LAPPEENRANTA UNIVERSITY OF TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING

MASTER'S THESIS

GREEN FIELD FLUTEBOARD FACTORY INFRASTRUCTURE REQUIREMENTS IN RUSSIA

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Lappeenranta 15.05.2007

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ABSTRACT

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Department: Electrical Engineering
Year: 2007
Place: Lappeenranta

Thesis for the Degree of Master of Science in Technology.
85 pages, 15 figures, 6 tables and 2 appendices.
Examiners: Professor, D.Sc. Juha Pyrhönen professor D.Sc. Pia Salminen
Keywords: corrugated board factory, Russian corrugated board market

Russian corrugated board market is rapidly developing. Owing to that Russia becomes more and more attractive to the companies – world leaders in corrugated board production. Thus, in order to strengthen or even to maintain its market position the firm should uninterruptedly develop improving volume and quality of the products. At the same time operations in the Russian market are commonly associated with various types of risks which should be avoided. Unfortunately, the information of the Russian corrugated board market is not systematized yet there is almost no theoretical background in this area and, therefore, the thesis is mainly based on the practical experience of the managers of Stora Enso.

The goal of the paper is to define and describe the main particularities of Russian corrugated board market which are lying in different areas and to concentrate on the difficulties with which a corrugated board factory may face while functioning in the Russian market.

The contribution of the thesis consists of forming general requirements and principles while establishing a corrugated board production facility and maintaining its operations in order to avoid risks, to save time and financial resources and as a result to operate in the Russian market obtaining higher profits.

ACKNOWLEDGEMENT

I want to thank Stora Enso Packaging and especially Jouko Kolu and Jorma Turpeinen for the possibility to write this master's thesis.

My thanks to my supervisor professor Juha Pyrhönen for the opportunity to study in Lappeenranta and for his guidance and comments during preparing this thesis.

The warmest thanks to Julia Vauterin for her help and kind attitude during my studies at Lappeenranta University of Technology.

I also wish to thank my mother and my friends for their support as well as my professors at St. Petersburg Electrotechnical University for giving me huge background knowledge.

Finally, special thanks go to Carlos Claramunt, Evgeniy Polev, Gennadiy Kritzin, Tatiana Kravtsova, Tatiana Rumyantseva and Vesa Saarinen for their assistance in writing the thesis.

Lappeenranta, Finland, May 2007
Egor Golovanov

ACRONYMS

AC – Alternating current

DC – Direct current

UNCTAD - United Nations Conference on Trade and Development

WTO – World Trade Organization

OECD - Organization for Economic Co-operation and Development

EU – European Union

MNE – Multinational Enterprise

FDI – Foreign Direct Investment

FPI – Foreign Portfolio Investment

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1 INTRODUCTION

1.1 The objective of the paper

After recovering from the economical crisis which abruptly started in August 1998 the Russian market is now rapidly growing. The income of people has been increasing for the latest several years. It means that the consumption of goods is also increasing proportionally to this. One indication of this development is the increase consumption of corrugated board is Russia. The corrugated board market in Russia is growing faster than the economics in general and is very profitable. That is why this field is attractive to companies – the world leaders of corrugated board production.

Stora Enso Packaging started corrugated board production in Russia in 1998 in Balabanovo mill Kaluga-region. That time the knowledge about Russian market, about general tendencies and trends was quite poor. Consequently, this idea was risky and nobody could say with confidence what would be the result. Despite of that, the Balabanovo project was recognized as successful. Furthermore, the consumption of corrugated board was increasing so rapidly that it was difficult to cover all demand. These issues encouraged the management of Stora Enso to enlarge Balabanovo mill and to think about a new project. In 2004 the new Arzamas mill in Nizhnyi-Novgorod-region started to manufacture corrugated board and in 2008 another new mill in Lukhovitsy, in Moscow-region is going to be started.

However, it is important to remember some specific phenomena which are taking place in Russia. One of the main asperities consists of the fact, that “the rules of the game” are changing very rapidly and unexpectedly. Particularly, it is related to the legislature, but the Russian economical situation cannot be named stable as well.

Aforesaid means that unlike in countries which are considered to be developed, in Russia it is almost impossible to employ the ideas which were utilized in a project which was developed several years ago in a new project. Thus, every new project has to be started from so-called zero-point regardless on the experience which was obtained in previous projects.

The objective of the thesis is to recognize and define general principles and requirements for corrugated board factory infrastructure concentrating on the economical, financial and legal aspects. The idea is to form basic knowledge about Russian corrugated board market so, that the following project of Stora Enso will not be started from the scratch. Owing to that, time and financial resources of the company will be economized. At the same time, in this paper it will be paid little attention to the engineering aspects of constructing corrugated board mill, because these duties are almost the same and do not differ from country to country very much.

1.2 Corrugated board and its manufacturing technology.

1.2.1 What is corrugated board?

Nowadays, corrugated board can be named as the most often utilized packaging material in the world. At the same time, the flat boards (the liners) which are used in process of manufacturing of corrugated board are considered to be the most commonly manufactured paper type.

The main advantages of corrugated board:

- Low weight. The package has only slight impact on the total weight of the product
- Soundness during the warehousing and transportation
- Flexibility and protection property make the corrugated board acceptable for soft goods
- Protection from the temperature fluctuations thanks to the air in a closed place between the layers that forms a good insulation
- Small space demand during the transportation. The product is transferred to the consumer as a flat
- The possibility of printing using various methods
- Easy converting
- Environmentally friendly. The possibility of recycling
- No static discharge problems [2]

Corrugated board has several layers. In the general case it consists of free layers – two liners and a layer of corrugated board between them. All these parts are glued together

representing rigid and light construction with good protection qualities. Naturally, these protection qualities are highly dependent on the materials used. The basic constructional principle of the corrugated board is shown in Fig. 1-1

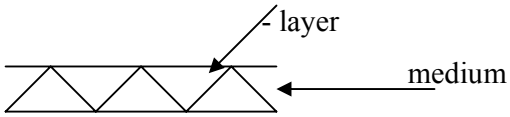

Fig. 1-1 Corrugated board basic structure

The types of corrugated board which are commonly produced

- single faced, Fig. 1-2.

Fig. 1-2 Single-faced corrugated board

- single wall, Fig. 1-3.

Fig. 1-3 Single wall corrugated board

- double wall, Fig. 1-4.

Fig. 1-4 Double wall corrugated board

- triple wall (triplex), Fig. 1-5

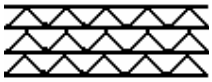

Fig. 1-5 Triple wall corrugated board

The idea of manufacturing double and triple wall corrugated board is to make this product stronger. Surely, if the other conditions are the same double wall corrugated board has

better protection characteristics than the single wall one, however, the weight of the corrugated board is also increasing.

Another important characteristic is the height of the flute. The thickness of corrugated board depends on it as well as it depends on the thickness of the board

1.2.2 Manufacturing technology of corrugated board packaging

The process of transformation containerboard to completed product consists of three stages: corrugated board production, converting and printing. In this chapter all these actions will be described one after another

Production of corrugated board

Corrugator can be named as the main part of production cycle of corrugated board. This item is producing corrugated board utilizing board and glue as raw materials.

The simplified scheme of the corrugator is shown in Fig.1-6.

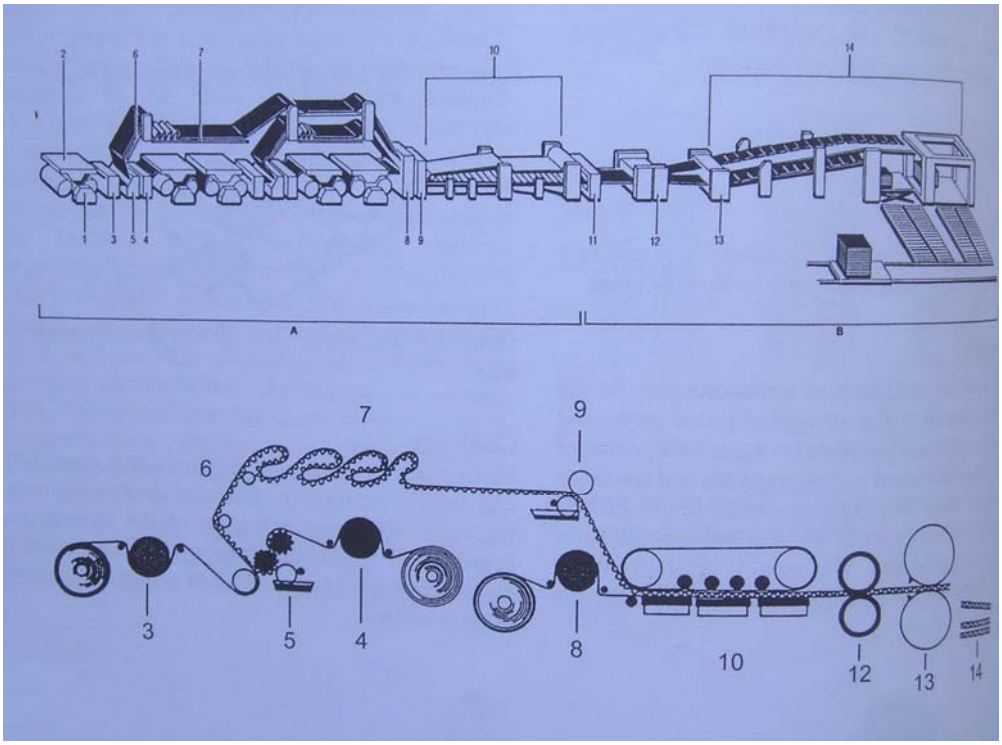

Fig.1-6 Corrugator. A – wet end; B – dry end; 1 - Mill roll stand; 2 – Splicer 3 – Liner preheater; 4 – Preconditioner; 5 – Single facer; 6 – Inclined conveyor; 7 – Bridge; 8 – Preheaters; 9 – Glue machine; 10 – Double facer; 11 – Rotary shear; 12 – Slitter-scorer; 13 – Cut-off knife; 14 – Take-off devices; [2]

The corrugating process can be described as follows. Firstly, the medium, which is forthcoming from the reels, is warmed with the help of a pre-conditioner. Next, it is damped with steam and is corrugated between electric drives driven rolls. Therewith, after the board was fluted the glue is spread on the surface of corrugated tips. At he same time, the heated line, which is forthcoming from the other side of the single facer, is pressed to the glued corrugated tips of the medium. Thus, single faced corrugated board is produced. The corrugated board web is then transferred to the bridge.[2]

Single faced corrugated board is transported through the pre-heater and is delivered to the glue machine. In this machine the glue is spread on the surface of corrugated tips. Simultaneously, the second liner, which heretofore was heated is disposed to this glue in the double facer. Hence, the corrugated board structure is produced. The slitter-scorer produces creases in the web, thus the web is slit into parts. After this, side trimming is executing. Thereafter, the webs are forwarded to the to the cut-off knife where they are sheeted. Competed sheets of corrugated board are collected in the take-off. After that, they are transported to the warehousing place, were they are waiting for converting. [2]

Despite of the fact that corrugating process is united it can be divided into several independent stages. Every stage is realized by an independent machine. Every machine will be shortly described below.

Mill roll stand

The aim of the mill roll stand is to unwind the liner and the corrugated medium. Actually this device can be described as a rack in which two reels are positioned. When one reel is expired, another is going to be spliced. Contemporary mill roll stands are produced without shaft. Thus, there is no shaft in the middle of the reel. Instead of it core chucks are utilized. [2] Types of drives used: AC torque controlled

Splicer

When the reel in the mill roll stand is unwound it should be changed to another one. Thus, splicing process occurs. Formerly, this process was executed manually. It ordered the machine work at idle regime. The webs were joined using glue or special tape. Naturally, idling the machine caused a reduction of productivity and moreover the process of manual splicing increased waste.

Nowadays, splicing is an automotive procedure and is executed at full machine speed. This, surely, increases productivity and reduces waste. The splicer consists of three parts: splicing unit, buffer stock and automation. [2] AC servo drives are used in the splicing process to perform the accurate work.

Single facer

In fact the single facer can be named as the key element of the corrugator. It defines the flute structure of the board. The main characters of this device are corrugating rolls. They are representing two rolls having flute surface which are used to make the board corrugated. The lifetime of the corrugating rolls depends much on the quality of board. The aim of another part of the single facer - pressure roll is to press the liner against the medium. Single facer also includes glue equipment. The goal of this device is to spread glue onto the flute tips after the board was corrugated and before the liner is pressed to the medium. The pre-heaters, which are used for heating the board are the part of the single facer as well. [2] Types of drives used: DC motor, AC motor, AC servo, AC frequency controlled.

Pre-heaters and pre-conditioners.

All the boards are heated before proceeding. The pre-heater contains three parts: a steam heated electric motor driven cylinder, wrap arms and a base. This device can be described as ordinary pressure vessel. The regulation of heat, which is transferred from the cylinder surface to the board is executed with the help of roll arms. The goal of the roll arms is if needed to increase or decrease the surface of the cylinder which is in contact with the board. The roll arms are position controlled with electrical servo drives. Contemporary pre-heaters thanks to the automatic wrap control are capable to maintain constant

temperature of the board by means of changing the contact angle between cylinder surface and the board, while the speed of the machine changes.

The corrugating medium pre-conditioner is almost like liner pre-heater. Pre-conditioners are equipped with accurate speed controlled electric drives, because corrugated medium does not withstand the pulling forces which occur during the machine acceleration.[2] Types of drives used: AC frequency controlled

Bridge

After passing the single facer single faced corrugated board is forwarded to the inclined conveyor and bridge. The bridge conveyor is operating at a slow speed. Thus, a speed difference occurs. Consequently, the folds of the web are formed. The number of them should match the requirements in order not to break the web. Formerly, this control was accomplished by the machine operators; however, nowadays automatic bridge controls are utilized. In addition, special devices, which are controlling the correct position of the web in the cross machine direction, should be established. [2] Types of drives used: AC servo

Glue machine

The aim of the glue machine is to spread glue on the surface of the single-faced corrugated tips likewise it happens in the single facer. [2] Types of drives used: AC servo, AC frequency controlled, DC motor drives.

Double facer

The function of the double facer is to couple single-faced corrugated board and the liner.

This device contains two parts: heating part and traction part. Heating part has two functions. First, it has to transfer the required amount of heat to the board in order to gelatinize the glue and to produce a firm glue bond. The bond quality has to be satisfactory for slitting, scoring, chopping and stacking operations of the corrugator. Second, it has to evaporate the superfluous level of humidity, which is evolved from the glue. The aim of the electrical drives controlled traction part is to pull the corrugated board over the heating part. [2]Types of drives used: DC motor, AC frequency controlled

Slitter-scorer

The goal of the slitter-scorer is to trim the edges web, which is forwarded from the double facer. Another function of this device is to cut the web into parts. However, usually the number of parts does not excess 6-8. [2]Types of drives used: AC motor, AC servo.

Cut-off knife

The aim of the cut-off knife is to cut the web into pieces with the required length. Commonly, the corrugator is equipped with two knives. This gives an opportunity to cut two different lengths of the sheets at the same time. However, one- and three-knives machines are used as well.[2] Types of drives used: AC motor, AC servo.

Take-off

After the cut-off knife the sheets are forwarded to the take-off, which can be also named like sheet stacker. This process is quite difficult considering the fact that speed of take-off conveyor is five times less than the sped of the corrugator. Thus, it means that completed sheet has to be pressed in a controlled way and has to be put on the conveyor using e.g. brushes. [2] Types of drives used: AC frequency controlled.

Control

The control over the process of corrugating is very important. Moreover, developing informational technologies give much more opportunities of control than it was earlier. Nowadays, from the central control desk, which consists of several computers, located at the place protected from noise, the majority of set-ups and adjustments of are executed. [2]

Converting of the corrugated board.

Under converting the processes which transform the corrugated board into complete product are understood. First stage is printing and then comes converting. There are two possibilities for converting die-cutting and in-lines

Printing.

Nowadays, in era of information the role of the packaging is not only to protect the product from the external impacts, but to bring itself information and advertisement as well. That is why the requirements for printing are very strict. These requirements include the following: colours, tone and brightness of the printing as well as its location on the packaging. The design of the packaging and printing on it should be done so that every concrete product can be easily distinguished from the product-competitor. Printing is a rather complicated operation. It requires appropriate printing plates, good inks, suitable printing equipment, with accurate position controlled drives and furthermore professionally skilled, experienced personnel. [2]

Nowadays, Flexo - printing is widely used method n corrugated board industry. Strictly saying it is the most popular method of printing in the packaging industry. This method consists of several printing units. Flexo-printing units can be easily associated with flat-bed and rotary die-cutters.

Other methods of printing:

- Screen printing
- Letterpress printing
- Offset printing
- Gravure printing
- Digital printing [2]

Balancing: the process of producing corrugated board packaging can be divided into two main parts: manufacturing corrugated board sheets and converting these sheets into packaging. From year to year every stage of these processes become more and more automatized. The implementation of physical power of personnel is decreasing, however, automation leads to the higher requirements of the professional skills of the staff and its competence.[2]

Die-cutting

The process of die-cutting transforms corrugated board sheets into a package blank using creasing knives or/and cutting knives. Naturally, the waste (extra parts of the sheet) should

be possessed from the blank. Die-cut package can be produced from the blank either manually or using packaging machine. There are two basic methods of die-cutting: flat-bed die-cutting or rotary die-cutting.

Production of die-cut packaging, firstly, requires producing of die-cut tool. In order to produce the tool, following questions should be investigated.

- choice of die-cutting method: flat-bed or rotary die-cutting
- evaluation of the number of blanks to be mounted on the tool and their location in it.

After considering these questions the following problems have to be solved: the type of the box and dimensions of the box, order, printing and quality characteristics, etc. die-cut tool is produced in accordance with the two dimensional die-cut drawing which should be made by a designer [2]

In fact, the process of moving away the waste from the blank is accomplished more properly in flat-bed die-cutting. Moreover, the most complicated blanks are as a rule produced using this method as well. Furthermore, for very small as well as for very long products, flat-bed die-cutting is also advantageous. However, independently of the chosen method the quality of die-cut tool as well as the skills and attentiveness of the operator have a serious impact on the quality of the final product. [2]

Flat-bed die-cutting

Generally, the process of flat-bed die-cutting can be separated into four stages: feeding, die-cutting, waste stripping and blank delivery.

The sheets are forwarded to the feeder either manually or automatically using a pre-feeder. Before feeding, all printing must be completed. It will be advantageous to connect printing and die-cutting machines in order to arrange a functional production line.

The most commonly used are suction feeders. Utilizing suction the sheet is transferred to the grippers. The grippers, which are mounted side by side to gripper bars, grip the leading edge of the sheet. The gripper bars deliverer the sheet to the die-cutting. In the

die-cutting part the corrugated board sheet should be converted to the desired package using die-cut tool. The sheet of corrugated board is positioned between two platens: upper platen, in which the die-cut tool is installed. This platen is fixed and lower platen – cutting plate, which is movable. Canal grooves are positioned on the cutting place in order to be sure that the sheet is located in the correct position. [2]

After die-cutting the sheet is delivered to the stripping part using gripper bars. The stripping die tool is mounted on the upper stripping plate at the same time the female stripping board is mounted on the lower stripper section's movable support frame. The idea is that when the female stripping board is moving with the corrugated board sheet located on it up and down against the stripping die tool. Thus, the stripping stroke is produced. Stripping parts of the die tool separate the waste from the package and force them to fall through the holes in the female board. [2]

After stripping the corrugated sheets are forwarded to the delivery part by gripper bar as well. In this section the sheets are separated from the grippers and are collected in the so-called intermediate magazine. When the number of sheets in the intermediate magazine reaches the desired level (quantity of sheets per batch) the batch is dropped to the belt conveyor.[2]

Rotary die-cutting

Rotary die-cutting machines are widely used nowadays; however they are less popular than flat-bed die-cutting machines and have above mentioned limitations of their usage. The rotary die-cutting machine consists of four parts: pre-feeder, feeder, die-cut and delivery. The principle of operation of pre-feeders and feeders is the same as in flat-bed die-cutters.

Rotary die-cutting occurs when corrugated board sheet is forwarded between two rotating cylinders with the help of the die-cut tool. It cannot help mentioning, that case of rotary die-cutting productivity and capacity of die-cutter is higher, but on the other hand the quality of the product is lower than using flat-bed die-cutter. The waste is stripped with the help of the rubber strips. The removal of waste is accomplished by means of vibrating

belts. After die-cutting the sheets are forwarded to the delivery conveyor. Which purpose is to transfer the sheets to the stack. [2]

1.3 Electrical drives overview

A contemporary corrugator consists of about 50 electric drives which are located in different parts of the device. Surely, every drive requires careful investigation, because improving the characteristic of even one drive may lead to the improvement of productivity of the corrugator as well as to the reduction of electricity consumption. At the same time studying the electrical drives is not the goal of this thesis thus in this subchapter only general description of main types of electrical drives installed in the corrugator will be given.

AC servo drives. These types of drives are commonly used when it is essential to obtain fast and accurate response characteristics and position control. In order to obtain such characteristics AC servo motors generally have small diameter as well as a high torque. There are two types of AC-servo drives – induction motor servos and permanent magnet (PM) servos. The popularity of PM servo drives has increased a lot during the latest years and most important servo drive manufacturers have both induction and PM servo drives on the market. Owing to the small rotor diameter such a drive is capable of maintaining a low level of inertia and consequently achieving rapid acceleration and deceleration characteristics. The maximum dynamic response can be obtained. Due to present day advanced control methods such as AC vector control or DTC it is easy to achieve nearly linear speed-torque characteristics which are essential for accurate servo motor control. Such types of drives are produced e.g. by Baumuller company and are installed in BHS corrugators. [31]

AC frequency controlled. This type of drive allows controlling the rotational speed of the AC motor by means of controlling the frequency of electric power supply of the motor. AC frequency controlled drive can be named as the adjustable-speed drive. When such type of drive starts it requires low voltage and frequency. Such a behaviour helps to avoid high currents that ordinarily occur when the motor consumes the electricity directly from the network. [29] The accuracy of speed and torque control can be e.g. maintained

by the direct torque control (DTC) principle utilized by ABB. In the case of DTC the following characteristics are normally achieved: the speed accuracy is 0,01% of the rated speed and the torque accuracy is 1% of rated torque. Such characteristics are appropriate for corrugated board industry.

DC drives. These types of drives are also widely used in contemporary corrugators. E.g. in the single facer and the double facer speed and torque controlled DC drives are used. Speed feedback can be achieved when utilizing a tacho-generator and encoder. There is a large supply of DC drives in the market e.g. drives produced by ABB are established on corrugators. [30]

1.4 Introduction to the investments.

It will not be a mistake to say that contemporary world is driven by investments. To attract investments foreign and home is one of the goals of the state's government. It happens so, because investments give the opportunity to the country to emerge, to increase its competitiveness in the world scale. That is why almost all countries have special governing bodies which are oriented in attracting investments and in forming suitable conditions for them.

Generally, foreign investments can be divided in two groups. The first group is formed by foreign portfolio investments or passive investments. They include equities (shares) which are ordinarily named as risk capital and debts (bonds) which are named as interest capital. Investment into FPI usually has as its object two main purposes. First, is to achieve payments or dividends. And second, is to speculate them and sell when the selling price will be higher than purchasing price. When investing in FPIs the businessman does not have a goal to establish the control over a company and to participate in its management. These investments are commonly considered as short-term. [5]

The second group is formed by foreign direct investments (FDI). According the definition of OECD the FDIs are "long term investments which impose significant degree of influence on management". The FDIs are invested to the production facilities and to the infrastructure (buildings, roads, machinery, etc). Therefore, every country is mainly

interested in this type of investments because they increase the competitiveness of the country in the world market. FDIs can be invested to purchase already existing company, to establish a new enterprise or to buy a share in a business. There are two categories of FDIs

- Vertical FDIs – investing to the industry in the foreign country which can support inputs into or sell outputs to the business's home operations. The good example can be oil companies which are controlling all the stages of production beginning from the oil extracting and finishing by gasoline distribution through filling stations. However, these types of investments become more and more old-fashioned and are acceptable only in several specific industries.
- Horizontal FDIs – investing resources to the host country to the same industry in which company is operating in a home country. One can see this type of investments considering almost any high-tech company, for example, mobile phones producing. The company which has main office and main production unit e.g. in Germany is able to establish the same factory, for instance, in China or Poland. In that case, company is as a rule not producing components but only assembling them. Components are purchased from independent suppliers which are competing between each other in order to achieve a contract. [5]

As it was mentioned above investor in the FDIs market is able to choose between two possibilities – to invest resources in completely new company or to purchase already existing one. The first opportunity is known as Green Field investment. This type is advantageous for the host country because such kind of investment helps to increase the stock of home capital investment and to induce the manufacturing ability.

Generally, Green Field investment provides new technologies and management concepts to the host country. Moreover, competitiveness in the internal market as well as competitiveness of the country in the world scale is increasing. At the same time, it helps to solve unemployment problem. Green Field investments are very common in the case of emerging markets. [5]

The second opportunity is known as Brown Field investments or acquisition. At its simplest form it means that one company becomes a part of another. At the same time,

acquired enterprise continues its activities as independent company having its original name, staff etc. Thus, it may take place imaginary competition between two or several brands which are actually owned by one company. Hence, it almost necessarily causes decreasing of the competition and, at the end of the day, may lead to monopolistic market.

However, these FDIs are driven by three types of motivation. The first, is to establish an affiliated undertaking of a Multinational Enterprise (MNE) in the host country in order to extract natural resources for the purpose of obtaining raw materials in order to utilize them in the production units in other countries or to sell them in the global market. In cases than there is lack of raw materials in the home country or it is cheaper to extract them in a foreign country or the company wants to increase its share in the world market. Thus, it can be named as extractive motivation. It is implemented in oil, copper and some other industries.

The second can be called as source motivation. Under this the establishing of the enterprise in the host country in order to decrease production costs (labour, components, etc.) is understood. The main indication of such kind of motivation is the fact that completed goods are exported to the home country or to the third countries.

It is considered that the source motivation is dominating, however, such point of view becomes more and more old fashioned. Labour costs are between 10 – 15% of the total production costs, thus the total reduction of the production costs will be negligible. Moreover, speaking about high-tech products it is important to notice that 80% of the production costs lie in the engineering area (research and development) and only 3% in the labour area. [5]

Hence, the market motivation becomes more and more prevalent. The aim of it is to enter to the market with the production manufactured inside the country in order to avoid e.g. import duties or to decrease transportation costs.

Thus, it means that nowadays MNEs are not seeking for the cheap labour but they are seeking for the rich markets. (e.g. Japan car companies established their production units

in the USA not on the basis of cheap labour, because there is no cheap labour in he USA, but on the basis of rich market and high demand)

However, source and market motivation are often overlapping. Initially, high-tech companies have found the production units in China, in order to obtain source advantages, however, nowadays, when this market becomes more and more wealthy the motivation of the MNEs is changing to the market one.

Next, it will be a serous mistake to think that FDIs are transferring from rich countries to poor counties. In actual fact, the majority of he FDIs are moving between rich countries. This can be seen in the following table

Table 1-1: the share of the Foreign Direct Investments into developed countries from the overall world FDIs [14]

Year	Value in per cents
1998	68,7
1999	76,2
2000	80,4
2001	72,0
2002	71,4
2003	64,3
2004	55,7
2005	59,2

According to the UNCTAD World Investment Report, 2006 the leaders in receipting FDIs in 2005 year are the UK, the USA, China, France, Netherlands, Hong Kong (China), Canada, Germany, Belgium, Spain, Singapore. These countries are either developed or representing emerging economies with high potential of growth. These statistics prove that nowadays FDIs are mainly market oriented. [14]

Examining FDI question one cannot help mentioning the behaviour of the volume of the FDI on the world market. Started in the early eighties the growth of the FDI continued by the end of the century and was followed by rash drop see figure 1-7

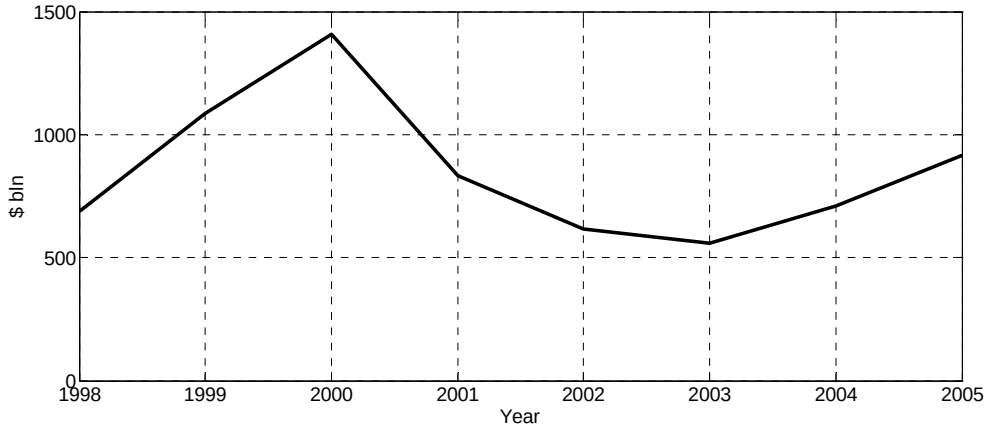

Fig. 1-7 Overall FDIs in the world market [14]

During three years 2000-2003 the overall level of FDI reduced in almost to one third. It can be named as collapse of the FDIs. However, from 2003 year FDIs started to grow again. Unfortunately, no expert can tell with high level of certainty what had happened. Were it generating of cyclical fluctuations in this market or can it be described as structural problems or any other reason.

At the same time, one of the reasons of decreasing of he FDIs can be explained in the following way. For many years investors have been thinking that they should invest every coin into the project, however, nowadays the idea of outsourcing becomes more popular. In that case the MNE does not more investing all the resources to the business in the host company but utilizes the services of the contractors e.g. transportation services, etc in order to decrease production costs or increase productivity.

The main ways of outsourcing:

- manufacturing contracts
- subcontracting
- licensing
- franchising
- servicing contracts [5]

Balancing, the problems related to the investments are very many-sided and require very careful investigation and discussion. However it is not an objective of this paper. Here was only an attempt to create a short overview of these problems.

1.5 Russia's Economic Status in Brief

At the end of eighties Soviet economics faced with serious problems which some years later proved to be unsolvable:

- Soviet economics was military oriented. The competition with the USA in area of weapon manufacturing and distribution, which is known as “arms race” took lots of resources from the Soviet economics.
- Decreasing of oil prices and problems in oil industry which caused the inducing of oil extraction
- Soviet economics was state-planned and showed its ineffectiveness. It could not react with the required level of flexibility to the changing requirements of the market and to change of situation in international economics.
- The lack of provisions. From the end of sixties Soviet Union became the greatest importer of food in the world and a lack of production as a whole. That surely caused the dissatisfaction of population and led to the social instability.[4]

These problems in addition with the international problems between different nations of Soviet republics caused the disintegration of Soviet Union. After the Soviet Union was dismounted the economics of Russia and other former Soviet republics felt into collapse.

At the end of 1991 the situation was absolutely critical and required immediate and resolute actions from the government

The President of Russia Boris Yeltsin expected from the prime-minister Egor Gaydar the program of the stabilization of Russian economics. From January 1992 the prices were no more controlled by the state, restrictions in home trade were cancelled, rate of exchange of ruble became floating. These measures helped to return goods to the shops from which the goods almost disappeared in the middle eighties. Also Gaydar assumed the measures in order to decrease budget deficit. Also, according to Anatoliy Chubais' ideas, privatization

process was started. This program was absolutely necessary but it had grave consequences for Russian people. Initially, Russian society was enthusiastic to this program but quick increasing of prices changed its opinion. People named Gaydar's program "shock therapy". Political pressure to Yeltsin and Gaydar increased. [6]

In summer 1992 Yeltsin had to resign Gaydar. Victor Chernomyrdin became a new prime minister. Former Head or Soviet Central bank Victor Gerashchenko became a head of Russian Central bank. This could be considered as the step back. During 1994 Chernomyrdin's government followed a policy of increasing of expenses, adoptions and inflation. This caused ruble crisis in October 1994. So-called "Black Tuesday". [6] The early nineties period is known in Russian history as a period of "wild capitalism" It was quite easy for a person to become rich in three days, however, it was not surprising if he would find himself killed on the fourth day. These days, when the Russian legal machine was not operating at all and the only argument in solving the commercial disputes was Kalashnikov machine-gun were not felicitous for foreign investments into Russian economics.

However, in the middle of nineties the situation changed. The state became stronger and managed to establish a control over crime level. Surely, not all problems were solved nevertheless normal climate for business was established. A lot of international companies entered into quickly developing Russian market. Initially, the majority of them were not thinking about the opportunity of organization of production of goods in Russia, but only about trade, however, economical crisis which took place in Russia in August 1998 changed these plans dramatically. This crisis had an external impact.

- Russian ruble was under pressure caused by consequences of Asian economical crisis
- decreasing of oil prices in the world market

Mainly this crisis, however, had a deep internal background. The government had to borrow money distributing sovereign bonds inside Russia and abroad in order to cover budget deficit. These measures in conjunction with low assembling of taxes, inefficient management of state debts, poor condition of the industrial part of economics, which had not recovered from the crisis occurred in the beginning of the nineties, pushed Russian

economics into collapse. High oil prices gave an opportunity to the government to pay for the debts. However, when the prices decreased the government realized that it is impossible to fulfil the obligations related to the payments of the debts.

Thus, in the middle of August 1998, the government declared about its intentions to break the payments for the debts. This meant the default of the country. Russian ruble was devaluated to one third less than in a month (6.29 rub for 1$ on 15.08.1998 and 20.83 rub per 1$ on 09.09.1998) Fig. 8 illustrates the rapid fall of the ruble.

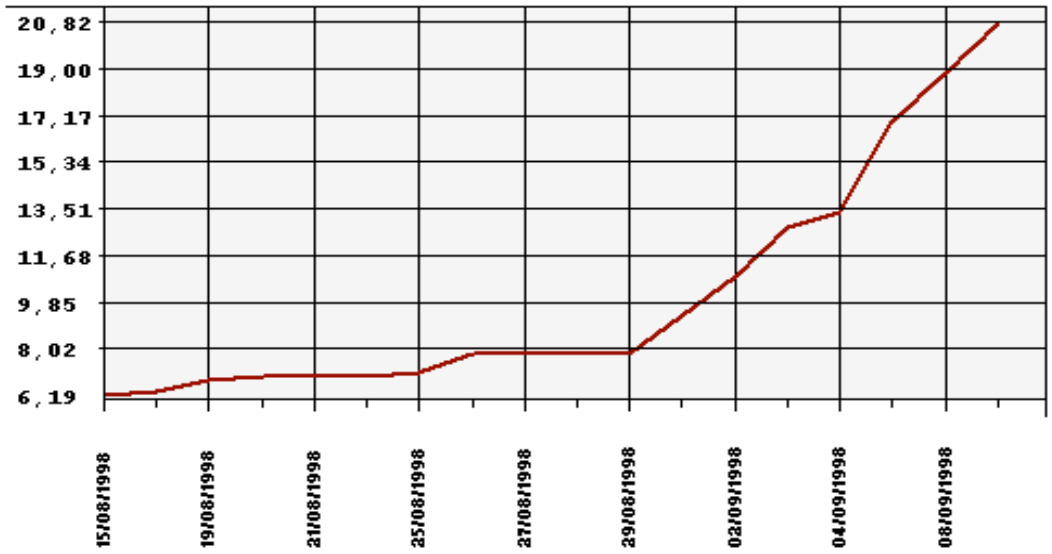

Fig. 1-8 Exchange rate – rubles per US dollar established by Central Bank of Russia [21]

The RTS Index which represents business activity in Russia fell down to its lowest level in its history since it was established on 01.09.1995– 38,5 points.[32] Crisis in banking area occurred as well.

The devaluation caused inflation wave. The prices for imported goods increased noticeably. Therefore, the consumption decreased almost proportionally to this. These consequences forced the international companies to reconsider their policies related to Russia. Their understood clearly that it is hardly possible to compete in Russian market with the companies which are producing goods inside the country because the difference in prices between imported goods and commodities produced in Russia was too considerable. Thus a lot of world-known companies started to manufacture goods in

Russia using two ways – constructing new plants or purchasing already existing ones and reconstructing them.

Putin, after he was elected as president at the beginning of 2000, started to provide very sensible economical policy in order to stimulate economical growth and to attract foreign and home investors into Russian economics. Income tax was decreased from 35% to 24%, value added tax from 20% to 18%, tax on profits was decreased to 13%, unified social tax from 35% to average level of 26%. Also this tax obtained a regressive scale, so in some cases it may be decreased to 24%. These measures with the help of extremely high oil prices were shown effective. RTS index increased from 143,29 in 2000 to 1125,6 in 2005 Foreign Investments in Russian market increased. Nowadays, Russian market is rapidly growing. For the latest 5 years RTS Index increased approximately tenfold from 143,29 in 2000 to 1125,6 in 2005, Fig.1- 9.

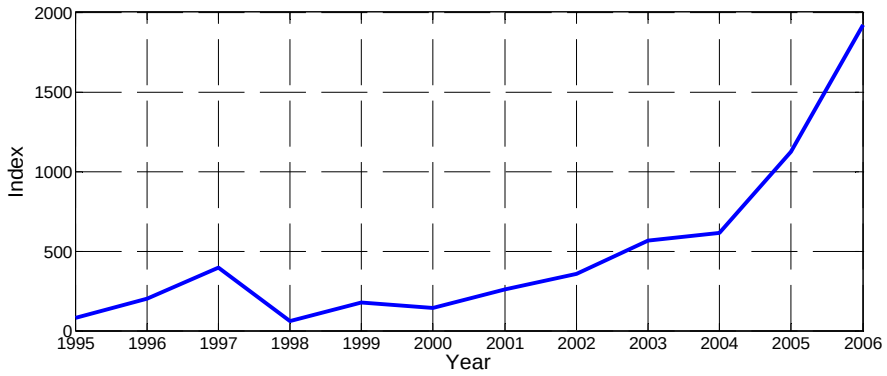

Fig.1- 9 RTS Index dynamics (position at the end of the period) [32]

GDP shows the growth at average level of 6,5% per year. The amount of foreign investments increased approximately fivefold for the latest five years (10958 M$ in 2000 and 53651 M$ in 2005). [33] At the same time, an investor entering to the Russian market is facing with several risks.

Russian economics is raw-material-dependent. The export of mineral resources formed 64,6% from the whole export in 2005. This share is increasing every year (42,5 % in 1995). In absolute values this looks much more impressive – 33278 M$ in 1995 and 155853 M$ in 2005 [33] In conjunction with extremely high oil prices (68$ per barrel at

the end of 2006, whereas so-called average historical level is 19,61$ per barrel) this may be considered as the reason of impetuous growth of Russian economics

Hence, nobody can tell with sufficient level of certainty what will happen in case of possible decreasing of oil prices. Will Russian economics be able to withstand such difficulties? Can it cause a new collapse? Unfortunately, nobody knows the answers. Fig 1-10 illustrates the oil price behaviour during the latest years.

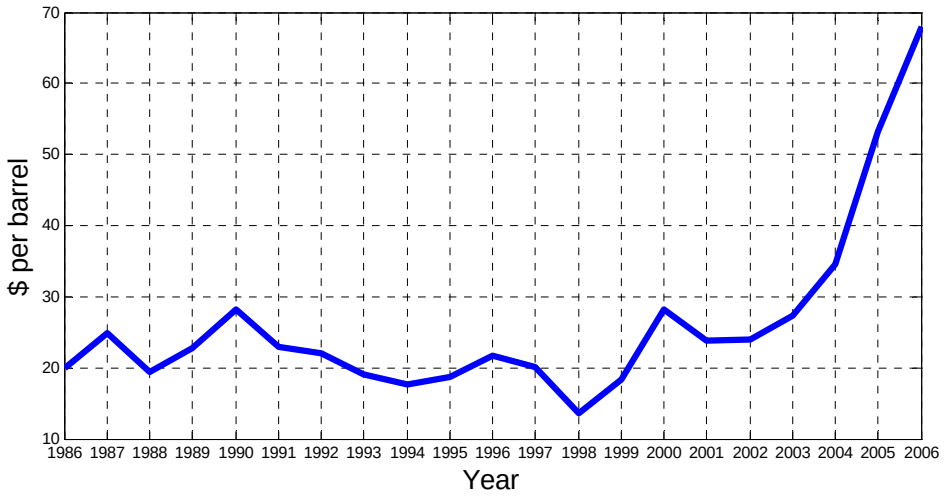

Fig. 1-10 Oil prices (at the end of the period) [19]

One of the securities which Russia has in the case of oil price decreasing is the resource of stabilization foundation. However, in Russia the available funds of this foundation are 9,9% of GDP at the same time, comparatively to this, the same foundation in Norway has 100% of GDP. For the investor in means that all plans related to the forecasting of economical development of Russia may be ruined one day. [4]

Another important thing which should be under consideration is the political situation in Russia. Some annoying tendencies happened already in the 2001, however, the most well-known occurrence took place in 2003. The most considerable event which happened during Putin's presidency in economical area was, certainly, the Yukos oil-company crisis. It was completely unpredictable from the economical point of view. In the second half of 2003, Yukos' top managers and major owners, Mikhail Khodorkovsky and Platon Lebedev, were arrested with the charges of tax evasion and embezzlement. The company was put under scrutiny and received numerous back-dated tax charges eventually

amounting to 27.5 G$. The company faced with the possibility of bankruptcy. The sale of the main part of the Yukos – Yuganskneftegaz company did not help. This company was sold in an auction the results of which seemed to be very strange to the experts in Russia and abroad. It was a signal for the investors that the pressure of state to the economics is increasing. [15]

Resignation of Andrey Illarionov in 2005 who was the President Putin's advisor in economics also was a signal to the investors. He was in Putin's team since 2001 and always was a supporter of liberalization of Russian economics. His views were often contradicted the general line of the Kremlin. Illarionov named the sale of Yuganskneftegaz as a "swindle of a year".[1]

Some time ago, it was considered, that only Russian companies and businessmen have problems with Russian authorities, whereas foreign investors are completely protected. But in 2006 The Russian Ministry of natural resources declared about its intentions to stop "Sakhalin 2" project because of the problems of environmental protection. This project is supported by Shell company and millions of dollars were invested in it. At the end of the day, Shell had to sell the controlling share in this project to state controlled company – Gazprom. After that, all complaints of the state in area of environmental protection immediately disappeared.

Intervention of the state in economics is intensifying from day to day. Yukos and some other affairs showed that there are no clear rules of the game in Russian market. Rejection of liberal reforms and increasing control from the state side are threats of stoppage of economical growth in Russia.

1.6 The contributions of the thesis

The aim of the thesis is to make presentation of Russian corrugated board market, to understand general tendencies which occur there, to realize what factors influence the behaviour of the market, to describe main particularities which distinguish Russian corrugated board market from this one in developed countries and to explain main

[1] Radio "Echo Moskvy" interview, December, 2004

difficulties with which corrugated board factory may face while entering into Russian market.

On the basis of this information and with respect to particularities which will be investigated it is key issue to form general requirements for corrugated board factory in Russia and main principles of establishing the mill in order to make if reasonable and therefore profitable project.

2. STORA ENSO CORRUGATED BOARD FACTORIES IN RUSSIA

In this chapter three projects of Stora Enso in Russia will be briefly described. The attention will be paid on motivation which drove the managers of the company to establish the concrete factory as well as on facts which forced the firm to construct the mill in that current place

2.1 Balabanovo mill

Stora Enso started its operations in the Russian market (at that time Soviet market) at the end of the fifties. The volume of export was varying from year to year but always has been remarkable. After the dismounting of the Soviet Union the liberalization of foreign trade was announced by the Russian government. Trade barriers were reduced and the operations of Stora Enso (that time Pakenso-group) in Russian market were intensified.

The increasing volumes of export to Russia forced the management in the middle of the nineties to think about the idea of constructing a corrugated board factory in Russia. Actually, since the transportation costs play an essential role in the flute board business in would be advantageous to have a source of corrugated board near the consumers. In addition to this, transportation time would be considerably reduced. Furthermore establishing a production unit in Russia would help the company to avoid customs tariffs imposed for import and all the delays in delivery related to customs would be declined. One more advantageous factor of establishing production facilities in Russia was the increasing level of flexibility between the company and the customers. It means that all changes in the characteristics of corrugated board or volumes of production could be made much faster when the factory is local.

The level of flexibility is an essential issue. It seemed to be quite low when the corrugated board was imported from Finland. The latter embarrassed the co-operation between the Russian and Finnish units of Stora Enso. The official correspondence between the managers of the company in Russia and in Finland in the beginning of 1998 described the following examples:

- the quantity of the corrugated board which was delivered to the customer was less than it was ordered by the consumer (Amtel, juice manufacturer, Moscow)
- poor printing quality because of wrong liner used (Magellan, Kristall alcohol plant, Moscow)
- wrong printing, wrong size perforation, bad cutter sheets (Mega Cola, soft drink manufacturer, Moscow)

and some others.

Thus, almost every order in Lahti resulted in various types of problems and might damage the image of the company in the local market. Surely, such co-operation cannot be named as successful. No advertising campaign would help in case of non-fulfilment of liabilities for the clients. Naturally, the mill should produce the corrugated board at a quality which is expected by the customers. Undoubtedly, the consumer should be provided with the high quality products for the following reasons:

- Stora Enso was interested in repeating orders from the clients. Surely, in case of poor production quality it is hardly possible
- The corrugated board exported to Russia could be named as advertisement for the future clients, demonstrating the high quality of production. Certainly, if there is poor advertisement it would be a difficult task to involve new customers
- The reputation of the company would be suffered from this.

One of the explanations of such a problem could be the fact that capacity situation at Lahti mill was quiet difficult, however, naturally, clients are not interested in the supplier's difficulties, but only in achieving high quality products Thus, it was a serious task for the managers of the company to explain the customers why they should do business with Stora Enso.

Another key aspect that should be under consideration were the plans of already existing and potential clients to establish or develop their business in Russia, especially in the Central region of Russia (Moscow) and the North-West Region (St. Petersburg). Analyzing the plans of the consumers would considerably help to establish an accurate development strategy of Stora Enso in Russia and to evaluate correctly the required

volume of production of corrugated board. Table 2-.1 shows the key events in investment market during 1997.

Table 2-1 Key investment events in Russia. [8]

Company	Location	Event
Gillette	St. Petersburg	New shaving sets factory (investments M$25)
Campina-Melkunie	Moscow	Dutch dairy company (inv. M$50 in a new plant)
Searl-Pharma	Moscow	Russian-American pharmaceutical plant (inv. M$32)
Philip Morris	St. Petersburg, Voronezh, Rostov	Invements M$300 in coming 3-4 years
Cherkizovo	Novgorod, Kashira	Two new meat-processing plants (inv. M$24)
Coca-Cola	Russia	Investments M$600 nationwide
PepsiCo	Russia	Investments M$550 nationwide
Rothmans International	St. Petersburg	M$80 investment in new plant
Wrigley gum	St. Petersburg	New plant
L'Oreal	Moscow	New cosmetics factory
Nestle	Zhukovsky	New ice-cream plant
Stimorol	Novgorod	Chewing gum packing plant
Stollwerck	Pokrov	Confectionary plant
Parmalat	Nizhny Novgorod	New dairy plant

Hence, the table demonstrates that many companies were planning to expand their production capacities in Russia. Consequently, it was possible to assume that the consumption of corrugated board of these companies would increase.

Furthermore, investigations over competitors showed that the only competitors were Russian corrugated board producers. Using old-fashioned machinery they could provide the consumers only low quality products and owing to the lack of financial resources they could hardly improve they equipment in the nearest future. At the same time, foreign

companies – world leaders in corrugated board production had not started their production in Russia.

Thus, almost everything said that the idea of constructing the corrugated board factory would be successful. At the same time it seemed to be quite risky to construct a production unit in Russia due to the almost unpredictable behaviour of the Russian market. However, it is known that the average price of constructing a corrugated board factory is equal to approximately 60 M€. This amount was only a small part of the whole investment budget of Stora Enso. So, risks compared to the future possible profits were not very considerable. Thus the decision to establish a factory in Russia was made.

The next step was to define the location of the factory. Basically, only three Russian regions were investigated the North-west, the Central and the Volga regions. It seemed to be logical to construct the mill in the North-West Region because it is near from Finland. It could help to maintain a high level of flexibility between the head office in Finland and the factory in Russia. It would be easier to accomplish the exchange of personnel in that case as well. However, a market study showed that the quantity of consumers in that region as well as in Volga region was lower than the quantity of them in the Central region. Furthermore, the population on the Central region is larger than in North-West region. Thus, on the basis of the potential consumers SE also planned to develop its production units in Central region. As it is known the delivery distance is one of the main competition factors in corrugated board business and, hence, the flute board factory should be located close to the consumers. Therefore, the Central region was chosen as the place for a new corrugated board factory.

The next step was to define the concrete location of the factory. Several places were researched in Kaluga and Moscow regions. A very important factor in the process of choosing the place was the commitment of local authorities in the project. Thus, after some discussions Balabanovo Kaluga region was chosen. That place had several advantages:

- concernment of the region authorities
- Obninsk city is located close to Balabanovo and could be considered as a source of labour force

- Stora Enso has bought not only a piece of land. It also purchased old buildings which belonged to the company which produced metal products. That company also had started to construct new building for the factory. All that meant that there was already an existing infrastructure i.e. engineering communications (electricity, water, gas, etc.) Thus, Stora Enso saved time and some material resources due to this.

The main difficulty was that the company did not have any previous experience in establishing production units in Russia. Thus everything was made for the first time. It was necessary to find containerboard suppliers, transport servicing companies, firms which are capable in constructing the factory to gain an understanding in Russian legislation system and so on. At the same time it was impossible to utilize the previous experience of the competitors in this area, because it did not exist.

Another essential issue was the personnel training. In order to teach employees they were sent to Finland (Lahti and Heinola corrugated board mills) where they learned how to operate the machinery of the factory.

However, the main difficulty was the unpredictable Russian market. It was unknown if it will accept the new product or not. It is easy to answer this question looking to the following table

Table 2-2 production volumes of Balabanvo mill [8]

	1999	2000	2001	2002	2003	2004	2005	2006
Forecast 1000 m^2	30000	50000	60000	70000	80000	90000	90000	90000
Real data 1000 m^2	22862	57128	85214	101136	118578	133489	150256	159313

This table demonstrates the production volumes of the Balabanovo mill. The forecast was made in 1997 during the planning of the factory. Thus, it is easy to see that the real volumes of production considerably exceeded the planned volumes. Surely, in order to increase production the expansion of Balabanovo mill was required

Why it happened so? It is possible to assume that it can be explained as a result of the economical crisis happened in Russia in 1998. When ruble was devaluated the prices for imported products increased considerably. The consumption of them surely decreased. Many companies realized that in order to survive in the Russian market they have to establish their production facilities in Russia. Thus, naturally, more corrugated board was required by the market. So this crisis made an impact for development of the Russian industry. Hence, Stora Enso enjoyed many benefits of being in the Russian market at that time. Relationships with the consumers of flute board were established these days and it is possible to say that foundation of successful development of Stora Enso in Russia was made. At the same time, as a result of defaulting Stora Enso had also to change its plans. Initially, it was planned to purchase the containerboard from foreign suppliers. Increasing prices for imported goods, however, forced the managers of Stora Enso to find local suppliers.

Balancing, Balabanovo mill was the first project of Stora Enso in Russia. Due to proper realization and impact of external circumstances it was successful and showed to the international competitors that it is very profitable to do corrugated board business in Russia. Thus, in order not to lose the market share under the pressure of competitors it was necessary to think about new projects in Russia.

2.2 Arzamas mill

The success of Balabanovo project showed the profitability attractiveness of Russian corrugated board market. Thus in order to maintain and improve market share it would be compulsory to expand production capacity in Russia. The results of market forecast these days showed that the capacity of Balabanovo mill would be fully in use up to 2003 year.

As Balabanovo mill was located in Central region the place for the second factory was chosen in the next target region – Volga region.
Arzamas was selected on the basis of following factors

- it is located inside target area

- Only regional remarkable competitor Nabereshnye Chelnij situated in 600 km to from Arzamas thus outside 200-300 km delivery radius
- Good road and railway connections to all directions
- Arzamas city with 130000 population could be considered as a source of labour force
- Located closely Arzamas-16 city which is known as a Russian high-technology center could be considered as a source of personnel for key positions.[9]

As it was mentioned before it is key issue to have appropriate information about the current demand for corrugated board in the target regions but also to have forecast for the future consumption of corrugated board. This prediction showed the following results for the top-customers. See the table

Table 2-3 forecast of development 2001-2005 of top-customers. [9]

Customer	Segment	Forecasted growth 2001-2005 %
Moscow Kristall	Vodka	17,5
Ligett Ducat	Tobacco	23,3
Transmark	Beer	17,1
Baltika	Beer	53,9
Lianozovo	Dairy	37,9
JTI	Tobacco	36,7
Tulpivo	Beer	53,7
Heineken	Beer	67,2
Multon	Juices	47,5
Nestle	Confectionary	38,4
Svetogorsk	Paper	60,4
WBD juices	Juices	51,5
Bat Moscow	Tobacco	40,2
NN Maslozhirkombinat	Dairy	25,9

Thus, as it shown in the table the top-customers planned to enlarge their production capacities. Hence, naturally they will need more corrugated board to package their

products. Since it was not the fist project of the company in Russian market it had some experience how to operate it. The latter means that e.g. transport servicing companies were already known thus were was no need to find them, personnel training could be done in Balabanovo mill not in Finland, difficulties with Russian legislation were known and thus not surprising etc.

Table 2-4 Production volumes of Arzamas mill

Year	Amount 1000 m^2
2004	38145
2005	69729
2006	99368

As it shown in the table the Arzamas mill demonstrates considerable per year growth of production. At the same time it cannot help noticing that remarkable volumes of corrugated board which are produced there are redirected from Volga region to the customers which are located in the Central area hence additional transportation costs occur. One of the reasons for that can be overestimating of the level of development of Volga region and at the same time underestimating the development of Central region.

2.3 Lukhovitsy mill

Stora Enso faced with the facts that

- despite the expansion of Balabanovo mill its production capacity has been fully booked in 2005.
- Despite the expansion in 2005 the capacity of Arzamas mill will be fully used at the end of 2007 [10]

The success of Balabanovo and Arzamas projects forced the managers of Stora Enso to think about the new project in Russia. Thus, the decision to construct a new mill was made on the basis of the following facts:

- Strong growth in the Russian market is expected to continue. See figure 2-1

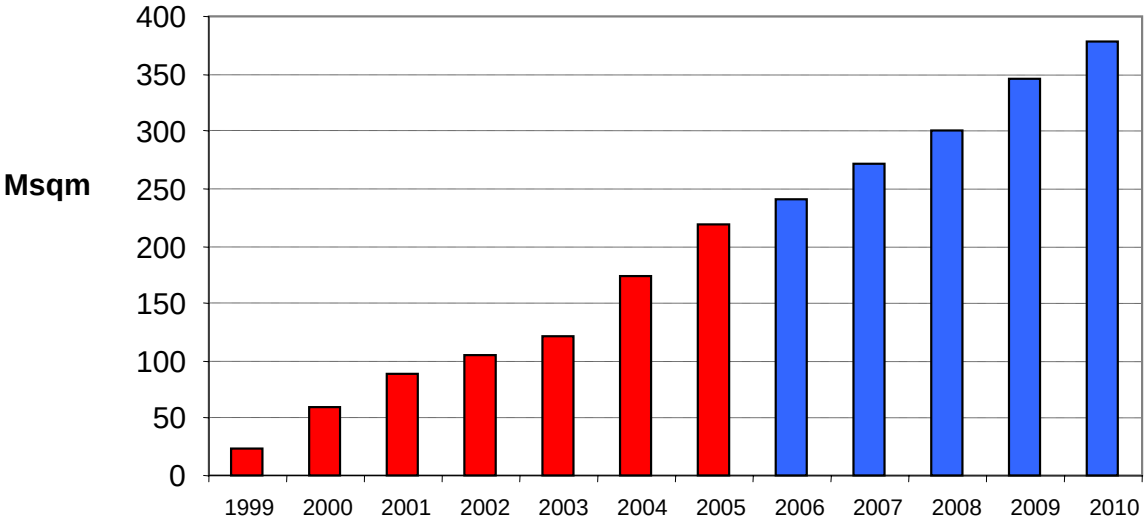

Fig 2-1 The sales of Stora Enso Packaging in Russia (real data and forecast) [10]

- A network of several well located plants can serve efficiently international and local brand owners on their relevant market area
- New plant will strengthen competitive position of the company in the market
-

Moscow area was chosen on the strength of the following:

- The growth in Moscow area is the strongest in Russia
- Transport distance of corrugated products is important competitive factor. Nowadays the transportation of increasing volumes to the international customers in the Moscow area is accomplished from Arzamas

The preferred location seemed to be Tula or Kaluga regions, however Lukhovitsy (Moscow region) was chosen on the basis of the following ideas:

- Suitable infrastructure connections available
- Good roads, (Moscow-Ryazan) and Moscow 3rd ring-road, and railroad connections to all directions
- Lukhovitsy with 65000 inhabitants gives a good base to recruit personnel
- The nearest bigger city Kolomna (25 km and 200.000 population) can also be used for the recruiting [10]

Lukhovitsy mill is going to start its operations thus nowadays it is impossible to say will this project be successful or not as well as to make any conclusions related to this factory

3. LOGISTICS

Logistics plays an important role not only in activities of the company, but in economics as a whole. The definition of the term "logistics" may be given as process of planning, implementing, and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related from origin point to consumption point for the purpose of conforming the requirements of the customer. [2]

Furthermore, if one is speaking about the consumer and its interests it is possible to say that generally logistics is marketing oriented. Thus, logistics can be named as a part of the marketing policy of the company. The goal is to satisfy the consumers of the company and consequently to obtain maximum profit. The interaction between marketing and logistics see the figure 3-1

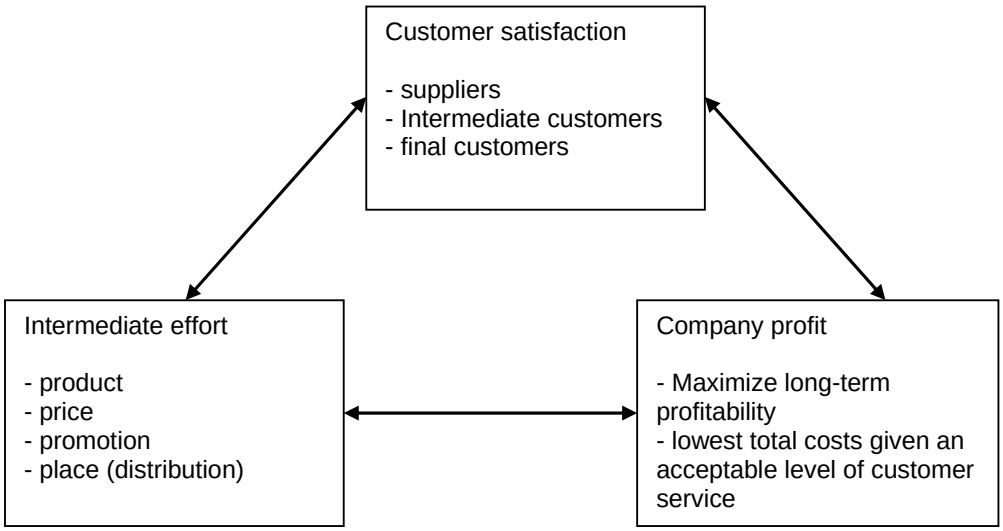

Fig 3-1 Marketing/Logistics Management Concept [1]

The functions of the logistics:

- market analysis and demand forecasting
- definition of the requirements in resources
- transportation
- warehousing
- supplier choosing

[2] The definition is given by the Council of Logistics Management, 1986

- reserve forming and reserve management [1]

Considering logistics management in corrugated board factory it is important to know, that one of the main difficulties for corrugated board company in Russia is the problem of deficiency in raw materials. Already existing pulp and paper mills are hardly able to supply all demand for containerboard. – the number of corrugated board factories is increasing every year, whereas the number of pulp and paper mills remains stable and their volume of production is not increasing either. In addition, all of these mills were constructed in the Soviet period of the history and cannot be named as modern, hence, they are with difficulty capable to support the required level of quality of their production. Naturally, huge mills such as Archangelsk mill are able to invest essential resources in the modernization of manufacturing process but small plants do not almost have such an opportunity, because even moderate level of improvement requires considerable financial investments. The idea of constructing a new pulp and paper mill is regarded among Russian or foreign investors however the implementation of this idea is connected with serious difficulties and risks. This can be easily explained. The average level of investments in such a kind of a mill is equal to about 1 G€ Actual political and economical situation in Russia does not give a possibility for the businessmen to invest so solemn recourses into Russian market.

Strictly saying, the problem of deficiency in raw material is not so grave for already existing corrugated board factories, however, it may be a serious question for the companies, which have an intention to enter into Russian market or for those which want to enlarge their volume of production.

One of the possible solutions of this issue is to utilize raw materials which are bought abroad. However, according to Russian customs legislation the custom duty for containerboard is established at a level of 15%, which can be named as prohibitive impost. The latter does not give an opportunity to import containerboard so, that it will be expedient from the economical point of view.

Nevertheless, in accordance with the requirements of the World Trade Organization (WTO) a country is not permitted to have such prohibitive duties for imported products.

Since Russia is preparing to become a member of the WTO the governing bodies have to change the Customs legislation according to the WTO's standards.

Another possibility is to utilize recycled containerboard as a raw material, however, the corrugated board which is made from such a raw has worse characteristics and quality than corrugated board made from containerboard. Hence, recycled containerboard raw can be used only as supplementary stuff and it cannot replace containerboard.

3.1 Transportation systems

3.1.1 General description of transportation methods

The main goal for the logistics in area of transportation is to transfer the goods from the point where they were manufactured to the point where they will be consumed with a minimum level of difficulty. Under difficulties time and cost expenses are normally understood. Transportation can be named as the main link between the producer and the consumer.

Speaking about transportation, it is important to mention time utility and place utility terms. As it was recorded above logistics involves the transfer of goods from origin point to consumption point. A product which was manufactured at one place values almost nothing to the assumed consumer in case it is not delivered to the place where it will be consumed. This can be accomplished with the help of transportation. [1]

The place utility is created by the transference across the place. Time utility shows how rapid and how compatibly the goods will be transferred between two points. This is known as time-in-transit.

If the goods owing to improper organization of transportation are not available at the moment of time when they are needed it may have sorrowful consequences for the company such as lost of sales, dissatisfaction of the customer and the downtime of the product.
There are four possible ways of transportation

- railway
- marine
- vehicular
- aircraft

The choice of transportation system depends on the following conditions:

- type of a cargo (weight, volume, etc.)
- distance
- value of the cargo
- location of the destination point
- regularity of transportation
- safety of the cargo [1]
-

Aircraft transportation

It is well known that aircraft is the fastest method of transportation which supports the best safety characteristics and reliability of delivery, however, it is the most expensive way in which the size of a consignment of goods is strictly limited as well. That is why speaking about corrugated board transportation this method should be taken out of the consideration.

Railway transportation

Railway transportation is able to support the delivery of considerable volumes of cargo with comparatively low tariffs.

In Russia “Russian Railways” is the single company in the railway transportation market, consequently, there is no competition in this market. Therefore, “Russian railways’ has an opportunity to establish the terms and conditions of the contracts almost without discussing them with the second party. Moreover, it is state-owned company. Surely, this company is not very effective.

The main disadvantages of railway transportation:

- comparatively low transportation speed
- impossibility to look after the current position of the cargo during its transportation in real-time

- railway branch line required in order to deliver load
- in case of any damages of the cargo during transportation it is almost impossible to compensate the losses

The latter can be simply explained. As far as "Russian railways" is the only company in Russia there is no alternative in the market of railway transportation, this company, does not risk loosing the customers. It is difficult to compensate the diseconomies using legal mechanisms as well. "Legal machine" in Russia is operating at very low speed, thus to solve the problem using it will take a lot of time and financial resources and the result is absolutely unpredictable.

Car transportation

The market of car transportation service is fairly developed in Russia. The competition between different service companies is quite high so unlike to railway transportation the conditions of the arrangements can be discussed between both parties.

Advantages:

- flexibility - the possibility to reach almost every point of destination. So-called "from door to door" principle
- possibility to look after the current position of the cargo during its transportation in real-time mode
- high delivery speed

Disadvantages:

- relatively high prices
- the road conditions in Russia are not satisfactory everywhere
- the limitation of the weight of the truck. According to Russian legislation the maximum weight of the truck can't exceed 20 tons

There is another possibility except the utilization of service companies – to use own transport. Utilization of own transport requires the following:

- place for parking
- maintenance
- supplementary staff
- special license for transportation service

Therefore, according to idea of outsourcing it is not recommended to have own transport in the structure of the company.

Marine transportation.

The cheapest method of transportation which allows to transfer significant volumes of goods.

The main disadvantages are:

- very low transportation speed
- dependence on the season and weather conditions
- limitation of the area of transportation

One of the main peculiarities of corrugated board products consists of the fact that the relative weight of corrugated board is very low. That is why the price of transportation of corrugated board is relatively high. Therefore, it is not surprising that transportation costs are the second biggest part of first cost of corrugated board. Thus, it is very important to choose the effective method of transportation, because it can essentially decrease the first cost. On the other hand, choosing the wrong way will lead to the considerable growth of the prime cost.

It is considered that from the economical point of view it is profitable to transport corrugated board in case when the distance between the factory and the customer is not longer than 200-300 km, however if the consumer is ready to cover all extra expenses related to the transportation it is possible to carry the corrugated board to the distances which are longer than above mentioned. For instance, the corrugated board from Balabanovo mill is delivered to the North-West region of Russia in spite of the fact that the distance is about 700 km. Furthermore, one of the consumers of Stora Enso was willing to disburse for the transportation of production to Vladivostok, which is situated in the Far East region of Russia not withstanding the fact that the distance between the factory and customer is more than 10 000 km. Certainly, it occurs so because the absolute majority of corrugated board factories are situated in the Central and Volga region of Russia, thus the transportation for long distances is the only way to supply the demand for the corrugated board of the customers which are located in other parts of the country.

Surely, this kind of situation is impossible in European counties where nearly always it is an opportunity to find the corrugated board factory close to the customer.

Thus, this well-known 200-300 km radius is not obligatory requirement and should be named only as theoretical recommendation, because, in the final analysis, everything depends on the preparedness of the consumer to pay for the delivery of corrugated board.

3.1.2 Transportation of raw materials.

The main sources of the raw material for corrugated board manufacturing - pulp and paper mills are located in the North–West region of Russia - in Archangelsk, Kotlas and Syktyvkar. Accordingly, transportation of raw materials can be carried out using the railway system.

As it was mentioned above, “Russian railways” are not always adhering the conditions of the arrangements therefore the contracts between pulp and paper mill and corrugated board factory generally are arranged so, that the factory becomes the owner of the cargo not at the moment when the load is delivered to it, but at the moment when the containerboard is immersed into the carriage. This condition helps the mill to avoid and to protect itself from the risks associated with non-fulfilment of obligations of “Russian railways”. Naturally, these conditions of the contracts are favourable for pulp and paper mills but not for corrugated board factories. It should be taken into consideration, that in case of low-distance delivery railway transportation may become more expensive than truck transportation.

During the transportation containerboard should be protected from the influence of the weather – precipitations, wet climate, etc.
In some cases marine transportation is also suitable.

3.1.3 Transportation of corrugated board

There are two possible ways of transportation of corrugated board - car and railway transportation. The latter should be preferably used when the high distance transportation is under consideration. In utilizing this method the main problems are:

- not all consumers have their own railway branch line
- it is almost impossible to maintain the necessary temperature and humidity conditions in the carriages

In other cases car transportation is mainly used. Advantages:

- “door to door” delivery from the factory to the consumer
- possibility to support the required conditions in the truck

Surely, to make the transportation more effective from the economical point of view the truck should be completely filled with corrugated board. This condition is mostly obligatory. In European countries, where transportation distances are relatively low small – sized 1,5 tons lorries are widely used, however, in Russia with its high distances utilizing anything except 20 ton-trucks does not make any sense.

3.2 Warehouse organization.

3.2.1 Purposes of warehousing

Warehousing is significant in logistics. It has an essential meaning in the required level of consumer service. It is possible to determine the warehousing as the part of logistics system of the company which stores goods (raw, goods-in-progress, finished products) and supplies the management of the company with the information about the current status, condition, and disposition of the stored objects. It is also possible to use “distribution centre” term

The two main types of products can be warehoused:

- raw materials, and components – so-called physical supply
- completed products – so-called physical distribution

The main aims of warehousing:

- to decrease transportation costs
- to decrease production costs
- to obtain advantages which are given by discounts of quantity purchase and forward buys
- to support the supply source
- to vanquish the differences in time and place between the manufacturer and customer
- to reach least total costs of logistics management corresponding with a required level of consumer service [1]

3.2.2 Raw materials warehousing.

Considering raw materials warehousing for corrugated board production in Russia one specific item should be taken into account. The factory should have the reserve of raw for about one month period of production, but not for one week as generally in Europe.

That fact can be explained in the following way. The adjustment of the machinery for concrete type of containerboard with certain dimensions in pulp and paper mill takes substantial time. During this time the machinery is found in standstill mode. Naturally, that leads to the economical losses. Thus, the goal for the staff of the mill is to decrease the number of adjustments. In order to do it one type of containerboard is manufactured commonly one–two times per month. That means that corrugated board factory have to store up the certain type of containerboard so, that it will be enough for one month production. Othervice, if this item will be considered together with the problem of deficiency in raw, it may cause the stoppage of the factory.

The latter signifies that the dimensions of the raw materials warehouse should be calculated with respect to the above mentioned problem and should be appropriate.

General requirements for the warehouse:

- warehouse should be provided with railway branch line in order to easy delivery of raw
- should be supplied with the place for handy unloading of the carriages
- containerboard in warehouse should be protected from the precipitations

- easy connection between the warehouse and the factory should be established

3.2.3 Corrugated board warehousing.

Corrugated board is very exacting to the conditions of storing. The temperature and the humidity in the warehouse should be maintained at the appropriate level. That means that the warehouse should be equipped with the respective apparatuses. The latter denotes that to construct large warehouses with lots of supplementary equipment for long-time storage of corrugated board is not effective from the economical point of view, because it always causes extra expenses. Another opportunity is to rent the warehouse, so-called, public warehousing, but it also requires additional financial resources.

Hence, the goal of the logistics management is to shorten the time of storage as far as it is possible. In ideal case the production should be forwarded to the consumer without any storing, however, it is not always possible. Two days of storage are considered to be satisfactory result.

Thus, in order to decrease storage period the corrugated board is not produced to the future use, but only when it is requested by the consumer. The main problem in this area consists of the fact that often the customer does not know exactly what type of corrugated board it will need in certain moment of time. Hence, it is rather difficult for the factory to create production plan.

General requirements:

- special apparatuses for safe storage of corrugated board
- railway branch line and truck terminals. The number of terminals depends on the productivity of the factory (3-6 terminals)

Resulting, transportation and warehousing together have an essential impact on the place and time utilities. Choosing the proper strategies in these areas will help the company to decrease production costs and to satisfy the consumer. The latter, consequently, leads to the increasing of profits of the company.

4. LEGAL ASPECTS

Legal aspects always play an important role in establishing and managing of any kind of business in any country. Knowing the rules of the legislation will help to avoid negative consequences in the future. Surely, legal aspects of doing business differ from country to country noticeably and thus should be clearly investigated each time when an MNE enters to a new national market. In the EU market there is ongoing tendency of unification of legislation norms between the countries. These measures will essentially help the business and save its time. EU and Russian legislation requirements are not unified. Consequently, it may cause additional difficulties to the MNE which is going to enter the Russian market. Surely, it requires additional time to understand the laws.

In this chapter the process of constructing a corrugated board factory will be considered from the legal point of view including legislation norms and ideas which are not written in them but are, however, very essential.

4.1 Legislation requirements for corrugated board factory in Russia

Firstly, any company in order to start its operations should be registered in the Russian fiscal body and bank accounts should be opened. These procedures take about 1,5 months. The next step is to choose a suitable lot of ground area for the future factory. All the procedures related to the operations with ground are executed according to Russian Land Law. [24] When the area is chosen the state body issues a special document confirming that fact. This document should be adjusted with 16 different governing bodies. It may take from half year to a full year. The lot of ground can be bought or rented/ (for Balabanovo and Arzamas projects the lots of ground were purchased and for Lukhovitsy project the lot of ground was rented.) The practical experience demonstrates that in case of purchasing the lot of ground it will take less time to obtain all required documents from the executive bodies, however, purchasing, unfortunately, is not always possible.

According to the Civil Law (chapter 263) the owner of the lot of ground is allowed to construct buildings and constructions on it, accomplish reconstruction and demolition of them if these actions are not in contradiction with construction regulations and

requirements of function of ground area. [22] According to Russian Legislation these regulations are based on the Town-Planning Law

Town-planning Law (chapter 47) states that the process of constructing should be started with an engineering survey for the preparation of the project documentation. The goals of engineering survey are:

- obtaining the information about the environmental conditions in the ground area
- obtaining the information required for validation composition of the construction
- obtaining the information required for calculation the foundation and other parts of the construction [23]

On the basis of the engineering survey the architectural design is accomplished (chapter 48). Architectural design is the process of preparation the project documentation. The latter contains the information which defines architectural, technological, construction and technical solutions of the project (including solutions about environmental protection and fire safety) [23]

According to chapter 49 the project documentation is subjected to the state examination. The objective of it is to evaluate the correspondence of project documentation with the requirements of technical regulations. This examination is resulted by a positive or a negative finding. According to the requirements of the legislation this examination should be finished in three months, however, in practice, it lasts longer.

If the decision is positive the state body issues the permission for constructing the building. After having received the permission for the process the construction can by started. After the building is constructed the governing body evaluates whether it was accomplished in accordance with the permission for the construction, project documentation and town-planning plan or not. If the decision is positive the state body issues the permission for the exploitation of the construction and it is registered. After it the company is allowed to register its property rights for the building.

The next step is to connect factory to the electricity, water and gas and other networks. These measures are accomplished according to Russian Government resolution «The rules

of connecting the unit of capital construction to engineering-technical networks» After the company passes all these stages defined by the legislation it is ready to start its operations. [25]

Thus, the requirements of Russian legislation for a building project are described above. However, in practice the situation is more complicated. During the recent years the procedure of obtaining the necessary permissions and concordances have became more severe. There are several reasons for that: First, every law in Russia is conducted by by-law acts. They describe the procedure, how the law should operate. See the structure of Russian legislation in figure 4-1.

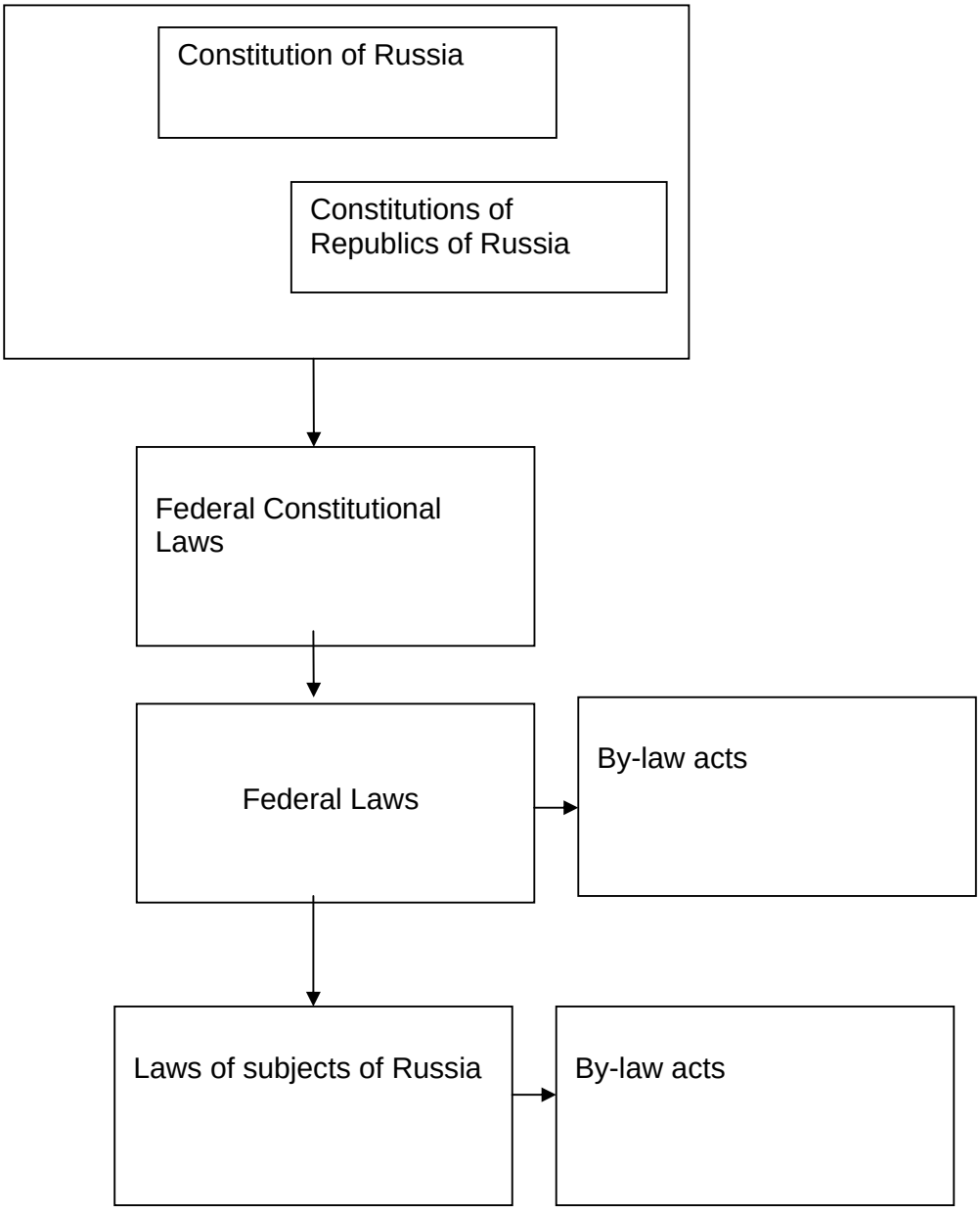

Fig 4-1. General Structure of Russian Legislation System

The main goal of them is to support the opportunity of matching the requirements of the law. However, these documents sometimes are in contradiction with each other. By-law acts have to be written by different authorities. Commonly, these documents are written independently and it may happen so, that one authority does not respect the requirements of another. Furthermore, during the recent years the number of by-law acts has been increasing.

Moreover, there is another problem, which corresponds to the latter. If the law which was recently accepted by the Russian Parliament and the Federation President has a link to a by-law act it cannot operate without it. According to the Russian legislation the by-law acts should be issued by the Russian Government. It takes some time. If the Government for any reasons postpones the issuing of by-law acts the law is not working during all this period.

Sometimes Russian Government changes by-law acts. Thus, the requirements for obtaining the required permissions and concordances are changed as well. Sometimes it occurs so that the official who is responsible for the issuance of these permissions does not know about the changes of the requirements. Therefore, the company very often has to execute itself the functions of the officials. The latter means that the lawyers of the company should look after the actions of the functionaries and to control whether the permissions which were given to the company are in accordance with the legislation.

The goal of these actions is to eliminate risks in the future. If another governing body will find out that the permission was issued with the infringement of law it may cause problems. At the same time, the fact that this infringement was made by the official will not be taken into consideration.

Finally, according to the structure of Russian legislation system in addition to the federal laws, laws of subjects of the Russian Federation also exist. Surely, the requirements of federal and local laws should correspond to each other. Fortunately, there are almost no contradictions between them.

Second, nowadays, in political area there is operating a system which is known in Russia as “vertical line of power” This term defines that the bureaucrat does not operate in harmony with interests of the society but according to its own accent and accent of its high-ranked chiefs. This «vertical line of power» represents the direct route to one of the most substantial problems in Russia, which is corruption

4.2 Corruption problem in Russia

Public opinion polls carried out by Russian sociological Levada - center show that Russians think that corruption is one of the main reasons, that does not give a possibility to Russian economics to emerge. [17]

Transparency International – organization which is investigating problems connected with corruption in its annual report – 2006 disposed Russia to the 121st place among 163 countries between Philippines and Rwanda with Corruption Perceptions Index 2,5 (maximum is 10). For comparison, leaders, so it means the most incorrupt countries which are Iceland, Finland and New Zealand have Corruption Perceptions Index 9,6. This index reflects an estimation of corruption level among businessmen, human rights organizations and experts in every concrete country.[18]

Experts of Transparency International say that countries scored less than three indicate rampant corruption that poses a grave threat to institutions as well as to social and political stability.

There is a sure-footed opinion in Russian society that corruption became a way of living of the bureaucracy, that it penetrated into all social, political and economical institutions. According to Transparency International the most corrupted sectors are political parties, police, legislature and judiciary. But corruption can be found also in educational, health protection institutions and some others. One could say that the economical development of Russia, public and sometimes even private life of Russian people depend on corruption. [20]

Hence, corruption is not only a local social factor, but it turned into a universal political threat that is able to stop the development of the country and to lead it to a new system crisis.

There are several reasons for that, which were investigated by INDEM foundation .First, the increasing role of bureaucracy: as it was mentioned above, the state attempts to control all sectors of economics. This intervention causes inefficiency of economics, because if

the company is managed by private owner his main goal is to increase profit and effectiveness of a company, but if it is governed by an official his main goal is to take from the company as much resources as it is possible. Moreover, these processes become stronger because of absence of some democratic institutions. Thus, there is no effective feedback between the authorities and the society.[20]

Second, business almost completely depends on bureaucracy. Officials are penetrating into private companies. There are different mechanisms for that:

- struggle between high-ranking officials for control packet of shares of a private company
- creating tax concessions for concrete companies
- participating of officials in artificial bankruptcies
- creating artificial monopolies
- placing officials or their relatives to the leading positions in private companies.

and some others. [20]

Third, inefficiency of the executive power. Corrupted bureaucracy is not interested in unbiased and accurate information about the situation in Russia, but without this information it is impossible to provide any reasonable reforms. State ownership is governed ineffectively. Oil and gas dope which supports Russian economics does not give a possibility to put into practice economical and administrative modernization.

Corruption causes criminalization of the society and strengthening of organized crime. Latter in cooperation with corrupted officials and businessmen become stronger by means of opportunity to get access into political power and so-called money-laundering.

One can say that these problems are specific for Russia. However, Professor A. Krueger in her classical paper states that high level of corruption is quite usual for the countries with raw-material-oriented economics. She named this occasion as “administrative rent”[3]

Speaking about the corruption in case of doing business in Russia top-management of the company should establish the strategy. At its simplest form, there are two possibilities.

[3] A. Krueger A Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences N.Y. Columbia University Press 1978

- to follow Russian tradition and to solve all the problems using the corruption mechanism
- to follow the legislation and to obey its conditions

The majority of Russian businessmen choose the first alternative. It is not surprising, because corruption accompanies them during all their life from the birth. However foreign investors prefer to follow the requirements of the legislation. The latter can be explained in this way.

It is well-known that bribe speeds-up the process of obtaining the required documents from the official, however, the majority of people do not realize that bribe does not protect from the problems which can arise in the nearest future.

Ordinarily, bribe helps to cover up several types of infringements of the legislation or not fulfilment of the requirements of the law. State supervision in different areas is as a rule intersecting. Thus, the actions of one official are commonly monitored and controlled by other officials. During these examinations the infringements of law are coming to light.

For instance, for registration property rights for estate property the company has to direct to the Federal Registering Service the required pack of documents. This Service has an opportunity to examine are these documents correct or not. The Russian Office of public Prosecutor also according to Russian legislation is able to examine any document.

Thus, the property which was obtained with the help of the bribe is notably less protected. Moreover, the foreign investments and foreign companies which are establishing the enterprises in Russia are under the state monitoring, which is much more attentive, when monitoring on Russian companies. Consequently, their illegal action will be noticeable.

Finally, if the company starts to solve its problems using corruption mechanism it will be well-known and every official will wait for the bribe, whereas if the company has the reputation as law-abiding company the bureaucrat will not expect to achieve a bribe. Hence, it is not surprising that thanks to the following the legislation foreign investments as a rule are protected much more properly, than home investments.

Balancing, from year to year it becomes a more difficult task to obtain all required permissions. Negative influence of Russian bureaucracy due to “vertical line of power” is sensed nowadays much more intensively than 10 years ago. Russian legislation defines the terms given to the officials for examination the documents, however, these terms are not usually observed. Thus, it is almost impossible to forecast with high degree of certainty the actual date, when the factory will start its operations. It is a very difficult assignment for the company to pass through all the stages of concordances and it requires the contribution of many employees of a firm to do it.

There is another tendency. The closer the factory is situated to Moscow the more it becomes difficult to achieve all required documents from the officials and the more it takes time to complete this work. It can be explained in the following way. There is lack of foreign investments in the regions located far from Moscow, thus the administration of these regions is interested in them. Hence, it is much easier to find mutual understanding in these regions.

It is an almost impossible task to formulate any general recommendations in this area. Every project in more or less extent has its own nuances and particularities. The latter means among the whole that the commitment of the governor of the region plays an important role. If this person is concerned with the project as it was in case Balabanovo, where governor Artamonov was interested in foreign investments and thus supported the project. It will be much easier for a company to operate in his region. If an official is negatively related to the project such an attitude may substantially complicate the operation of the business.

Finally, nowadays in Russia it takes from one to 1,5 year and requires high degree of patience to obtain all necessary permissions for constructing a corrugated board factory. In comparison, in Finland it takes 2-4 weeks to pass through all the procedures.

5. LABOUR FORCE AND PERSONNEL TRAINING

Naturally, it is important to have the appropriate quantity of labour force in the factory The city-source of labour force is normally one of the reasons of placing the factory in the direct location. Balabanovo mill is located near Obninsk city which has population about Arzamas mill located in the city with 130000 people, the population of Lukhovitsy is 65000 people, moreover near it Kolomna-city is located with population 250000.

Another key issue in this area is certainly the quality of labour force. Level of education and skills of the staff are sufficient. From this point of view the location of Balabanovo and Arzamas mill seem to be ideal. They are placed near the cities which are considered to be the centers of high-technology in Russia. Thus, consequently, the Surely, the motivation of the personnel is essential as well.

The corrugated board industry in Russia is developing now. It means that it is a difficult task to find an employee who has an experience of working in such industry. Thus recruiting the worker it is absolutely necessary to get acquainted him with the machinery of the factory. Another principal goal of training is the adaptation of personnel to the corporate culture and values of the company. Training includes the following programs:

- training of technical skills
- safety in the plant
- corporate values and goals
    - history, traditions and values of the company
    - description of positions
    - internal regulations
    - internal communication
    - organizational structures
- personnel development
    - communication training and effective negotiation services
    - team-building training
    - technologies of problem solving and making decisions
    - management training (setting of objectives and planning, result responsibility, guidance and control)

- The English language training

Naturally, when Stora Enso had started its operations in Russia the only way to train personnel who was supposed to work at the Balabanovo mill was to send them to Finland's factories of the company located in Lahti and Heinola where the employees learned how to operate the high-tech machinery and equipment. Surely, company had to spend additional financial resources to the activities and it also took extra time. Moreover, even though some training operations could be executed in Russia they were accomplished by Finnish specialists, because that time it was hardly possible to find Russian trainers for corrugated board industry

While establishing Arzamas and Lukhvitsy projects these difficulties were declined. Nowadays, Balabanovo factory is utilized as a place for traineeship of the personnel and all training process is accomplished by means of Russian trainers.

6. ENERGY SYSTEMS OF CORRUGATED BOARD FACTORY

During establishing the production facility the company is usually facing various kinds of problems related to the engineering communications. It is not sufficient to just install proper water and gas systems as well as sewage. However, the key issue in this area of industry is establishing reliable electricity connections. Actually, as all the machinery in the factory is electrically driven an uninterruptible electric power supply is essential. The maximum power needed for a corrugated board factory is typically 2 MW and the annual consumption in the range of 10 GWh.

Speaking about Russia the following major facts should be considered. First, due to the fact that Russia owns huge amounts of natural resources the price for electricity in Russia is lower than in developed European countries. This, surely, represents one of the competitive factors of being present in the Russian market. Really, lower price for the electricity allows to decrease production costs and thus to achieve additional profit. Second, engineering infrastructure (not only electricity but water and gas systems as well) in Russia are in poor condition comparatively to the European countries. The majority of the transmission lines and power plants are a heritage of the former Soviet Union. The modernization of them was hardly accomplished. Thus it is possible to assume that they have a relatively low level of reliability.

Considering Russian electricity systems it is important to mention that there is no competition in this market. All infrastructures belong to the “Russian United Energy Systems” company and its representatives in different Russian regions. The major part of the company belongs to the Russian state. Thus, it is impossible to choose the supplier with a higher level of reliability and lower prices. It means that “Russian United Energy Systems” does not risk losing consumers due to its improper operations. Surely, one cannot say that this company does not accomplish any kind of modernization; however, the paces of it are very slow. Russian Government declared its plans related to the reforms in this area pointed to the de-monopolization of the electricity market. Furthermore several federal laws were issued, however, in practice the situation does not change sufficiently.

The above mentioned facts demonstrate that in every particular area the resources of electric power are limited thus during the choosing the location for the corrugated board factory this issue should be taken into consideration. . From this point of view it might be advantageous to locate the factory away from large cities because they consume a lot of energy and the distribution systems in the cities often work at their limits. It might also be clever to avoid the very vicinity of other big industrial plants and factories which also require electricity. So the best location is somewhat away from big cities and factories in an area where the distribution systems have enough capacity.

However, the problem of electricity supply as well as any other problem related to the corrugated board production should be solved with respect to other issues both advantages and disadvantages. The last are the following. First, if the corrugated board factory is located away from the factories – consumers of corrugated board one of the main competitive factors in corrugated board business – low delivery distance benefit between the supplier and the consumer would be lost. Second, if the mill will be located away from cities the problem of lack of labour force will occur because large cities are normally considered as a source of the personnel. Furthermore, food industry represents a sufficient part of the consumers of corrugated board. Thus, they are trying to locate their production facilities near by large cities. Thus this entire means that corrugated board factory has to be located close to the consumers near by a large city. This conclusion may, however, be disadvantageous from the electricity consumption point of view if the electricity production level is insufficient or the networks operate unreliably.

Another issue which goes hand in hand with the above mentioned is the opportunity of expansion of the production capacity. Such an enlargement requires additional power which is not always obtainable. Hence, during the process of choosing the location of a corrugated board factory not only the current situation should be considered but the possibility to achieve extra power in case of future expansion as well.

Another alternative for electricity supply which seems to be appropriate is to establish an independent power plant. E.g. natural gas driven or diesel-electric power plants might be an appropriate solution in Russia where e.g. natural gas is usually very well available. Such a power plant should suit well in combined heat and power production for the

factory. The electricity production efficiency is high – more than 40 % of the primary energy may be converted to electricity. An own power plant would help to avoid difficulties which happen in case of accidents in transmission lines as well as it will help to increase sufficiently allowed power limits. At the same time these actions require huge additional financial resources which are not always available. Nowadays, all financial resources of the company are spent to increase the market share in Russia but not in improving the electricity supply sector.

Let us consider how the problem of electricity supply was solved in Balabanovo mill. As it was discussed above Stora Enso has bought an already existing infrastructure of a metal production factory including its electricity infrastructure. At the same time it was possible to assume that the transmission lines were in more or less extent in a poor condition. The underground location of the lines made it quite a difficult and expensive job to examine them. The main disadvantages of already existing lines were the following:

- voltage distortionand supply breaks
- the supply was operating at full capacity (no space for more power)
- the protective relaying and the switchgear were not up to day

Thus, the decision to construct new supply lines was made. Unfortunately, the administration of the city did not want to participate in this project and, hence, all costs had to be carried out by Stora Enso.

Nowadays Balabanovo mill has two supplies. First, there are new 10 kV lines from the substation Russinovo related to the “Kaluga Energy” company. This is considered as the main supply. These lines are dimensioned so that they are capable to support 2 M W power required by the factory. The second source which is assumed as a reserve source in case of any damages in main transmission lines or inspection activities over these lines or in other cases when energy supply is interrupted. These are 10 kV lines from the substation “Balabanovo” related to the “Russian railways” The utilization of this source is non-preferable because it is connected to the railway electricity system and thus has a remarkable voltage drop when a heavy train is passing.

The electricity consumption of Balabanovo mill see the table 6-1

Table 6-1 Electricity consumption per year of Balabanovo mill

Year	Consumption MWh
2001	6453
2002	3580
2003	8530
2004	9000
2005	9500
2006	10060

The peak electric power of the factory is 2 MW and the average power in 2006 was 1.14 MW. This makes the peak exploitation time about 5000 h annually. Nowadays the target is to increase the power limits from 2 MW to 3 MW in order to support the future expansion of production capacity. In order to do that the improvement of transmission lines is going to be accomplished.

In case of accidents in both transmission lines the factory has its own diesel-generator with power 200 kVA. Naturally, if the maximum required power for the factory is 2 MW this device cannot cover the demand for the electric power. Thus the factory is not capable to operate in normal regime and only some security systems of the factory are maintained.

The electricity consumption of a typical corrugated board factory is well in the range on gas engines. A gas engine power plant equipped with synchronous generators should be capable of supplying the whole factory reliably. For example Wärtsilä's product portfolio consists of gas, oil and biofuel-fired power plants with an output range of 1 to 300 MW. Wärtsilä delivers more than 2000 MW of dependable power plants every year. High efficiency, fuel flexibility and modular design are features of these power plants are offering competitive power production. 24h services are also available.

The Wärtsilä 26 engine combines good fuel economy and low emission rates with high fuel versatility. [28]

According to Wärtsilä the main advantages of gas power plants are: high efficiency, fast loading, low emissions, fast delivery, simple proven design, extension possibilities, easy

maintenance, all at site. Such an own power plant for a flute board factory in the Russian environment might not at all be a bad alternative. Of course an own power plant makes the operation of a corrugated board factory more complicated and needs extra personnel but anyway it should be taken into consideration if the local infrastructure does not support the needs of the factory. If there is a possibility to operate the factory using own power the grid supply could be used as an optional spare power supply. Such an arrangement should make the availability of electric energy very good. [28]

Gas at Balabanovo mill is supplied by the “Kaluga region gas” company. The main and a unique consumer of gas in the factory is the boiler house which has two boilers. This boiler house produces the steam which is required for the manufacturing process of the corrugated board as well as on the purposes of heating and for hot water producing. The quantity of heat produced is 7500-8800 GJ in winter period and 5600-6300 GJ in summer period

Water is supplied by the “Kaluga water canal” company. In order to make the water pure two sorption filters are installed in the water supply system.

7. SAFETY REGULATIONS

7.1 General regulations

According to the Russian legislature the measures of manufacturing supervision are established at the Balabanovo mill.

The main objectives of the manufacturing supervision are:

- Guaranteeing of adherence the requirements of industrial safety in the factory
- Analysis of the conditions of industrial safety
- Coordination of the activities directed to the prevention of the accidents on the manufacturing entities, readiness to localize the accident and the liquidation of the consequences of the accident
- working out the measures directed to the improvement of the conditions of industrial safety and prevention the prejudice of the environment
- supervision over opportune realization of necessary tests and technical examinations of technical equipment which is employed in dangerous industrial objects
- supervision over the maintenance of technological discipline

Dangerous objects, which are installed at the Balabanovo mill according to the rules established in Russia should meet with the following safety regulations

- Federal law “About industrial safety of dangerous industrial objects”
- General regulations of industrial safety for organizations which are accomplishing activities in area of operation of dangerous industrial objects
- The regulations of arrangement and safe operation of vessels which are working under pressure
- Safety regulations during operation of industrial funnels and industrial ventilation pipes
- The regulations of arrangement and safe operation of stream pipe conduits and hot water pipe conduits
- The regulations of arrangement and safe operation of steam-boilers and water heating boilers

- Safety regulations of operation of gas distribution systems and gas-consuming systems
- The regulations of arrangement and safe operation of climbing cranes
- The regulations of arrangement and safe operation of permanent-set compressor systems, air tubes and gas pipelines
- The regulations of arrangement of electrical installations

7.2 Electricity regulations

The main document which is defining electricity regulations in Russia is "The regulations of arrangement of electrical installations"

Part 1 General regulations

Section 1. General part

This part states that:

- electrical equipment, electrical devices and materials in all electrical installations should correspond with the requirements of the state standards
- Construction, performance, installation method, class, insulation characteristics of electrical machines, electrical apparatuses, electrical devices, cables, wires and other electrical equipment which are in use should correspond with the parameters of electrical grid, operating conditions, conditions of the environment
- Electrical installations should be protected from the influence of the environment
- Electrical installations should correspond with the requirements of the permissible level of noise, vibration, magnetic field intensity, electric field intensity, electromagnetic compatibility
- In electrical installations it should be eliminated the possibility of appearance of waste materials such as chemical agents, oil, garbage, technical water and so on in the places which are not oriented in storing of the waste materials
- Schemes should be simple and clear. Inscriptions, markings and colorations should be appropriate [26]

Section 2. Power supplying and electrical circuits

In process of designing of power supply systems the following questions should be considered:

- the perspective of development of power supply systems with the respect of rational combination of already existing grids and grids which are in process of designing
- providing with complex centralized power supplying of all consumers which are located in the coverage area of power supply grid
- limitation of the short-circuit currents by the limits which are defined with the respect of the perspective
- decreasing the losses of the electrical power
- environmental protection

internal and external power supply should be considered as a complex with respect of the opportunity and advisability of technological reserving

Considering reserving, overload capacity of the electrical installations should be taken into account

The probability of short-term decreasing or disappearance of voltage because of relay protection and automatics and long-term disappearance of voltage because of system damage should be considered. [26]

Section 7. Grounding and electrical safety

Current-carrying parts of the electrical device shouldn't be accessible for accidental touch. Accessible parts shouldn't be under voltage which is dangerous

For the protection from electrical shock in normal conditions the following measures can be done:

- basic insulation of current-leading parts
- barriers setting
- enclosure and covering
- Allocation out of reach area
- Utilizing of extra-low voltage

For the protection from electrical shock in case of damaging the insulation the following measures can be done:

- protective grounding
- automatic switching-off the voltage

- potential balancing
- double or strengthened insulation
- extra-low voltage
- insulating lodgings and zones

Grounding device which is utilized in grounding of electrical installation which has one or several functions and voltage levels should correspond with all the requirements which are requested from the grounding: protecting people from electrical shock, protecting electrical devices from the over voltages and so on. [26]

Section 9. Insulation of electrical installations

The choice of the insulator or insulating construction made of glass or porcelain should be made on the basis of specific effective leakage distance dependently on the fouling factor at the place where the device is located and nominal voltage. The choice of the insulator or insulating construction made of polymers should be made on the basis of discharge characteristics in dirty and dewy conditions [26]

Part 2. Electric wirings

Permitted long-term currents for cables and wires should be applied considering possible heating of the conductor, environmental temperature, chosen method of cabling (internal, external, open, closed) The section of the lead of a cable should correspond with the requirements.

Part 3. Protection devices

Section 1. protection devices for the circuits up to 1kV

- breaking capacity of the protection device should correspond with the maximum value of the short-circuit current in the circuit
- The characteristics of the protection devices should be chosen so that they will not switch-off the circuit in case of short-term overloads (e.g. starting currents)
- automatic circuit breakers and safety catches are used as protection devices
- Devices should agree with the requirements of sensibility, selectivity and response speed [26]

Section 2. Relay protection

- for the systems with the voltage more than 1kV
- for the automatic shutdown of the damaged component from the undamaged part of electrical system (device)
- reaction on dangerous, abnormal operating regime of the element of electrical system (e.g. overload, overvoltage)
- relay protection as a rule should assure the selectivity of protection

Section 3. Automatics and automatic remote control

Used for:

- automatic reclosure of lines, phases and other devices after the automatic shutdown
- automatic load transfer of reserving power supply or reserving device
- switching-on the synchronous generators and synchronous compensators for parallel operation
- control of the excitation, voltage and reactive power
- control of the frequency and active power
- supporting the stability in the system
- limitation of increasing and decreasing of the frequency
- limitation of increasing and decreasing of the voltage
- Overload protection [26]

Part 4. Distribution devices

- The choice of wires, apparatuses, devices and constructions should be designed not only considering normal operating regimes (compliance with normal voltage, current and so on), but also considering short-circuit current situation (thermal influence, dynamic force and so on)
- The parts of distribution devices related to different types of currents and voltages should be designed in such way that, it will be easy to define and to contrast them

Electrical devices, insulations, supporting structures and so on should be constructed so that:

- forces, heating, electric arc and other phenomena (arcing, gas blowouts) which are appearing during the process of normal operation of a device can’t lead to the

damage of the equipment, appearing of short-circuit currents, ground short circuit, and cause injuries of the personnel

- in case of violation of normal operation of the device the required localization of damages caused by short-circuit currents should be provided
- when the voltage is switched-off in the circuit current-carrying parts and constructions should provide safe inspection for the personnel without interrupting of normal operation of neighbouring circuits [26]
-

Part 5. Electrical machines

Section 1. Placements for electrical machines.

- Placements for electrical machines should be equipped with telephone communication, fire alarm and other types of alarms which are required and also with the industrial vacuum cleaner and devices for blowing-off the machines with dry, clear compressed air
- Rotating parts of electrical machines should be protected from the accidental touch
- Placements should allow handy transportation and assembling or electrical machines
- Should be foresaw the measures for removing of excessive heat from the machine (ventilation) [26]
-

Section 2. Generators and synchronous compensators

- Design of a generator or synchronous compensator should provide its normal operation during 20-25 years with the opportunity of changing worn-out or damaged details without complete dismounting of the machine
- generator or synchronous compensator should be equipped with monitoring devices, control and signalling devices, devices for protection rotor from over voltage, automatic devices which provide automatic start, operation and stoppage of the machine.
- Appropriate system of cooling should be established
- Excitation system of a generator or synchronous compensator consists of excitator (DC generator, AC generator, transformer with converter), automatic regulator of excitation, switching equipment, measuring apparatus, devices for protection excitation system from damages [26]

Section 3. Electrical motors

- Electrical motors should be chosen, established and equipped with cooling system so, that the temperature during their operation will not excess the limits
- Electrical motors should be grounded according part 1 section 7 of the Regulations
- Electrical and mechanical parameters of the motors (nominal power, voltage, rotating frequency, relative duration of operating period, starting, maximum and minimum torques, limits of regulation of rotating frequency etc.) should match with the parameters of the mechanisms which are driven by the motor in all operating regimes
- To drive the mechanisms in which the regulation of rotation frequency is not required it is recommended to use synchronous motors and asynchronous motors with squirrel-cage rotor
- Synchronous motors should have as a rule devices for forcing the excitation
- It is allowed to utilize DC motors only in cases where AC motors are not capable to support the required characteristics of the mechanism or not satisfactory from economical point of view.
- The design of the motor should correspond with the conditions of the environment
- Motors should be chosen and established so that It will be excluded the opportunity of appearing of water, oil etc. on the windings and current collection equipment and the vibration will not excess the allowed limits
- Motors which are established in places with normal conditions should belong to IP00 and IP20 class or higher
- Motors which are established outdoors should belong to IP44 class or higher
- Motors which are established in placements where there is a possibility of appearing of a dust or same elements on the windings should belong to class IP44 or higher or have appropriate blow-off system
- Motors which are established in wet or extremely wet placements should belong to class IP43 or higher and have insulation which is appropriate for wet conditions [26]
-

Part 6. Electric lightning

Part 7. Electrical equipment of special purpose electrical installations

This part represents regulations for the electrical devices established in:

- apartment, public, administrative buildings and sport halls
- explosion hazard zones
- fire-hazardous zones

Also this part represents requirements for thermal-electric installations (induction heating devices, dielectric heating devices, electron-beam devices, laser devices etc.), electric welding equipment and electrolysis installations.

Generally, one could say that the Russian safety regulations do not differ remarkably from typical European Union member countries' regulations. The voltagele levels used are the same. Typical delivery voltages are 10 or 20 kV and 1 kV is the limit for low voltage systems. Small industrial drives – such as those in a flute board factory – typically operate at 400 V or 690 V level. 230 V is used for lighting. All this makes it possible to use same kinds of materials, components and installation procedures in Russia as e.g. in Finland. This makes the building of electrical apparatuses in Russia, in principle easy. [26]

8. CONCLUSIONS

As a conclusion to the thesis it is essential to formulate some general requirements for a corrugated board factory in Russia as well as to describe some aspects which cannot be changed by the company but influence the corrugated board business in Russia remarkably.

Engineering aspects. Undoubtedly engineering aspects are the key issues in constructing and operating a factory. Improper constructing or infrastructure (roads, electricity grids, water and gas pipelines) establishing may lead to grave consequences. Even though the project is profitable from the economical point of view the above mentioned problems will obviously cause a large variety of difficulties. However, these engineering aspects do not differ much from country to country: the structure of the factory and the requirements for the infrastructure are the same independent of the country. The suppliers of the machinery are well-known thanks to the earlier projects of Stora Enso in different countries. E.g. corrugators produced by the German BHS have shown their effectiveness and reliability in many countries. Thus, all general principles can be implemented in the case of Russia. At the same time Russia has some particularities in this field. The infrastructure (roads, electricity grids and water and gas pipelines) are at the moment more or less in poor condition and commonly require improvement. (e.g. the electricity grid may not be able to support the power level required for the operating the factory; the quality of water is poor etc.) The latter, naturally, leads to additional costs. Hence, in order to reduce costs these issues influence much the location selection when trying to find places with a better infrastructure. Furthermore, poor infrastructure usually reduces the ability to expand the production facilities as well. This expandability always requires additional power resources which are not simply obtainable. Thus, preliminary works (electricity grid modernization) in order to achieve extra power should be completed in advance.

Another problem lying in that area is the maintenance of the machinery. The availability of well developed servicing companies which are capable to maintain the machinery of the factory is quite poor. The latter means that it is hardly possible to outsource the maintenance by hiring a service company as it is commonly done in developed countries.

Thus, all the measures related to the maintenance area are accomplished by the staff of the factory.

Region selection. The region selection is generally made on the basis of the following facts: the consumer demand and competition level in that and close regions. Surely, not only the current situation should be considered, but a trend investigation is required as well. In that area it is important to achieve information about the intentions of the clients to expand their businesses and to establish new production units. Thus, close and warm relationships with the consumers are essential.

Three Russian regions are normally considered; Central, Volga and North-West regions. The consumption of corrugated board in these areas is high due to the concentration of production units and population. At the first sight the North-West region is preferable because it is the closest to Finland, thus closer cooperation with the mother-company can be established, however, the consumption level there is the lowest within these three. See figure 8-1.

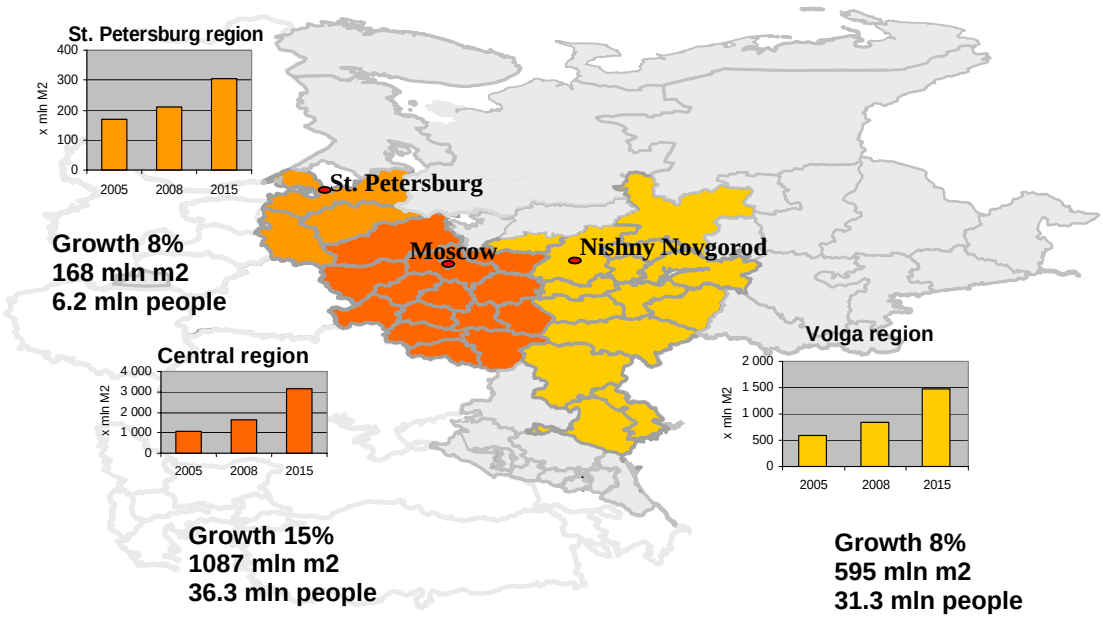

Fig 8-1 Target regions and their growth in 2005 [10]

Other Russian regions (Siberia, Far East, Northern Caucasia) are normally not considered due to their low consumption level and the de-concentration of population.

Proper region selection is substantial because of the fact that corrugated board delivery is ordinarily profitable when the distance between the supplier and the consumer does not exceed 200 -300 km.

Another key aspect, which is particular in Russia, is the concernment of the head of the region in which the factory is going to be established and his attitude to the project. Due to the "vertical line of power" the officials of the region will proceed all the permissions and concordances much faster if they achieve the order from the governor to do that.

Location selection. When the region is chosen this is the next step. The choice of the location is made generally on the basis of the following aspects:

- Availability of suitable infrastructure (electricity, gas, water, sewage, roads, railway connection)
- sufficient level of quantity and quality of labour force
- Appropriate price for land
- Availability to achieve the required land lot

Selecting the proper place for the factory is a very complicated task and requires endowment of many employees of the company. It can be named also as the most difficult and time-required stage. These investigations commonly take about a year.

Labour force. As far as the production of corrugated board appears to be a more and more automated process the requirement of the quantity of workers is reducing. At the same time, reciprocally to this demand to the knowledge, the educational level and skill demands of the worker are increasing just as his responsibility.

Russia is famous for its education, especially, in technical area throughout the world. The level of education there is higher that in other transitional countries and can be easily compared with the developed ones. The number of people who have achieved the higher education is high as well. Undoubtedly, it is much easier to train an educated employee. Thus, time and costs will be reduced. Surely, the factory should be located in the place

where enough educated workers may be found. Another ongoing tendency in the Russian labour market is the increasing of salaries. It appears to be more and more difficult to find cheap labour in Russia. Thus, so-called source motivation can hardly be implemented in Russia in the nearest future.

At the time when Stora Enso started the manufacturing process in Russia (Balabanovo mill) company had to send the employees to Finland (Lahti and Heinola) in order to teach them to operate the machinery established in the factory. Fortunately, nowadays this problem has disappeared and the staff that will be employed at the new Lykhovitsy mill will be taught in Balabanovo.

Almost the same words can be implemented to managers. Initially, the majority of managers have come from Finland, but later they were substituted by Russian ones when they obtained enough knowledge in the area of corrugated board production and distribution. And now they are capable to pass their experience to their younger colleagues.

Conclusion: To find highly educated and skilled labour force is not a real problem in Russia.

Corrugated board market growth. Corrugated board market in Russia shows the annual growth about 10% and is faster than the growth of the Russian economics in general, approximately 6,5% per year, see figure 8-2

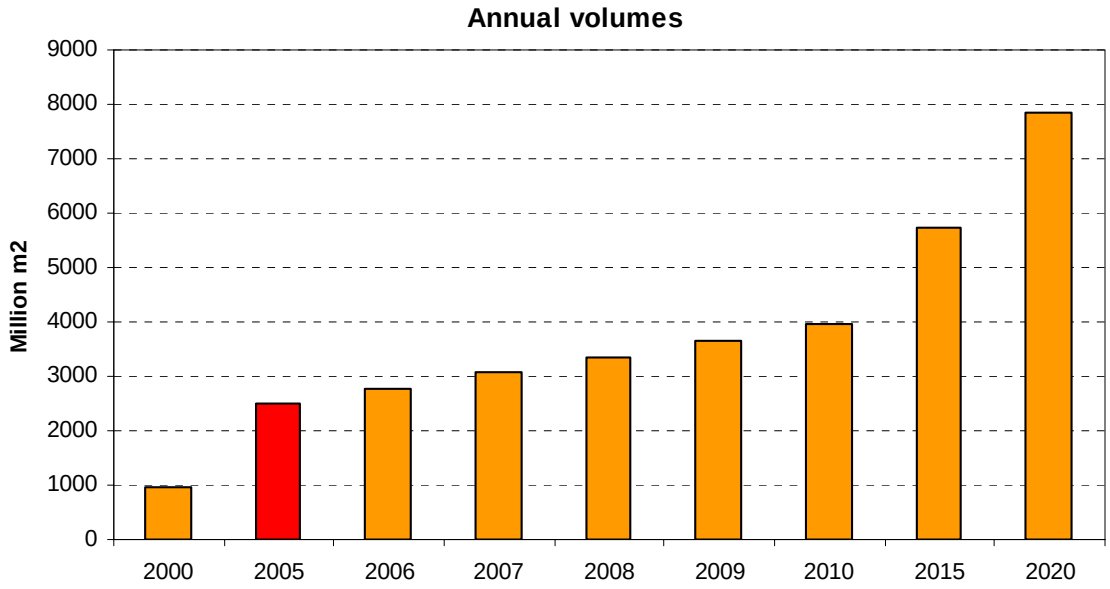

Fig 8-2 Corrugated board production in Russia (forecast) [10]

The investigations of Russian corrugated board market show that to cover the increasing demand for flute board it will be necessary to construct at least 10 factories during the next 5 years. Hence, if the company wants to maintain and increase its share on the Russian corrugated board market it is absolutely necessary to think over new projects.

Containerboard supply. This can be named as a core problem in the Russian corrugated board industry. Despite of the fact that nowadays there is enough supply of containerboard it can hardly cover the increasing demand of the flute board industry in the future caused by the rapid growth of corrugated board market. Constructing a new pulp and paper mill requires much time and – what is much more important – huge capital resources and a much more firm infrastructure as a flute board factory. Fortunately, the quality of containerboard is not the problem, especially regarding huge pulp and paper mills, however, the ability to choose the supplier is rather scanty. One of the ways of solving this problem is decreasing the customs tariffs by the Russian Government for containerboard under the pressure of WTO.

Consumers.

The majority of consumers of Stora Enso in Russia are representing multinational brands. It can be noticed that there is an ongoing tendency representing structural changes in the consumer market. During the latest years more and more world-famous enterprises are entering the Russian market and establishing new production facilities there. Enjoying the advantages of large economies of scale these companies are capable to reduce prices for their production and thus to make the business of small Russian firms unprofitable. Small companies in that case have two opportunities either to disappear of to become a part of MNE. These actions will probably lead to an oligopolistic market (Market with few suppliers and large variety of consumers) in Russia in the nearest future. Especially, it is related to beer and tobacco markets. The latter means that it is significant to establish close relationships with MNEs and to improve co-operation with them in order to expand production proportionally to the increasing manufacturing facilities of MNEs in Russia. Naturally, this market structure generates certain risks. If the number of consumers is decreasing the corrugated board producer becomes more dependent from one concrete customer. It means that if the company will lose a customer which is purchasing a large volume of corrugated board it will correspondingly lose a remarkable market share

Risks related to national economics. It is well-known that Russian economics is raw-material dependent (especially oil and gas). The problem is that the behaviour of prices for these commodities are mainly dependent on more political than economical factors and are thus hardly predictable. A possible abrupt reduction of oil and gas prices will with high degree of probability push Russian economics into depression and consequently the plans related to the increasing level of consumption of corrugated board may be ruined.

Another problem is the inflation level which is about 10% per year. Comparatively to the 1,5% per year which is considered to be appropriate for the developed countries this seems to be high. High inflation, surely, extends the pay-back time of the project. However, there is a tendency of decreasing the inflation in Russia from year to year.

Legal problems. Russia has a very complicated and tangled legislation system in which the functions of different authorities are often overlapping. It takes a lot of time to collect all required permissions and concordances. Furthermore, so-called administrative barriers

have appeared to be more severe from year to year. It is a very difficult task for a foreigner to gain an understanding of Russian laws. Thus, to hire a legal-advising company will be an appropriate solution in that area. Another rough problem is corruption. Despite of the anti-corruption laws which are operating in Russia the situation does not seem to be changed.

Political risks. Nowadays there is no stable political system in Russia. On the national level almost everything depends on the will of the President of the country as well as on the regional level almost everything depends on the governor and so on. As no clear "rules of the game" have been established there is certain risk for the firm to be acquired by state-owned company. This is mainly related to the raw-material industries as they are the most profitable

Nowadays, investors are waiting the approach of year 2008 when the next President elections will be held. Their results will define the political and economical course of Russia to the next several years.

Transportation. Since the main suppliers of raw materials are situated far away from the corrugated board factories the transportation of containerboard is accomplished by means of railway. Certain risks related to improper fulfilment of obligations by "Russian railways" exist. The main of them are damage of a part of cargo, and non-observance of delivery time. Unfortunately, due to the absence of competition in the railway transportation market these risks are nowadays unavoidable.

The transportation of corrugated board is accomplished mainly by trucks. These days, there is enough supply in the market of transport servicing companies, thus it is not a problem to find a reliable firm to deal with them in that area.

Competitors At that time when Stora Enso started its production operations in Russia it was the first among MNEs in this market sector there. The only competitors were Russian corrugated board producers. However, due to in more or less degree old-fashioned equipment established in their factories they could not provide appropriate quality of production. The quality level was not sufficient especially for multinational brands which

started their manufacturing in Russia. Thus at the end of 90-ties Stora Enso enjoyed many benefits of being the first company which provided high quality packaging products.

However, during the years the situation has changed. World famous corrugated board producers realized the attractiveness of Russian flute board market. Such firms as Kappa Packaging and SCA are trying to strengthen their market position in Russia as well as local corrugated board producers are improving their machinery in order to increase quality of their products. Consequently, the region selection for the new factory should be made with respect to the activeness of the competitors in that and close regions.

Balancing, Russian corrugated board industry shows rapid growth, unlike the same industry in Western Europe where average market growth is 0-3% depending on the country and markets are normally saturated. In Russia, the industries main consumers of corrugated board are emerging due to the positive consequences of defaulting in 1998. The MNEs have entered to the Russian market providing new technologies and establishing new production facilities. Thus, due to this and in addition to relatively low production costs Green Field investments in Russian corrugated board industry are very attractive.

Stora Enso was lucky to be the first among the companies world leaders in packaging solutions which started to manufacture corrugated board in Russia and accordingly enjoyed many benefits of it. It has managed to be the first in studying the market and thus in understanding the requirements of the consumers. Consequently, it achieved profitable agreements with the consumers. However, in as much as flute board industry is emerging and competitors are acting it is important to expand the production facilities in order to strengthen or even to maintain company's position and market share.

Surely, investments in the Russian economics always are connected with certain number of risks. Some of them, especially those lying on national level cannot be avoided nowadays, however, Russia from year to year goes away from the communist regime and command economics, thus the perspectives of the country and consequently the perspectives of the businesses operating there seem to be bright.

Finalizing the thesis it is essential to remember that there is lack of knowledge about Russian corrugated board market yet. There is almost now research and thus literature which is based on that research. Hence, almost everything in this area is investigated utilizing practical steps almost without theoretical background. This, this field of study requires additional research and this thesis may be assumed only as a first step in that area.

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10. APPENDICES

Appendix 1. Balabanovo mill financial statement [11]

	M€								
	1998	1999	2000	2001	2002	2003	2004	2005	2006
Cash flow from operations	0,63	-6,22	0,09	6,33	8,97	8,08	9,55	10,26	6,30
-capital expenditure	-24,88	-5,95	-2,40	-9,57	-2,69	-0,22	-0,60	-1,87	-0,15
Operating cash flow	-24,24	-12,16	-2,31	-3,24	6,30	7,86	8,95	8,39	6,15
Operating cash flow cumulative	-24,24	-36,40	-38,71	-41,95	-35,65	-27,80	-18,85	10,47	4,32
'- Interest 13%	-1,58	-0,79	-1,83	-2,43	-2,55	-1,96	-1,12	-0,14	0,78
Operating cash flow after interest	0	-12,95	-4,14	-5,67	3,75	5,89	7,82	8,24	6,93
Operating cash flow cumulative after interest	0	-12,95	-17,10	-22,76	-19,02	-13,12	-5,30	2,94	9,87

Appendix 2 . Arzamas mill financial statement [11]

	M€			
	2003	2004	2005	2006
Cash flow from operations	-3,13	-3,28	2,60	7,51
-capital expenditure	-19,51	-6,25	-7,17	-0,32
Operating cash flow	-22,64	-9,53	-4,57	3,20
Operating cash flow cumulative	-22,64	-32,17	-36,74	-33,54
- Interest 13%	-1,47	-3,75	-5,16	-5,92
Operating cash flow after interest	-24,11	-13,28	-9,73	-2,72
Operating cash flow cumulative after interest	-24,11	-37,40	-47,13	-49,85