boda , Stocker and Szlávik 2011)

Controlling system is composed by operative and strategic controlling. Within the borders of a firm this may have other specializations which complete it. These parts concentrate on e.g.: project controlling, quality controlling, marketing controlling, logistics controlling, etc.

In the next part let's take a look at the characteristics and importance of logistics and project controlling.

1.2.1. Logistics controlling

The logistics' major aim nowadays is to improve the customer service level, to satisfy customers' needs in the best possible way. Logistics requires performance measurement as well, but first we have to accept that the philosophy of controlling and logistics is not the same, the differences are shown in Table 1.

Table 1: Controlling and logistics

Comparing criterion	Controlling	Logistics
Organizational function (mentality)	coordinate	integrate
Goal of the management	information	time
Central market character	owner	customer
Motivation	profit, free cash flow	profit
Performance	optimal decision	service level
Object of the optimization function	input-output	material and information flow
Utility	decision supporting	place and time, customer loyalty
Motivate the development	market competition	market competition

Source: Dr Körmendi & Dr Tóth, 2007, p. 148

As we can see the main differences are derived from the definition of these sciences. Controlling helps to coordinate the company as it gives information to the owner/management to help decision making but on the other hand, logistics integrates the activities of the firm to reduce time, reach profit and customer satisfaction. With utilization of these tools, the company traces its operation in the most efficient way.

According to logistics' way of thinking, controlling must support the work of the management in:

- logistics performances,
- vendor activities,
- production lead time,
- customer and product structure,
- logistics costs,
- orders. (Dr Körmendi and Dr Tóth 2007)

So performance management, controlling and logistics have different goals but using and integrating them ensures the company confidence as it has information about each stage of operation. Due to the usage of cost centres, it can be seen that from the arrival of materials/products to the delivery of them where appear logistics performance and then logistics cost, which is a key information for further product calculation, such as the selling price. (Dr. Francsovcics 2001)

According to a survey, 28% of the respondent firms, there is no logistics controlling activity (mainly companies in the production sector), while in case of logistic service providers this amount is approximately 81%! The results show, that in order to keep the market position or to enter into new markets, the emphasis has to be and are on the measurement of the customer related activities' effectiveness. Implementation of logistics controlling or even controlling into a firm's activity can come to fruition solely with financial resources, adequate information technology and top management support. (Nagy 2011)

1.2.2. Project controlling

Nowadays operating with project is not novelty. If a company wants to be efficient and realizes profit, it uses the help of the project management. We call project:

“every innovative investment, technical, product improvement, application writing task which has exactly defined strategic aim, and time-, cost- and performance parameters. [...] The project management does the managing, organizing and successful realization of the project.”

(Dr Körmendi and Dr Tóth 2007, 139-140)

The market competition has established a situation in which individual aims and needs are in focus. For a company it is essential to give answers for these arising environmental challenges. Project management accomplish this task focusing on individualism and innovation. According to these, it increases efficiency so the firm can react to the changes much easier.

The process of project management has 4 basic parts. In Table 2, the project life-cycle model can be seen.

Table 2: Project life-cycle model

Period	Main tasks
Preparation	▪ Working out the suggestion ▪ Settling the project ▪ Marking technical area and business goals ▪ Analysing the feasibility ▪ Estimating the resources ▪ Preliminary contract negotiations ▪ Decision about the project launch
Project setting up	○ The project manager's designation and commission ○ Creation of the project's organization and operation ○ General planning ○ Refined resource plans ○ Initial meeting and review ○ Approval
Fulfilment	▪ Detailed plans ▪ Allocation of work and acceptance ▪ Training and communication ▪ Formal supervision ▪ Analysing the results ▪ Problem management
Project closure	○ Show and accept the results ○ Evaluation ○ Surety and guarantee

Source: Chikán & Demeter, 2006, p. 135

The project controlling helps the work of project management:

- planning the project process and the project tasks, the tasks and determination of the part of the their deadline (mile stones)
- planning and programming of tasks' expenditures (living labour, cost, etc.)
- coordination of risk estimating (in the case of external advisory firms)
- realization of task, control of the expenditures according to deadlines and
- to inform project management in time (for example about the missed deadlines, over drifting of the costs).

So the project controlling helps the project management's activity in planning, plan-fact realization controlling and the reaching of current information related to differences. (Dr Körmendi and Dr Tóth 2007) On the other hand, it ensures the innovative role of the company, makes it easier to develop.

THE MARKET AND THE COMPANY

1.4. PHARMACEUTICAL MARKET

1.4.1. World

Above all, in order to understand the operation of a pharmaceutical wholesaler, the mechanism and features of the pharmaceutical market has to be introduced briefly.

Pharmaceutical market is capital and technology intensive as the main expenditures appear in the research and development side.

Basically, there are two types of medicines: original and generic products. The original products are developed by using up huge amount of money and time (Research & Development costs); only the founding company has the right to produce it because of the patent. After patent expiration, other pharmaceuticals can produce the medicine freely, so it becomes generic. As a result, the market of the given medicine suddenly expands therefore its price drops. (Digner 2006)

Companies are depending on R&D, government regulations and support. On the other hand, the industry is in connection with the demography. One can pronounce, that today's average national population is an aging society which require healthcare in increased levels as well as more efficient pharmaceutical products. At the same time the high unemployment and other effects of the crisis force the patient to purchase generic medicines rather than original ones, which leads to higher sales and profit to the generic producers like Stada, Actavis, Sandoz or Teva. (Vasiljev and Pantelic 2010)

According to some analysts "*the global pharmaceutical market value is expected to expand over \$1.1 trillion USD by 2014.*" The report states, that innovation/patent loss balance will not be balanced or more likely the original products' sales will not exceed the generic ones. It can be caused because of government and healthcare regulations, which constrain the pharmacies and prescribers to choose the cheaper generic medicines. The generics' market in 2009 was approximately \$107.8 billion USD, by 2014 it could reach \$129.3 billion USD. (IMAP Inc 2010)

The top ten countries with regard to the turnover of the given country are shown in Table 3. The largest generic market is the United States, after Japan comes followed by China. In Europe, the most important among the countries are Germany, France and Italy.

Table 3: Pharmaceutical turnover in the world (generic markets)

Country	Turnover 2010 (billion USD)
USA	310,725
Japan	96,355
China	41,045
Germany	40,544
France	38,943
Italy	26,514
Basil	22,788
Spain	22,203
Canada	21,631
Great Britain	20,299

Source: BPI German Pharmaceutical Industry Association, 2011

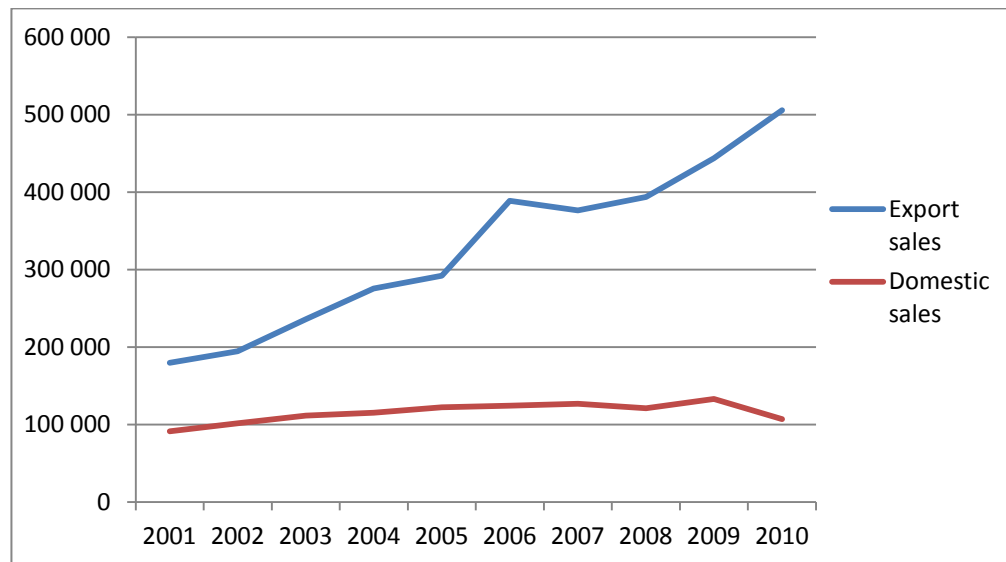
As we can see from the data above, the BRIC (Brazil, Russia, India, and China) countries appear in this sector, too. China has the second largest pharmaceutical market in Asia; incredible - more than 20 % - growth can be seen According to IMAP *“the key driver for the uptake of generics drugs is the fact that the majority of pharmaceuticals available and covered by the Essential Drug List (EDL) and National Drug Reimbursement List (NDRL) in China are domestically manufactured generics, with a preference for cheap generics over more expensive branded drugs among poorer patients.”* Brazil and India is becoming more and more competitive. In India, the main reason of the increase comes from the fact, that the protection of intellectual property rights is relatively weak. In the complex Russian market the legislation is not as intensive and appropriate to defence original products and patents, although several different decisions has been made. (IMAP Inc 2010)

1.4.2. Hungary

The Hungarian pharmaceutical industry exists since 1867, when the Central Hungarian Pharmaceutical and Chemical Works Co. was founded. It was the first company, which produced medicines and related equipment.

According to Gábor Blaskó, academician, *“from the R&D statistics it turns out that the largest Hungarian pharmaceutical manufacturer spends more for research alone, than the whole Hungarian agricultural industry, however, Hungary known as an agricultural country in Europe.”* (Egy valódi magyar sikerágazat - a gyógyszeripar 2011)

A pharmaceutical company in Hungary has to correspond to the changing laws and regulations as well as to the international requirements. Many experts state that this sector especially depends on the adaptability of the international standards. The next graph shows the amount of the sold products in case of domestic and export supplies. One can say that the export graph makes progress while inner sales remain stable or stagnate.

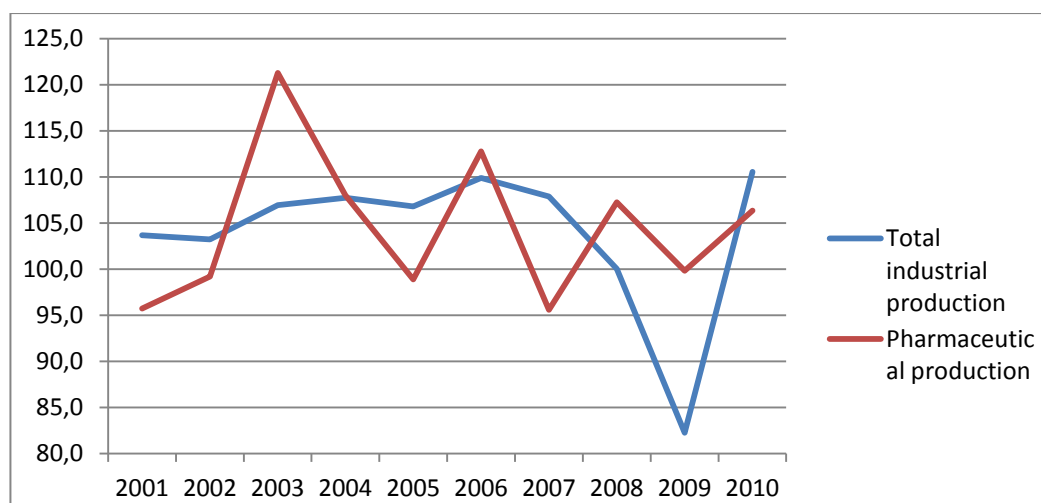


Source: Based on: (KSH, 2011, a) (KSH, 2011, b)

Figure 1: Pharmaceutical export and domestic sales

The difference between the two trades is enormous; in 2010 the export was approximately 505,466 million Ft, while sales in Hungary it made 106,673 million Ft. The export is almost five times higher than the sales within the borders.

The crisis has significant effect on the country and on the industry. The figure below represents these changes with volume indices. The production of all the industries and the pharmaceutical sectors' outputs can be seen. The data represent fluctuating tendency.



Source: Based on: (KSH, 2011, c) (KSH, 2011, d)

Figure 2: Total industry and pharmaceutical industry production

Between 2008 and 2009, in a huge decline, the crisis debuted. The main backtrack was in the processing, automotive industry or in metal processing, the firms had to decrease the capacities which resulted dismissals. According to the data of the Hungarian Central Statistical Office (KSH), the pharmaceutical industry was almost the only one, which stagnated. In case of total sales the schema is quite similar; by contrast the sales for domestic users plummeted in 2009 from the never seen heights.

The situation has been aggravated by the Semmelweis and the Kálmán Széll Plan. Semmelweis Plan (October 2010) is a discussion paper, which major aim is to create an effective healthcare system. In the section of medicine policy, the behaviour of profit orientated pharmacies and their decision-making system, which depends on the promotions and special offers of wholesalers and manufacturers, should change into a more patient focused service. The system of healthcare support - especially the medicine support - should be rethought and the importance of generic product should be strengthened. Usually 1/3 of the sold medicines are original, and 2/3 are generic products.

The Kálmán Széll Plan (March 2011) is aiming to reduce the state debt. The 'Debt and Healthcare' part highlights also the not appropriate medicine support system. On one hand, the Plan says the Hungarian healthcare is based on the illness not the prevention, the state spends far too much for supporting medicines than the region's average. Nevertheless, we mustn't forget the upsurge of the consumer prices. In the last 10 years – based on HCSO (KSH, 2011) - consumer prices has been increased by tenfold, since the Change of Regime it is seventy times higher!

1.5. THE FIRM'S MAIN CHARACTERISTICS

After investigating the global and Hungarian pharmaceutical market, there is a short presentation of the analyzed firm. The headquarters of pharmaceutical wholesaler is in the centre of the country, where the most modern pharmaceutical wholesale facility in Hungary is to be found which has been providing service to its healthcare partners since 2006, using 21st century technology. The distribution centre has a warehouse of 9,000 square meters, capacity for 11,500 European standard pallets and is capable for meeting orders of 6,000 boxes of pharmaceuticals. The system is almost 100 per cent automated.

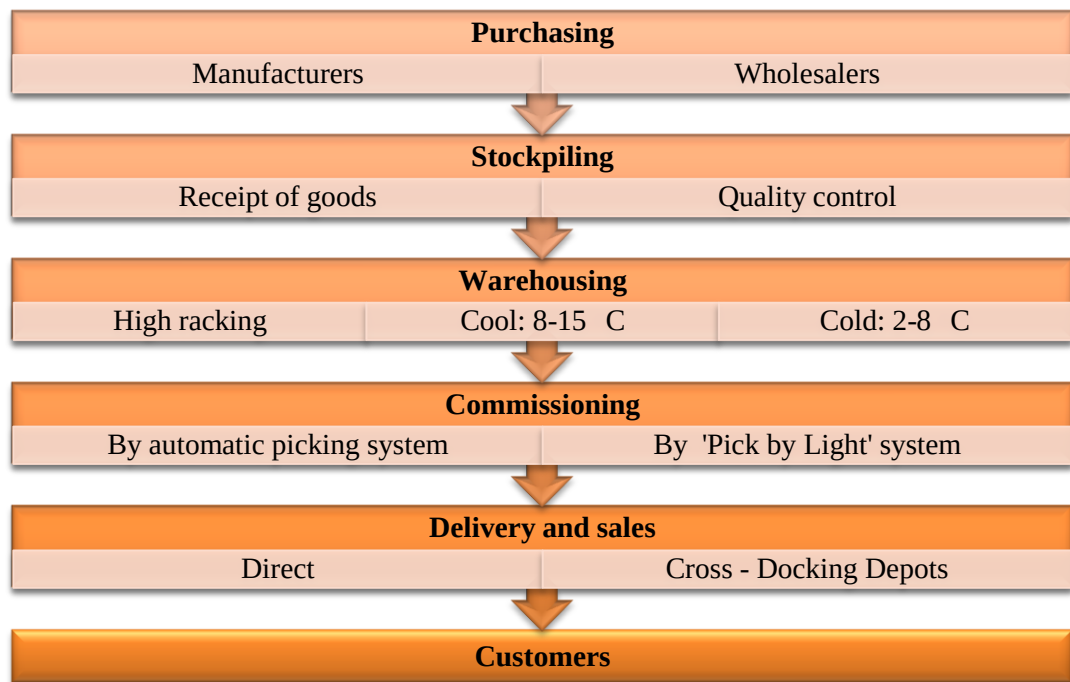
The company has three other warehouses which are not as modern as the DC. The smaller (7,600 square meters, 3,600 pallets) warehouses are located in city as well, close to the centre, being the head office of the company until 2006. The product was taken in the 1st warehouse, and the quality receipting was organized here, too. The picking operation was done in the 2nd warehouse. In the 3rd building infusions were stored and their transporting was independent from other products. Currently these warehouses are used for backup storage, secondary packaging, marketing and promotional assets' storing. Homeopathic and Compound wholesale operations are also conducted from this site. In the future, wholesale roles will be granted. From these warehouses, a wide area is supplied with pharmaceutical products including Budapest and Pest County.

The firm has 5 cross docking depots in the country on the Northwest, West, Southwest, Southeast and Northeast. These cross-docking warehouses are supplying the other parts of the country. Each night lorries are carrying products from the DC to depots containing customers' orderings, from where vans deliver the items directly to the customers. (Corporate material, 2011)

1.6. PHARMACEUTICAL OPERATION

In Figure 3 the operation can be seen in case of pharmaceutical wholesalers are located between the manufacturer and the customer. The activity's major tasks are:

- purchasing,
- quality control,
- stockpiling,
- warehousing,
- commissioning,
- delivery and
- sales.



Source: Figure based on corporate material, 2011

Figure 3: Pharmaceutical operation

During purchasing, the company acquires all those assets and information what is necessary for the optimal operation. According to Szegedi and Prezenszki the goals of purchasing are the followings:

1. to reach optimal quality,
2. to minimize total costs,
3. to choose and value suppliers,
4. to create a small inventory level and
5. to cooperate and integrate with other organizational units.

Pharmaceutical products require a high level quality control as well, not only because of the quantity or possible damages, but also to avoid illegal items. Products after arriving are being placed into the high rack storage area of the warehouse, or into the cool room (8 – 15°C) or cold room (2 – 8°C). Each product gets a specific bar code which ensures the up-to-date role of the database. With this barcode every part of the operation is easier, because employees always have to check if it is the product what they search for or not. It helps the track and trace function of the Distribution centre, too.

Afterwards, when an order is released, picking of goods starts by FEFO principle – First-Expire-First-Out - by depending on number of products being picked or type of product the commissioning can be done by the PEEM automatic picking system, “A

Frame”, or by the PBL (meaning that the box stays at a given point and a person picks products where lights appears, then pickers acknowledges the picking by pushing the button). Afterwards the box with the orders is sent to the expedition area and the delivery can be commenced to customers’ address.

1.7. BRANCHES OF BUSINESSES

The Distribution centre distinguishes 5 branches of businesses:

- pharmacy business,
- hospital business,
- customer service,
- therapeutic equipment business and
- wholesale of own branded products

In this section I would like to introduce one after the other to help to understand the importance each of each. The *Pharmacy Division* supports operations with pharmacies with which it has contractual agreements, not only with modern products and services, but also with technical information. This information is provided via magazine or by supporting the spread of the most modern information communication technology tools. Pharmacists' work is now supported by several modern Internet applications, developed by the company. Pharmacies have the opportunity to order via Internet or through telephone. The company works with more than 2,400 pharmacies, which means approximately 44% of the customers are these units. More than 50% of the whole ordered products’ value comes from pharmacies. Hence, pharmacies are one of the most important customers of DC.

Other significant partners are the *hospitals*. The company’s staffs supply a full range of pharmaceuticals to 130 pharmacies based in hospitals or other institutions. As a result of company’s work, health workers have all the pharmaceuticals at disposal which are essential for an in-patient facility - tablets, blood products, injectables, solutions for infusion and instruments for surgery - developed and manufactured by the firm. At the same time, as a wholesaler, they supply products manufactured by other so-called third party companies. However, only 6% of the total ordered value comes from hospitals but they are as important customers as the pharmacies. The number of hospitals is also quite low compared to the pharmacies, but they usually order in huge quantities and they are more flexible than the aforementioned units in case of deliveries.

There is another service, which is provided by the wholesaler, called the *customer service* which has to be mentioned here because this section responsible for helping and contacting the potential customers if they have any problem or question about a given product. The company developed a website, where relevant information of the industry and news related to healthcare are updated frequently. In that website the customers have the opportunity to order online from the company.

Therapeutic equipment also has an important role during treatment and rehabilitation. The firm's *therapeutic equipment business* has only been up and running since 2001, but they are already considered to be one of the largest wholesalers in this area.

The company is both a manufacturer and at the same time a wholesaler, approximately 30% of products sold are manufactured under its own brand name. The pharmacy section provides pharmacists with information on own manufactured products. The company has another website where the own products can be ordered on special offer.

In my essay, I will deal with mainly the needs of pharmacies, because they are quite significant customers and satisfying their needs and requirements is the most interesting, because many other characteristics have to be taken into consideration.

MEASUREMENT OF THE DISTRIBUTION CENTRE'S OPERATION

1.8. THE GOAL: TO REACH A HIGHER SERVICE LEVEL

The most important character in the life of a company is the customer. In case of pharmaceutical wholesale trade customers are hospitals and pharmacies. These units don't want to lay their capital in medicines and stockpile products, they prefer to be liquid. That's why customers give preference to those companies which can provide more than one deliveries a day: they need one product, so they sent their order for, and want to handle it as soon as possible to their patient.

During my research I had the opportunity to have an interview with one of DC's customer, a pharmacy in Abony. I chose this location because it is hard to accomplish second delivery in the afternoon. Only in case of huge ordered quantity is possible. According to the pharmacist, they are satisfied with the provided service of the wholesaler; they get the required product in time, in general, without problems. The pharmacy usually orders own brand products from DC. The answer for my question of what they think, in which cases they would order more, what they need, was they would prefer a delivery in the afternoon. On the other hand, they are open for cooperation as well.(Pharmacy 2011)

From this interview, it appears that when pharmacies order from the DC, they can take part of this opportunity according to their location in the following time frame which can be seen in Table 4.

Table 4: Time frame of ordering and product arrival

	Deadline of ordering	Product arrival
Budapest and Pest	7 a.m. -11 a.m.	afternoon
County	11 a.m. - 8 p.m.	following day
Other regions	7 a.m. – 8 p.m.	following day

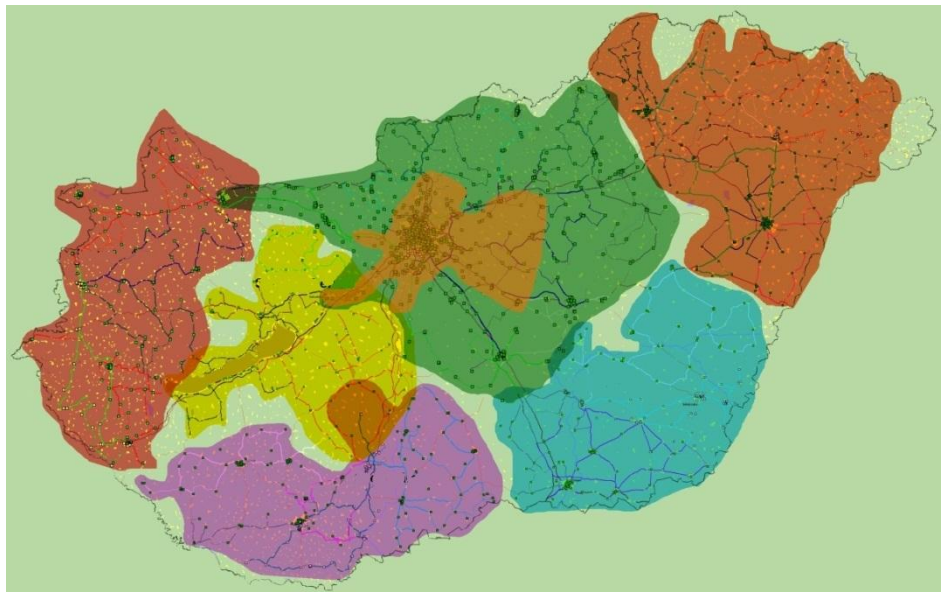
Source: Data based on corporate material, 2011

For Budapest and Pest County the Distribution centre can guarantee two deliveries a day. In this case the shipment will arrive in the same or the following day, thus pharmacies can optimize their stock more effectively.

The schema is different in for example Northeast region. Customers can order until 8 p.m. Next day a lorry departs from DC with euro pallets at about 2 a.m. to the depot of the region. There the cross docking takes place into vans and the direct delivery starts.

These dates depend on the pharmacies opening hours, the length of line, traffic etc. If the patient doesn't get medicines in time, or the DC is out of goods can cause losing of the consumer. According to the Világgazdaság, a Hungarian daily press, the company is the 3rd biggest pharmaceutical company in Hungary. Its competitors can deliver the products more than once a day, so they can satisfy their customer's needs more effectively, and reach higher profit. To Budapest and Pest County – as I have mentioned before – the DC can provide 2 deliveries per day, but unfortunately to the other parts of the country they can't reach this service level because of the distances.

In Figure 4 we can see how the DC supplies Hungary with pharmaceutical products. In region of headquarters, there is a smaller part which refers to the 2nd deliveries. The first solution may be to model how far the company can deliver with the vans at the moment. The aim is to reach higher service level without investments. The capacity rate is essential in this case.



Source: Figure based on corporate material, 2011

Figure 4: Supplied regions by DC

The second solution might be to have two regional warehouses instead of two depots. With this the company could reach not only the full range product scale, but also assure hospitals and pharmacies that they can order e.g. twice a day.

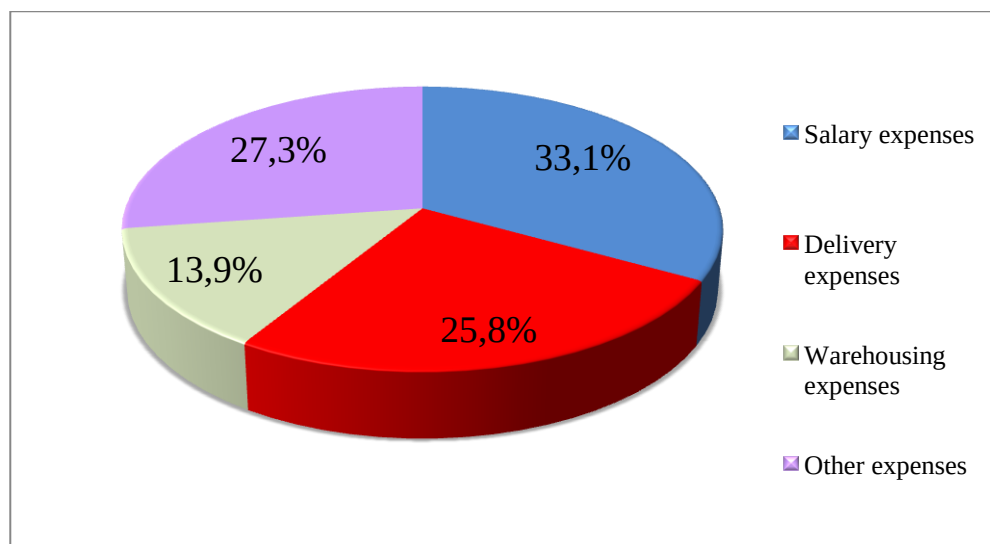
To test this opportunity we have to count:

- with the two warehouses can the company reach higher service level?
- is it worth to do this investment?

The next part of the essay is going to find the answers to these questions with the help of performance measuring and controlling.

1.9. COST STRUCTURE

First of all, let's take a look at the cost structure of DC which is shown in Figure 5. As we can see, the largest cost is the salary expense, after delivery expenses come in large proportion which describes the main activity of the firm. After, with 13.9% the warehousing expenses are the next. With the planned two regional warehouses expectedly the fix costs like warehousing and salary expenses will increase and hopefully the delivery expenditures will decrease. In the next sections the aforementioned three most important areas are explained: human resources, warehousing and deliveries.

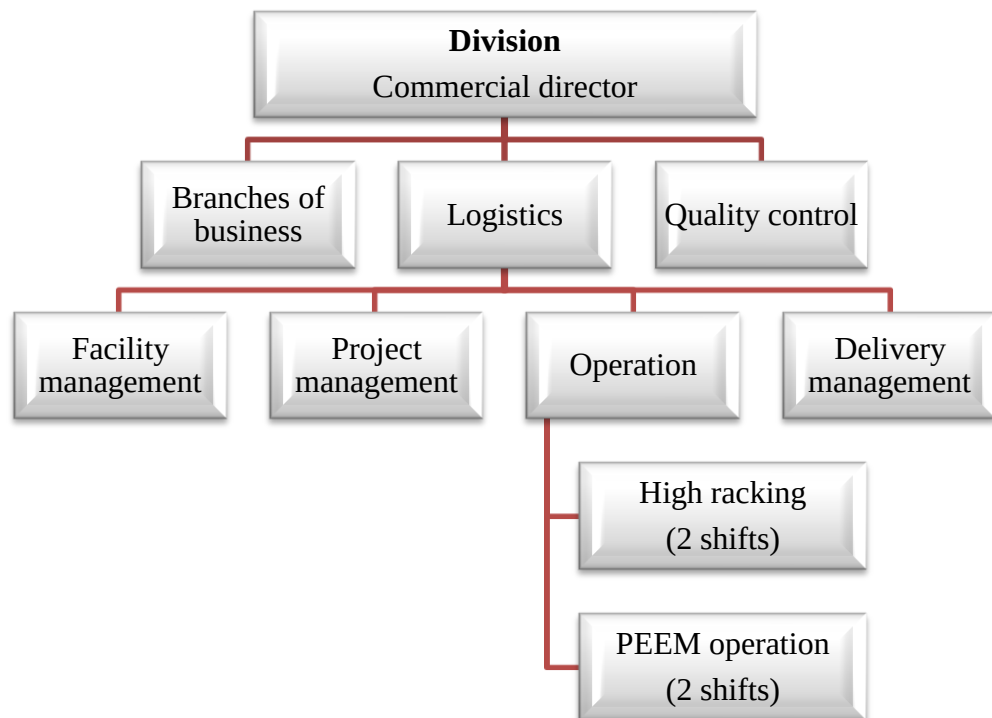


Source: Data based on corporate material, 2011

Figure 5: Cost structure of the Distribution centre

1.10. ORGANIZATIONAL STRUCTURE – HUMAN RESOURCES

One of the most significant characters in lives of companies is the labour. The wholesale of pharmaceutical products requires *“sufficient competent personnel to carry out all the tasks, which are the responsibility of the wholesale distributor. Individual responsibilities should be clearly understood by the individuals and recorded.”* (European Commission 2011) In Figure 6 the organizational structure can be seen. Seven section of operation can be distinguished in logistics: operation: high racking operation, PEEM operation; delivery and project management.



Source: Figure based on corporate material, 2011

Figure 6: Simplified organizational structure of DC

In every level of wholesaling activity like purchasing, quality control, warehousing etc, there is a need for coordination and cooperation. However, in order to improve efficiency these are not enough. I had the opportunity to take part in a meeting where a new practice or philosophy was under discussion called Kaizen. The Kaizen is originally from Japan and refers to the continuous improvement with small steps. The major aim is to motivate the employees to share their ideas because the operative part of the wholesaling process (like commissioning) depends on them. For example, in their everyday work a machine should be relocated to save product moving time and money, too.

For measuring the performance of works using unit cost is essential. Unit cost is the cost of how much does it cost to produce one product. Unit costs of labour, machines and land can be counted, too. In Table 5 the unit cost of unskilled labour can be seen. With this information, employees can be motivated in a better way. First, the main competences, planned performances must be clarified, during the operation to support and give feedback to employees is essential, then results should be evaluated.

Table 5: Unit cost of an unskilled labour

Unskilled labour	th Ft/year	
Salary	1,980	156,000 Ft gross salary/month
Public duties	534.6	27 %
Administration, personnel	396	20 %
Infrastructure	2	Location, equipments
	2,912.6	
	7,979 Ft/day	
	998 Ft/hour	
	16.62 Ft/minute	

Source: Data based on corporate material, 2011

1.11. WAREHOUSING

The capacity of the warehouse is 11,500 euro pallets which is now used almost completely because the company reaches the full range product scale thus one can say the field of activity is working in full utilization. The firm distinguishes two operations: one called high racking operation which is responsible for mainly receipting and stockpiling and the other one is called PEEM operation which main task is commissioning.

When a product arrives to DC - first the high racking operation works - the receipt happens which is the acceptance of items into inventory, here quality control is done. In general 140 pallets (Corporate material 2011) come, but eventually two times higher pallet number is imaginable which can cause overladen workforce.

There is a utilization index called stock rotation which refers to how long it takes for inventories to turn. In case of not own products it is relatively low, because they can influence the purchasing. On the other hand own brand products inventory rotation is extremely high, in some case the inventory rotation is two or three times higher! The reason is that own products are located in this warehouse after manufacturing. Safety stock is used for avoiding situations when there is supply shortage, and the orders cannot be satisfied. Here, the inventory management is joining. Major goal of inventory management is that the warehouse possesses convenient amount of products to fulfil the orders. However, they have to find the best solution not to have a high inventory level because it has negative effect on cash flow and engages inventories in asset side. At the moment the pharmacies can order from more than 14,000 (Corporate material 2011) medicines, homeopathic products and therapeutic equipment, etc.

When there is an order the commissioning starts (PEEM operation). In this section one example is shown: how much does it cost for the company to move 1 pallet? The results are in Table 6.

Table 6: Costs of moving a pallet

Moving a pallet	Ft/pallet moving
Pallet mover	100
Picking forklift	260
High picking forklift	310
Rotation very narrow aisle forklift	380

Source: Data based on corporate material, 2011

When the assessment happened, the salary of the employee (who uses it), the materials (like electricity, accumulator, oil, etc), other related services (insurance, cost of maintenance and repairing) and depreciation, etc, has been taken into consideration. There are one week work plan what helps shift leaders to organize a day. One can be faced with the fact that there are seasonal fluctuations: in July the required product numbers are low but in September the ordered quantity of items is significantly high which can be explained with changes of weather. In order to avoid mistakes in the process there are revisers who are in charge of reviewing the commissioned orders through the weight measuring, failed boxes. Precision of commissioning can be measured with returned products and/or claims. Overall 0.3% of orders are claims and 50% of complaints are coming up because of commissioning defaults.

Another key element called commissioning performance. As in the case of high racking operation, the PEEM operation has it own plans too; however there are not as prominent deviations as at that section in a week. The continuous raising in ordered items can be the answer for this phenomenon as well as stable increasing in inventory levels.

Traceability of products has to be mentioned. Track and trace is significant not only because of the precision point of view but also to avoid selling products with are close expiry. This issue imbibes the whole pharmaceutical supply chain; it helps to strain off the illegal pharmaceutical products from medical circulation.

In order to improve the performance and precision of warehousing activity DC uses a warehouse optimizing program, called *Storeopt*. The *Storeopt* was developed by Szeged Szofware Zrt. The program focuses on warehouse layout, thus how to locate the products in a commissioning area in case of new and furnished warehouse. The main optimizing aspects are the followings:

- weight: during commissioning the heavy products should be located below to avoid accidents,
- number of pickers: it refers to the number of employees working at the conveyor belt, the speed of the picking depends on the performance of workers,

- place of storing: picking time depends on the location of products, the direction and length are also contained in the cost of picking,
- exceptions: in course of optimizing the program can take into consideration exceptions. For example if two medicines have the similar names or the same product has different weights the probability of making mistake is higher. Exceptions are used to reduce or avoid these mistakes.

The program works with ABC analysis which is an analysis of range of items. It means that different products have different importance in case of warehousing, and require different level of inventories or dealing. In general, 'A' products are the most significant, 'B' items are significant and 'C' ones are less or marginally important. According to this ranking, 'A' goods are the easiest to reach (for the pickers), in case of 'B' products it is not so easy, there is a need for a forklift and in 'C' case, and this is the hardest task.

Storeopt can decrease costs and improve picking velocity. If the firm doesn't want to reorganize the whole warehouse, there is only a need for relocating some products (e.g. in case of special offers), this option is also achievable.

1.12. DELIVERIES

The deliveries section is the second largest amount among the costs. This is a core activity as well because it passes the pharmaceutical products to customers. Transporting medicines and therapeutic equipment requires safety. The delivered product's value is relatively high. *"The value of the product has a significant impact on the real transportation work. Value-density means the relative price compared to weight or volume. Value-density correlates with logistics costs, so it influences the entire logistic process. In case of high value-density the transportation and inventory costs grow because of security and strategic issues."* (Duma n.d.) This notion explains the practice in DC: the transportation cost cannot exceed 1% of the whole value of delivered products, which cost is relatively high comparing to other industries.

With help of route optimizer programs such as Versys, which was developed by Iterion, the company can keep the 1% principle: there is no need for the delivery manager to always organize the routes again and again with lot of variables; the program can find shorter and faster routes. Main aims of utilization:

- quality correction of route plans: cost savings with complied restrictive conditions,

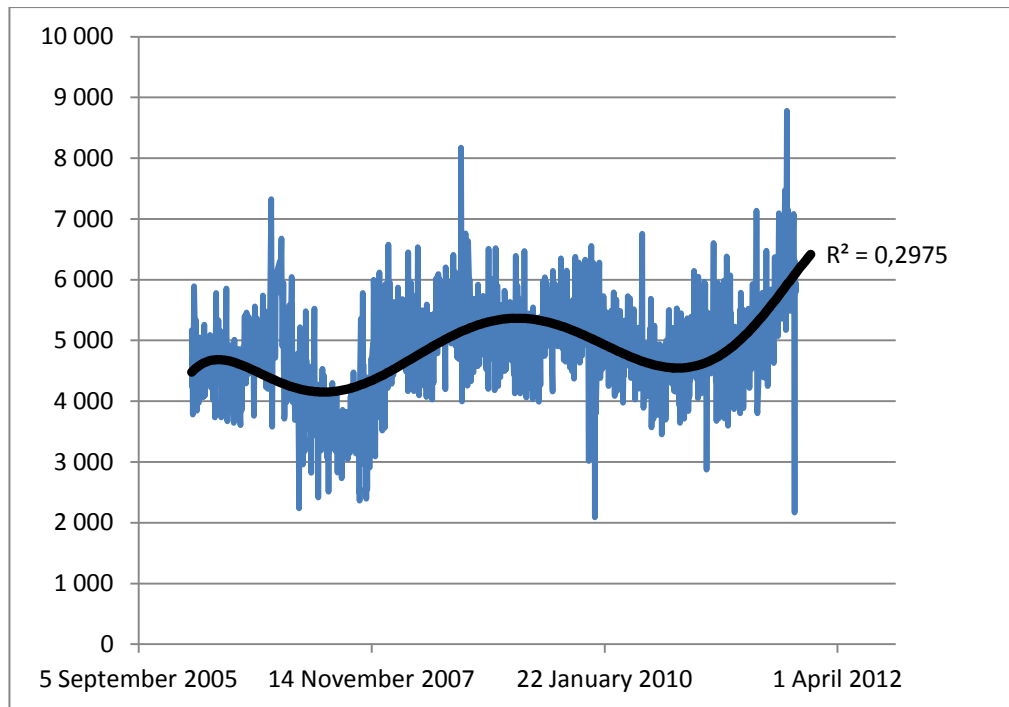
- to ease route organizing, make it faster and more flexible,
- delivery subcontractors' simpler control and governance and
- support for analysis.

The program estimates cost of the deliveries, has high quality scanning map in which the secondary and other smaller streets can be seen and helps the fruition of cost-conscious behaviour.

For measuring current service level the most important index is the delivery precision which shows relation between factual and confirmed delivery time. Pharmacies are extraordinarily sensitive in connection with deliveries. The reason can be that usually they make an order if there is a need for the medicine because one of their main aims is to be liquid and hold the lowest safety stock as possible. In case of one delivery per day DC can fulfil its task as delays are occur mainly because of the weather (snow in winter), accidents on road or traffic restrictions which are cannot be influenced by the vans or the company.

The utilization of vans is fluctuating and according to DC's data it is usually around 50%. The vans deliver normal, cool and cold temperature products. Overall, during deliveries, 10-15% of the products should be in cool and cold environment which items are quite critical to fulfil the proper temperature. If it is more than 15°C (the limit is 8-15°C), the consequences are unpredictable. These products are usually delivered in a Waeco box which is a portable refrigerator with compressor, it ensures the appropriate temperature, but composes extra cost by reason of its size. In the case of cool and cold items usually the terminology of cool or cold chain is used. It refers to the whole supply chain of these products with regard to their special needs. On the other hand, it does not contain the requirements of normal goods which need heating: in winter the average temperature is in general under 0°C, in that case in the vans the temperature is also low which has negative effect on pharmaceutical products because chemical processes might influence the quality of the goods and the result can be extremely dangerous regarding the patients. The loading area's temperature has to be between 15 and 25 degrees, in room-temperature. Hence we can say these expressions – cool-, and cold chain – are not suitable because they do not involve the option of heating area but this is just as important as refrigerating them. The best terminology could be the notion of *thermo chain* forasmuch it contains the special needs of cool and cold products as well as normal ones.

In Figure 8 the number of delivered boxes is shown from March 2006 until November 2011.



Source: Data based on corporate material, 2011

Figure 7: Number of delivered boxes from March 2006 till November 2011

The function above (black) expresses the tendency of delivered boxes. I've chosen polynomial trend line because the company has daily information about this function and it has quite a lot of fluctuating data. But, there are large differences, hence the reliability in this case is very small, on the other hand it shows the best way how the company perform now and what can be expected in the future. In 2007, there is a dramatic decline in deliveries because in February the so-called visit fee and the daily hospital charge had to be paid which was a painful point for the patients. From 2008, the recovery has started partly by the reason of expand of medicine support, according to HVG in 2007 and 2008 more than 1,700 medicines' price had been decreased.(hvg.hu 2008.) In addition, in March of 2008, a referendum refused the aforementioned visit fee and daily hospital charge. The fluctuations from 2009 to 2011 are mainly the effects of the global crisis. The firm is broadening its supply with more and more products (especially homeopathic ones) therefore the consecutive progress attributable to this process. With more data and continuous analysis the picture could be clarified. From the figure it can be seen that in the near future the number of boxes will increase, thus improving capacities will be useful. However, the possible risks have to be taken into account. At first, the environment is changing. Government regulations – based on the Semmelweis and Kálmán Széll Plan – is going to decrease radically the supports given to medicines. More

than 120 billion Ft could be the reduction of the support! As a result of this fact, the sales might stagnate instead of increase, and the prices and costs will rise.

REGIONAL DC AND ITS EFFECT

In the previous chapter, the main characteristics and performances of each sectors of DC's activity was discussed as well as measurement of human resources. As I mentioned before the most important aim is to reach higher service level with establishing new warehouses because the cross docking depots are not appropriate for this activity. The most difficult and time consuming is to deliver to the Eastern and Northern part of the country however the customers are the most interested in second deliveries in these regions. As it is a project first, its worthiness has to be estimated: if the turnover increasing between 15-30%, it is meaningful to do this investment. Here, the project controlling is quite helpful tool. In my essay I will analyse the establishment of Northern warehouse.

1.13. CHARACTERISTICS OF A REGIONAL DC

In this section I will introduce the most important parts of establishing one regional Distribution centre. Establishing a second one requires similar steps. The DC has approximately 60 fix routes every day, from this about 12 are related to Northeast region. At the side of cross docking function, the storage of files of the company is here, too. The building cannot be used as a warehouse because the area is only 300m² but on the other hand this is in the ownership of the firm. The average travelled distance is 300 km/day; the average cost of deliveries is 100 Ft/km. The highest number of customers is in this region except for the city of the headquarters, it is more than 15 % which is quite high number comparing to the other depots and regions so one can say this is a key region for the wholesaler. With redeployment of resources from depot of Northeast region, accomplishment of a warehouse would have a great importance.

First and foremost the location of new warehouses is essential. Using Versys all of information can be determined so it is easier to find the optimal location of the new warehouses because not only the delivery distance and time but also the cost can be estimated. In addition, new tours can be created which are suitable for new requirements. Due to this, the new location should be Debrecen or a town in its neighbourhood because

- this is the second largest city in Hungary after Budapest, centre of the region and
- the number of pharmacies and orders are high (50% of delivered value in the region is given by customers in Debrecen)

- as well as opportunities for renting a warehouse (cheaper than maintaining depot of Northeast region) which has all of the permission which are needed for storing pharmaceutical products.

Contrary to these advantages, it has a negative effect: problem of deliveries to pharmacies to Northern cities because the change in the location of new site results almost 50 km moving to the South so extra delivery cost would appear with extra time.

So in this case the most important is to think over the variables such as the costs and time of transportation. The main point in time is that one tour's duration has to be about 4 hours. The reason is that the driver works in full time, thus his working hours are 8 hours per day, the delivery manager has to calculate with not only the time of distribution but also loading and unloading, returned boxes and products, and way back to the warehouse. According to these parameters the current tours are not capable and cost-conscious to satisfy the changed requirements. During the assessment a new option appeared: a synergy with a company which deals with pharmaceutical wholesale as well. The new targets would be in this case: reduction of delivery costs, by dividing tours, creating new ones and using site of this firm as a cross docking depot. If the cooperation happens, DC will be able to reach the Northern parts easier, and ensure two or more transportation a day. The idea completed with outsourcing can be the most efficient way. With Versys new routes had been formed.

The project controlling uses two types of assessment: static and dynamic approach. The static analyses refer to a defined logistics activity's period; it doesn't focus on time, or maybe limitedly. These types of assessments are: cost and profit comparison, profitability and payback period calculation. The dynamic approach examines the benefits of investments related to the lifetime of the investment. These take into account the time risk, such as net present value, internal rate of return or annuity. (Francsovcics 2003)

During the analysis, first a static approach was used, the cost comparison, since one of the goals is to reduce cost with increasing service level. In Table 6 the comparison between current and expected costs of these options are shown. Compared to the original case the cost of renting buildings is lower, in case of synergy it is higher because two building would be rented: one in 'city nearby' and one would be used as a depot in the seat of a partner.

Table 7: Current and expected expenditures of depots and warehouse options

Monthly (thFt)	Northeast region	Debrecen	Debrecen (synergy)
Cost of site	650	462	925
Quality control	528	528	1,057
From DC	3,393	3,322	3,796
Route cost	9,346	11,084	9,059
Total	13,917	15,396	14,837
Annual total cost	167,004	184,752	178,044

Source: Data based on corporate material, 2011

The most interesting part is the variable/route costs. The utmost differences appear here. With new location, there are incredibly high costs because of the increased kilometres: transporting items to some partners to the North would be quite problematic. The idea of synergy is the best solution, the cheapest way because reorganizing of tours are the easiest and with outsourcing the deliveries new capacities will be involved.

After dealing with the deliveries which are one of the most significant parts in the expenditures, the other main functions, such as warehousing and human resources should be explained. There is a given warehouse which is appropriate for pharmaceutical products, and which will be rented by DC. But how will the operation work? Fundamentally there is no change in the procession. The warehouse differs from the centre only in technology as it will not as modern and big sized as the Distribution centre. There will be opportunity to stockpile products on pallets, but on salgo selves as well. These salgo selves are needed because for storing 14,000 different items in this relatively small warehouse (not in a high racking warehouse) it is a perfect option. Important feature, that the commissioning is manual in that case by reason of salgo selves and low height: employees can pick the needed goods without any electronic forklift.

From the group of dynamic assessments the internal rate of return (IRR) method should be used for further calculation because it focuses on cash flow, properly adjusts for time value of money. Unfortunately, data was not available for this calculation, but I hardly recommend the usage of this measurement.

To ensure at least two deliveries per day two shifts are essential: everyday customers can order twice, so the boxes should be prepared until departing. The number of personnel depends on the strain of workers but expectedly 30 employees are enough, which contains the pickers, supervisors, revisers etc. as well as the head of the facility.

1.14. EFFECTS AND FUTURE

The success of the new depository is unquestionable. It would cost much for the first time, but this is the only way to reach higher service level because the more the 31 transportation a day, the better satisfied the customers. With the help of SWOT analysis (strengths, weaknesses, opportunities, threats), I would like to sum up what effects might influence the establishment of this warehouse.

The *strengths* of this investment are the followings:

- First of all the accessibility of Northeast region will be trouble free, the main goal is reached: two transportations a day.
- Then the ability of increasing capacities if necessary is given hence full range product scale is tenable.
- Customer turnover might increase; pharmacies may more likely order from the wholesaler: it possesses almost all types of pharmaceutical products and therapeutic equipment.
- There is no need for long and expensive tours; the cost of deliveries will be cheaper because of shorter distances.
- Inventory level of DC declines, free cash flow and capacities are available. The focus can be on the distribution of other regions.
- Because of the decreased inventory levels the stock rotation time can be lower as well.
- The warehouse in Debrecen has another advantage as the company could have access to one of the factories of a pharmaceutical manufacturer, transportation money can be saved as well as the inventory rotation of own products which is extremely high right now would decline.

On the other hand with the new warehouse new *weaknesses* occur:

- The south part of the country the company's presence might decrease; plans are needed for measuring how DC should react to this fact.
- As this depository is not as modern as DC the complaints happen more likely, more attention is needed from pickers and revisers and supervisors.

There are some additional *opportunities* which can be exploitable in the future:

- Cooperation with customers might be possible, so for both parties it would mean decreasing costs and increasing reliability. This cooperation can happen in small steps, for example pharmacies may adapt themselves to the routes and would get discount or more than two deliveries. Often pharmacies define when they would

like to get their orders (like from 8 o'clock to 9 o'clock), in most of the cases they accept deliveries at a fixed time, which makes harder for the company to transport the required goods.

- The next opportunity is related to the partner firm. According to its profile, as it deals with pharmaceutical wholesaling, too, the cost of quality control might be saved. The partner has its own quality controller and the analyzed company also needs one, therefore they can employ one for both.

In addition, the wholesaler has to count with the *threats* of this investment:

- The first and most important issue in this part is the danger from the partner company does not fulfil the expected service level. In this case the company should search for another solution which would cost a lot of time and money.
- If both parties employ the same quality controller, the occurrence of defaults can increase because of the overloaded worker which is a quite sensitive point.

According to the aforementioned issues this investment has its own positive effects to the Distribution centre but the other side have to be taken into consideration as well.

CONCLUSIONS

Establishing a new warehouse is beneficial for firm. With this investment the main goals are fulfilled. On the other hand the expected increasing in turnover is a foresight and based on experiences derived from the past and questioners which was filled by the most significant customers. In my opinion the company should establish one more warehouse in the Western part of Hungary, and it will as advantageous as the analysed one. The calculating method would be similar.

But what were exactly required for this assessment? First of all, the need for improvement. Then all of the personnel have to accept and strain after the satisfaction of the customers. The integrated point of view has to pervade the whole operation. It can be improved by continuous trainings. Lack of information about processes and performances pull back the operation. Hence the importance of unit and specified costs, key performance indicators (KPIs) are essential because they help to motivate not only the employees but the management, as well. The most significant ones in case of a wholesaler are the commissioning and delivery precision, utilized capacity of equipment, inventory levels, inventory rotation and so on.

Inaccurate terminologies can cause lot of problems especially for those who are not professionals. In case of medicines and the pharmaceutical supply chain, the medicines special needs have to be in focus. Thermo chain could be a new and exact definition of storing and delivering products, however, if the pharmaceutical companies take care of this, it is not sure that the patients will do. In my opinion the importance of this has to be highlighted in every stage of operation.

Utilization of novelties of information technology might cut costs. If we just think back to the calculation and creation of new distribution tours, we can see, without Versys it would cost huge amount of money. The effective operation is completed with a warehouse optimizing program, StoreOpt, which enhances efficiency.

Interconnected functions of logistics, controlling, project and performance management is quite useful, because each of them has different aims and methodology. Implementing them into each other is not easy but with a great management team it would not cause problem.

Pharmaceutical industry has exact limitations; the regional Distribution centre has to meet these. One and the most important is the Good Distribution Practice (GDP) of medicinal products for human use which is a guideline and a directive, too.

We can see that for one target, for the greater satisfaction of the customer a company has to do almost everything, in case of pharmaceutical products the attention and traceability are core competences because people's health is the most important in life.

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