

Implementation of Innovation Processes to the Textile Industry in the Czech Republic

Master's thesis

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zadání

I declare that I carried out this thesis “Implementation of Innovation Processes to the Textile Industry in the Czech Republic“ independently, using only the cited sources, literature and information obtained from shareholders and by interviews with employees, local councillor and inhabitants.

Brno, December 2015

First, I would like to thank my supervisor, Mgr. Petr Klusáček, Ph.D., for his help and professional guidance. I would also like to thank Ing. Zdeněk Šikula and Ing. Lubomír Pařízek for their helpful advice and information when needed. Thanks to them I had an opportunity to base my thesis on it. Last, I would like to thank my family who has supported me during my whole life.

Abstract

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In the first part of the thesis, concepts of the textile industry, enterprise and its features for successful operation on the domestic and international markets with strong competition at the present time are defined, including a description of innovations and innovations with regard to the textile industry. This theoretical basis is gradual preparation for understanding any issues related to the practical part which focuses on particular enterprise and a specific technical innovation implemented in the enterprise. The second part of the thesis introduces MICROTEx a.s. which is a traditional manufacturing enterprise focused on the production of piled upholstery fabrics. The thesis takes into account that the company would like to implement new weaving looms for a new type of fabric and width, which is the current innovation goal of the company. Therefore, the thesis is aimed at choosing the best machine out of two options from different foreign suppliers based on the conceptions and requirements of the shareholders of Microtex a.s. This innovation will definitely result in a competitive advantage of the company by expanding its product portfolio as well as other benefits both in the company and in its external environment. The external environment means a municipality where the enterprise resides. The analysis of connection between the company and municipality is based on qualitative interviews with the shareholders and employees (simultaneously inhabitants) of the company and with the mayor as well as on studying documents and files provided by the company and the municipality.

Keywords

Textile industry, innovations, MICROTEx a. s., weaving loom, municipality, sustainable development, competitive advantage

Abstrakt

Pazourková, S. Implementace inovačních procesů do podniku v textilním průmyslu v České Republice. Diplomová práce. Mendelova univerzita v Brně, 2015.

V první části práce jsou rozebrány pojmy textil, textilní průmysl, podnik a vlastnosti podniku, které udržují firmu jako vysoce konkurenceschopnou na tuzemském i mezinárodním trhu, dále jsou popsány inovace a inovace vzhledem k textilnímu průmyslu. Tento teoretický podklad je postupným seznámením s problematikou související s praktickou částí, která již je zaměřena na danou firmu a konkrétní technickou inovaci a její implementaci do podniku. V druhé části je práce výhradně zaměřena na společnost MICROTExa.s, která je tradiční výrobní společností zaměřenou na produkci potahových látek pro čalouněný nábytek. Vzhledem tomu, že společnost chce zavést do výroby nový typ tkaniny o nové šíři, tak implementace nového stroje do podniku je aktuálním a prioritním inovačním záměrem. Hlavním úkolem práce bude vybrat nejvhodnější tkací široké stroje ze dvou variant od různých zahraničních dodavatelů na základě představ a požadavků majitelů firmy Microtex a.s. Tato inovace přinese pro společnost komparativní výhodu, jelikož rozšíří svoje produktové portfolio, ale také jiné přínosy, jak ve firmě, tak i na firemní okolí. Mezi hlavní externí okolí je myšlena především obec, ve které má firma svoje sídlo. Propojenost firmy a obce je zanalyzována na základě kvalitativních rozhovorů s majiteli a zaměstnanci (zároveň obyvateli obce) firmy, starostou, společně s prostudováním dokumentů a záznamů poskytnutých firmou a obcí.

Klíčová slova

Textilní průmysl, inovace, MICROTEx a. s., tkací stroj, obec, udržitelný rozvoj, konkurenční výhoda

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1 Introduction

The textile industry belongs to the oldest industries in Czech countries where it has had old tradition. The textile industry was one of the inherent parts of Czech economy in 19th century. In 1990s, the textile industry started to decline in the Czech Republic and in whole Europe. Many enterprises were unable to deal with the circumstances that started a new period. Privatisation, opening the market to Asian competition, structural changes and lot of other situations required a falling-off of many companies in the traditional textile and garment industries. The companies which were able to adapt to the situation on the market took those current changes as a new idea to strengthen their business position. Many of the enterprises were not be able to stay on the labour market by goodwill (Tiba, Tepna, OP Prostějov). The innovative tendency of entrepreneurs towards the future was an essential. The prediction of the future development and requirements of the coming markets environment was necessary. Technical textiles and the special textile products have become a great impulse to the textile future in Europe. This direction has had to bring a competitive advantage to Europe and a defensive element against the dominance of Asian countries. European quality has been a cornerstone and the innovations are ways to achieve it.

Brno, called “Austrian Manchester”, became one of the most significant industrial zones in Czech countries. Unfortunately, the textile industry in this region cannot be proud of the spectre at the present time. Nevertheless, there is a successful company close to Brno that reminds the light of the bright history of the spectre and especially the light of hope for the future in the textile industry. The company is located 35 km from the South Moravian metropolis in Lomnice. The named enterprise, Microtex a.s., overcame each of the above obstacles in the past and became a major European manufacturer of upholstery. The manufacturing of upholstery fabrics started in Lomnice around 1951. The company was established in 1994. Since then, it has been developing. The company took an advantage from the quality basis of history and approached the opportunity for the perspective of piled upholstery fabrics. The basis for success obviously lies in modernisation, innovation and workforces qualified in technology and products. These aspects have strengthened the stability position on the domestic and European markets predominantly.

The external environment, such as the company residence, is also essential. The enterprise that resides in a small municipality is a significant component of the local

community and has played an important role for local inhabitants. The company has an impact and positive influence on employment. The cooperation and co-existence with the municipal authorities and inhabitants have played an important role and could bring about both positive and negative effects. Good relationship between the internal and external environments of the company can result in great advertisement and good conditions for the development of the company. Local inhabitants are observers, valuers and creators of the reputation of the company.

Innovations have been the basis for the substantial development of the enterprise. Therefore, the thesis closely focuses on technical innovations by purchasing new weaving looms. This loom is expected to increase the international competitive advantage primarily by extending product portfolio. The competitive advantage, sustainable development and profit have been the decisive aspects.

This can result not only in the development of competition but also in regional development in the form of new work and other opportunities provided by the company.

2 The aim of thesis

The thesis is generally focused on a relationship between textile, innovation and the enterprise in the given area under the given conditions. The thesis is predominantly focused on the introduction of weaving looms in the enterprise, MICROTEx a.s., which is a leading producer of piled upholstery fabrics. The selection of weaving looms was preceded by a marketing analysis based on a good knowledge of the company's strengths, weaknesses and external environment which would provide important information essential for the subsequent introduction of the selected machines in the enterprise. A new weaving machine will enable a completely new type of fabric with new width to be manufactured. A fundamental aim is to determine criteria by which new machines will be selected, to establish the importance of new machines and to justify the selection. A further aim is to compare offers from two companies according to previously determined criteria and to evaluate them. Another task is to choose two most frequently woven products for the selected machine and to perform necessary calculations. The economic evaluation of the investment will follow.

Once the selected machine has been introduced, it is expected to increase international competitiveness and sustainability and to create new job positions in the surroundings of Brno which belong to regions with the highest unemployment rate.

Another aim of the thesis is to show the connection between the enterprise and the external environment represented by the municipality of Lomnice u Tišnova where Microtex a.s. resides. Qualitative interviews were conducted with the shareholders, municipal authorities and employees who were also the inhabitants of Lomnice at that time. Besides, municipal and company documents were studied. The research included the common development of connection between the company and the municipality from the establishment of the company in Lomnice up to the present time. The files and practical experience are basis for drawing conclusions in the respect.

In short, it means that the objective of this thesis was to conduct a comprehensive assessment, including marketing and technical analyses based on the selection of the most suitable weaving machine, which would provide the company with a source document for purchasing a new machine, supplemented by the mayor's and employees' viewpoints regarding the synergy between the enterprise and the municipality of Lomnice.

3 Literature Review

3.1 The textile industry

3.1.1 Characteristics of the textile and clothing industries

The textile and clothing industries are very heterogeneous and diverse industries (Invest in EU, 2013). The textile industry is usually more capital intensive than the clothing industry and highly automated, particularly in developed countries (WTO, 2004). The textile industry covers a range of activities from the transformation of natural (cotton, flax, wool, etc.) or synthetic (polyester, polyamide, etc.) fibres into yarns and fabrics to the production of a wide variety of products. The industry includes two types of textile fibres as “natural” and “man-made” fibres.

Differences between natural and man-made fibres are as follows:

- 1) “Natural“ fibres include cotton, wool, silk, flax, hemp, and jute;
- 2) “Man-made” fibres include those coming from the transformation of natural polymers (viscose, acetate, and modal), synthetic fibres (organic fibres based on petrochemicals such as polyester, nylon/polyamide, acrylic, and polypropylene) and fibres made from inorganic materials (glass, metal, carbon, or ceramic).

The industry includes also the treatment of raw materials, which means the preparation or production of various textile fibres and/or the manufacture of yarns.

- 1) The production of knitted and woven fabrics;
- 2) Finishing activities aimed at giving fabrics the visual, physical, and aesthetic properties that consumers demand. This includes bleaching, printing, dyeing, impregnating, coating and plasticising.

The transformation of those fabrics into products include clothes, carpets and other textile floor coverings, home textiles and technical or industrial textiles (European Commission, 2015).

3.1.2 History of the textile and clothing industries in Czech countries

Textile manufacturing has always belonged to traditional industries in Czech countries. The manufacturing area extended from the north of Bohemia through the east to the north of Moravia with centres such as Liberec, Děčín, Semily, Dvůr Králové nad Labem, Náchod, Broumov, Ústí nad Orlicí, Šumperk, Rýmařov, Krnov and many other places. Other essential areas included Brno and its surrounding, Aš, Nejdek, Vysočina region, Humpolec, and Písek.

Wool, cotton and flax enterprises were situated there. German entrepreneurs played an important role. After 1781, the home based manufacturing was gradually replaced by mechanized workshop. The turn of 19th to 20th century was a period of the biggest factories development. The first spinning machine originating from the Habsburg Monarchy was designed in Brno in 1802. The first steam engine in the textile industry in the Habsburg Monarchy was introduced in Brno in 1814. After the dissolution of Austria-Hungary, eighty per cent of textile enterprises from the former empire were located on the territory of newly formed Czechoslovakia. Czechoslovakia became a significant European textile exporter. Technology news, such as open-end spinning, shuttleless weaving, multiphase weaving and Arachné technology, were invented here and brought to the world in the 20th century (Janošíková, 2011).

The following maps show the main regions of the textile industry in the territory of the current Czech Republic.

The 19th and 20th centuries: North Bohemia (Liberec, Děčín and Rumburk), East Bohemia (Semily, Broumov and Náchod), North Moravia (Šumperk, Rýmařov and Krnov) including the Bohemian-Moravian Highlands, South Moravia, West Bohemia, Middle Bohemia including Prague and South Bohemia.

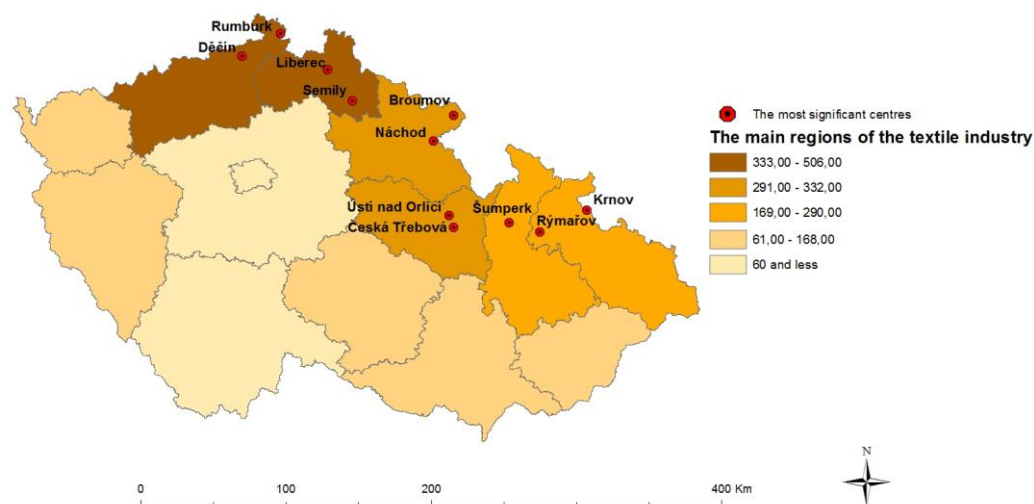


Figure 1: The 19th - 20th centuries, the main regions of the textile industry in the territory of the current Czech Republic
(Source: own work, data sources: Boček, 2007)

In the meantime, the largest decline in the textile industry was reported in North Bohemia and East Bohemia.

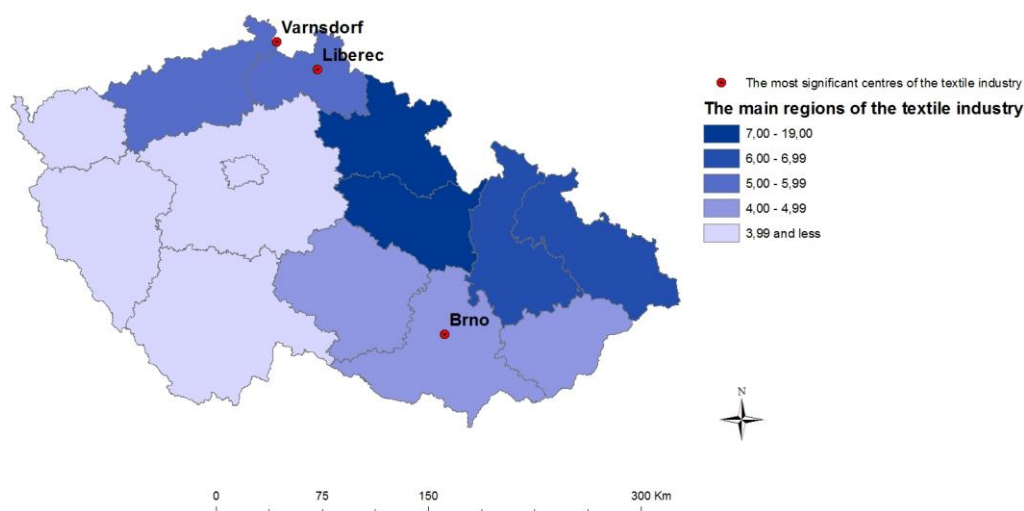


Figure 2: The main regions and centres of the textile industry in the territory of the current Czech Republic in 1989

(Source: own work, data sources: Economic Indicators Database of 31 December 1989, ČSÚ Prague 2001)

Situation since 1989: East Bohemia (19 centres, four of them in the district of Náchod), North Moravia (seven centres), North Bohemia (six centres) and South Moravia (five centres). The most significant centres: Liberec, Brno and Varnsdorf.

3.1.3 Enterprise bankruptcy and its impact on a municipality

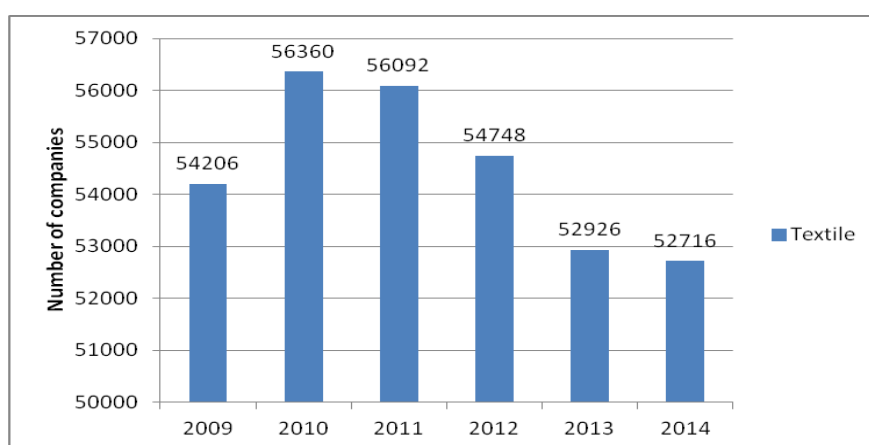
The bankruptcy of a textile enterprise which was an essential employer and business subject in a particular area could have fatal consequences on a municipality. There is the risk that the premises or buildings, as industrial heritage, can change into brownfield land whose further exploitation can be much more difficult over time. In such a case, the surroundings are disfigured, which may cause ecological problems, concentration of socially disadvantaged, homeless or violent people as well as other problems in the neighbourhood like drug abuse. It is essential that the industrial heritage can find new utilization possibilities and become again an economic source and entrepreneurial opportunity after revitalisation.

Examples of brownfields related to Czech textile enterprises: Perla (Ústí nad Orlicí), the Tanvald region (the former national enterprise called Seba – Rokytnice nad Jizerou, Bílina), the former spinning and weaving mill called Smržovka and/or the textile centre in the Trutnov region as a follow-up to the former company called Texlen.

3.1.4 The textile industry in the EU at present

The textile industry and the clothing sector are significant parts of manufacturing industries in the European Union. The textile industry plays a crucial role in economy and society. Despite the growing competition of cheap production from Asian countries, the textile industry is still an important industry in many regions in Europe (European Commission, 2015). The EU-28 is the largest world market for textile and clothing products, with household consumption of nearly EUR 500 billion. In 2014, the EU textile and clothing industries reached a turnover of EUR 165 billion. The EU is the world's second largest exporter (after China) of textiles (24 %) and clothing (26 %). The EU includes about 173.000 companies in the industry employing 1.6 million people (Euratex, 2014).

Following graph shows number of Textile manufacturing companies in Europe.



Graph 1: Number of Textile manufacturing companies in the European Union (EU 28) from 2009 to 2014

(Data sources: www.statista.com)

3.1.5 The textiles–garments production chain

The textile industry forms part of a larger production chain. The textile industry itself consists of two major operations which include yarn and the manufacture of fabrics. The general trend has been for textile manufacturing to become more capital intensive. The output of the textile industry goes to three major end-users. Despite some recent changes, the textile

industry is less fragmented and more technologically sophisticated than garments industry (Dicken, 2003).

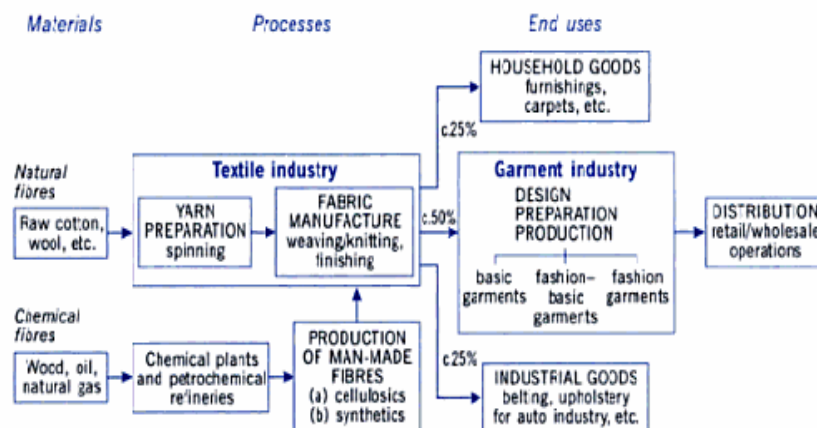


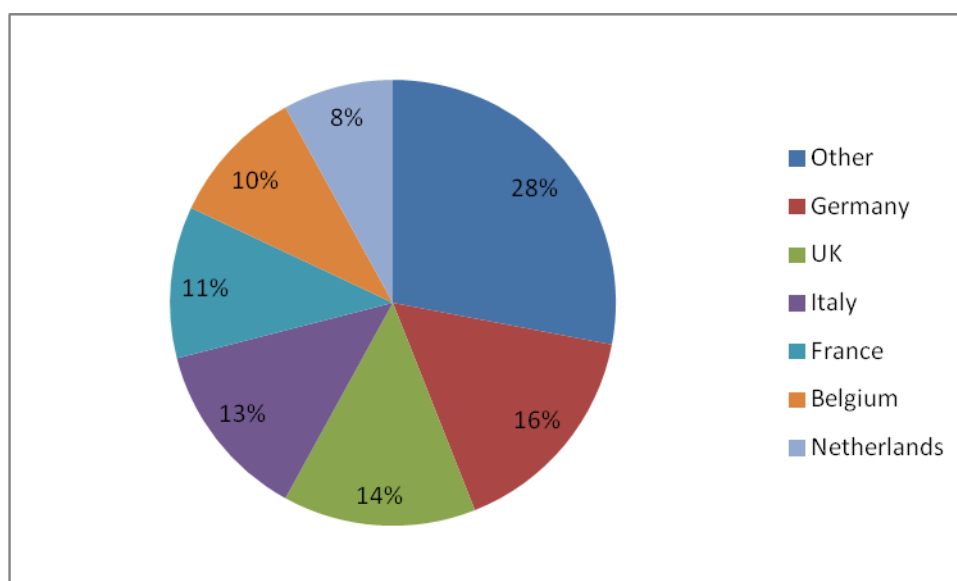
Figure 3: The textiles garments production chain
(Source: Global Shift: Reshaping the Global Economic Map in the 21st Century)

3.1.6 Four areas with a strong impact on the development of the European TCL industries

- Global competition: The strongly rising competitiveness of Asia countries (particularly China) is a major threat to the European TCL industries.
- Knowledge base: New innovative textiles with added value differ from the traditional textile and clothing industries (technical and intelligent textiles). They still have a weak market position because skills are widespread.
- Markets: Consumer markets are strongly price sensitive. Time to market has become a key competitive factor.
- Environmental costs: Energy prices and costs of climate change affect the world economy (chemicals, logistic system) (Texmedin, 2007).

3.1.7 Geographical spread of the textile industry in the EU

Italy, Germany, France, Spain and United Kingdom are the biggest producers of textile and clothes. The textiles and clothing sectors also play an important role in the national economy, accounting for 5% to 15% of employment and up to 10% of the total export of manufactured products (Portugal, Greece, Lithuania, Poland, Slovakia, Romania, Bulgaria and the Czech Republic). With regard to the textile industry in this work, the United Kingdom, Germany, Belgium, the Netherlands, Austria and Sweden contribute relatively the most to total textile production (EEN PACT, 2015).



Graph 2: Leading EU/EFTA producers of home textiles
(Source: Trade statistic home textiles, 2014)

It is quite difficult to localise the textile industry specifically because a great number of small and medium-sized enterprises are located all over Europe.

Some of the most significant centres of the textile industry in Europe: Italy: Milan, Turin, Brescia and Verona; France: Lille, Lyon, Mulhouse and Paris; the Baden-Württemberg, Bavaria and Rhine regions; England: Central part, Manchester, Leeds, Leicester and Nottingham.

3.1.8 European enterprises with a long lasting tradition

The following table and graph show textile companies focused on upholstery fabrics similarly to MICROTEX. All those companies have had a long-lasting tradition of success of operation in the market up to the present time. Spain belongs to those countries with the most compatible focus as MICROTEX.

Table 1: European enterprises with a long historical tradition
(Data sources: www.ivgt.de, www.textilhogar.com, essenziale-hd.com)

Enterprise	Country	Seat of enterprise
G-LAMADRID	Spain	Barcelona
EQUIPO DRT	Spain	Paterna, Valencia
CARMEN REY	Spain	Marcón Pontevedra
Textil Olcina	Spain	Alicante
ZECONZETA	Spain	Madrid
HENRIQUES & RODRIGUES	Portugal	Prior Velho
Fernando Roda Ltd.	Portugal	Lisbon
RUBELLI	Italy	Venecia
ANTICO SETIFICION FIORENTINO	Italy	Firenze
FORTUNY	Italy	Venice
DELE CUONA	United Kingdom	Winsdor
LEE JOFA	United Kingdom	London
MARVIC TEXTILES	United Kingdom	London
FOX LINTON	United Kingdom	London
PIERE FREY	France	Paris
BISSON BRUNEEL	France	Lyon
FLAMANT HOME INTERIORS	Belgium	Geraardsbergen
SEDAC TEXTILES	Belgium	Wevelgem
COLLEZIONE CESAVO	Netherlands	Nieuwkuyk
CHIVASSO	Netherlands	Zoetermeer
Holl and Haag	Netherlands	Gouda
IBENA	Germany	Bocholt
CURT BAUER GmbH Ave	Germany	Aue
FA KÜMPERS GmbH & Co. KG	Germany	Rheine
Gebr. Elmer & Zweifel GmbH & Co. KG	Germany	Bempflingen
Nicolaus Weber GmbH. & Co. KG	Germany	Fulty
Christian Fischbacher Co. AG	Switzerland	St. Gallen

3.1.9 Significant changes in the textile industry in the Czech Republic

In the 1980s, Czechoslovakia was considered a superpower with regard to the consumption of raw materials in manufacturing per capita. In 1987, Czechoslovakia reached the sixth place in global rating in this respect. The manufacturing of cotton yarn by open-end spinning in Czechoslovakia was compatible with the world in 1988. Technological equipment lagged behind that of its international competition.

After 1989, the textile industry was characterised by restructuring. Many of the textile and clothing enterprises were unable to survive under the new conditions of open market. 1989

was characterised by decreasing employment, reducing production levels, and many traditional textile and clothing producers discontinuing their activities.

Western Europe and North America went through the same situation twenty years earlier than post-communist countries. Therefore, it is possible to declare that it is real and worldwide development (Kyselá Lenka, 2009).

The textile and clothing industries experienced significant changes during the years that followed. The privatisation process did not provide only a positive future to particular companies. Some of them have faced the consequences of privatisation until recently. Another problem was caused by opening the internal market to Asian competition, which put our industry out of business.

The textile and clothing industries went through several structural changes in organisation and product specialisation. The traditional textile and clothing industries fell into decline because they were unable to resist and cope with the rise of cheap products from Asia. It was an impulse to increase the specific production of technical textiles, special textile and clothing products. Household linen stood a big chance of developing, too. The advantage is in tradition, research institutes, experience of the Technical University of Liberec and/or links with similar institutions in the European Union. Those changes had consequences on the restriction of the traditional textile and clothing industries, decreasing business and employees. Nevertheless, those changes also brought some positive consequence such as increasing productivity at work experienced in the developed countries in Europe. The textile industry did not disappear definitely, however, the traditional textile and clothing industries were gradually replaced by products with value added. The growth of production is based on new technologies and adequate product composition.

Qualified workers are necessary but the number of jobs in the textile industry was reduced in the middle of the 1990s. Disproportionate growth of rate and the situation in the world trade have just accelerated the process (Hospodářská komora ČR, 2013).

3.1.10 Most significant textile enterprises in 1989 and in the 1990s.

Table 2: The most significant textile enterprises in 1989
(Source: ČSÚ Praha 2001, Economic indicators diabase)

Name	Seat	Region	Current existence
Bytex	Vratilavice nad Nisou (9 plants)	Liberec	Only two plants left
TIBA	Dvůr Králové	Hradec Králové	Ended up in bankruptcy
HEDVA	Moravská Třebová	Pardubice	Some plants left
PERLA	Ústí nad Orlicí	Pardubice	Some plants left
TEXTILANA	Liberec	Liberec	Went into liquidation
SLEZAM	Náchod	Hradec Králové	Went into liquidation
TEXLEN	Trutnov	Hradec Králové	Plant
PŘÁDELNY ČESANÉ PŘÍZE	Nejdek	Karlovy Vary	Plant
LOANA	Rožnov pod Radhoštěm	Zlín	Went into liquidation
BENAR	Benešov nad Ploučnicí	Ústí nad Labem	Went into liquidation
SEBA	Tanvald	Liberec	Plant
JITEX	Písek	South Bohemia	Plant
ELITE	Varnsdorf	Ústí nad Labem	Plant
VELVETA	Varnsdorf	Ústí nad Labem	Plant

There are many reasons why most enterprises came to an end in the years following privatisation. The above enterprise BYTEX and its nine production plants are used as an example to explain the main causes of the failure of some enterprises and the reasons why other enterprises kept their position in the market.

Table 3: Bytex and its nine plants
(Source: own work, data from MICROTEX a. s.)

Production plant	Seat	Region	Product line	Current existence
Plant 1	Vratilavice nad Nisou	Liberec	Carpets	NO
Plant 2	Chrastava	Liberec	Carded yarns	NO
Plant 3	Rumburk	Ústí nad Labem	Tapestry fabrics	NO
Plant 4	Jihlava	Vysočina	Plush and fur-like fabrics	NO
Plant 5	Hlinsko	Pardubice	Upholstery fabrics, tapestry and printed fabrics	YES
Plant 6	Brno	South Moravia	Double plush carpets	NO
Plant 7	Lomnice u Tišnova	South Moravia	Furnishing and upholstery fabrics	YES
Plant 8	Rochlice	Liberec	Blankets and plush fabrics	NO
Plant 9	Náměšť nad Oslavou	Vysočina	Double plush carpets and smooth double sided carpets	NO

Only two out of those nine production plants have operated and been active in the market until the present time. All of them went through the privatisation process in the 1990s except for the plant in Rumburk which was not even subject to privatisation and went into liquidation. The plant in Hlinsko was the first one within the whole enterprise which was successfully privatised. Since that time, it has been manufacturing all kinds of fabrics although only in limited quantities. The plant in Lomnice u Tišnova, known for the manufacture of furnishing and upholstery fabrics, was privatised after 1990 but later on it went into liquidation. Microtex bought the buildings from the bank and started to reconstruct the buildings and gradually modernise weaving looms. The development of production has continued until recently. This thesis is focused on the enterprise in more detail.

It has already been mentioned that there are several reasons why some enterprises gradually stop production. The main reasons are:

- Opening of the market: Imported competitive products are burdened with minimum customs duties and enterprises are not prepared to respond to price competition as far as productivity is concerned;
- Most enterprises are provided with outdated technology and machines, manufacturing productivity is low, and imported products have a greater value added than domestic products;
- Human factor: In many cases, companies are not willing to take a healthy risk, get rid of obsolete machines and gradually replace them with modern, sophisticated and productive technology. Absence of marketing and other factors important for the development of production.

The main reasons why some enterprises survived different unfavourable circumstances and why many of them even strengthened their position are: Modernisation, reduced costs (no concentration of complex production and unfortunately the fact of reducing the number of employees), innovation of machinery (more efficient machines), continuity of production (complex process), hardware and software using various control mechanisms (quality surveillance), arrangement of all stages of production so that they are close to each other, preferably in the same building (from the storage of raw materials through the production itself to the storage of finished products), focus on product quality, right focus on certain markets (effective market research and establishing new contacts), good relationships and communication between employees, prediction of new trends and prospects for technical and household textiles

in Europe (with the greatest innovative potential) and, last but not least, tradition (most of the above companies were established in the second half of the 19th century).

Advantages of enterprises in the Czech Republic and some other European countries: Great innovative potential, transportation and logistics, cheap labour (Eastern Europe), the EU is in favour of the profitability of production, advanced machinery industry, better product promotion, and a large consumer market (Central Europe).

3.1.11 Most significant current textile enterprises

Table 4: Most significant textile enterprises in the Czech Republic at present
Source: (ATOK, 2014)

Ranking	Company name	Seat
1	JUTA a.s.	Dvůr Králové nad Labem
2	PEGAS NONWOVENS s.r.o.	Znojmo
3	Nová Mosilana, a.s.	Brno
4	KORDÁRNAPlus a.s.	Velká nad Veličkou
5	VEBA, textilní závody a.s.	Broumov
6	Mehler Technologies s.r.o.	Lomnice nad Popelkou
7	Toray Textiles Central Europe s.r.o.	Prostějov
8	MILETA a.s.	Hořice
9	LANEX a.s.	Kladno
10	Tessitura Monti Cekia s.ro.	Borovnice
11	VLNAP, a.s.	Nejdek
12	SVITAP J.H.J. spol. s r.o.	Svitavy
13	AMANN s.r.o.	Chřibská
14	Technolen technický textil s.r.o.	Hlinsko
15	BN International, s.r.o.	Česká Skalice
16	STAP a.s.	Vilémov u Šluknova
17	CONROP, s.r.o.	Bolatice
18	CNM textil a.s.	Ostrava
19	GRUND a.s.	Mladé Buky
20	VELVETA a.s.	Varnsdorf
21	HEDVA, a.s.	Moravská Třebová

It is obvious that Velveta and Hedva have recently operated under the same names as they used in the past. The reasons why some enterprises perished and some of them survived have been mentioned before. Although the following enterprises have not been presented in the table above, they have been the most significant producers of upholstery fabrics in the Czech Republic:

MICROTEX a.s. (Lomnice u Tišnova), KOLOVRAT, ČM s.r.o. (Chýnov u Tábora) and DEKORA-Jeniček a.s. JABATEX s.r.o. whose production line was similar to that of the three companies went into liquidation a short time ago.

3.1.12 Tendencies in the textile industry

Development tendency in the textile industry is influenced by internal and external factors.

The internal factors include:

- Reduced production and the reduction of less promising production
- Clear focus on export
- Export policy to the required extension of line
- Shortening of the delivery date
- Absence of equity capital
- Requirements on the delivery practices
- Depreciation of basic funds
- Disintegration of research in certain domains
- Increasing wages

The external factors include:

- Absence of export policy
- Loan acquisition
- Defence of the internal market
- Image of the Czech Republic
- Legislative environment for creditors
- High proportion of wage labour in the confection industry (Burešová, 1998).

3.1.13 Strategy of the textile and clothing industries by 2025

Basic changes in the quality of business environment are necessary for the strategic objectives. The government of the Czech Republic has to solve problems of the decreasing competitiveness of all national economies. Those problems are:

- Corruption environment
- Effectiveness power of governance
- Accessibility and price competitiveness of energy
- Stable law and business environment
- Equality in technique, price, utility, social and ecological standards

The strategy presents the current statements causation, strengths, weaknesses, and grounds for the future development.

- 1) The impact of globalisation and liberalisation has affected all open regions (EU, USA, Japan, etc.) by increasing imports from Asian countries, decreasing prices of products and lower employment. The Czech textile and clothing industries lost their significant parts on the Czech and international markets. The ability of the Czech textile and clothing industries and the EU to deal with the impact of liberalisation is significantly limited as most non-European markets are closed. The textile industry has maintained its important part in the manufacturing industry in the Czech Republic and the European Union by production, innovation potential, creation of added value and employment.
- 2) The strengths of the Czech textile industry are competitive wages, qualified workforce, closeness to wide consumer market, partial inflow of new capital, and functional and social dialogues.
- 3) The industry has proved high resistance and ability to restructuring in the most difficult competition environment.
- 4) The weaknesses of the industry are weak position on the markets, predominantly mass production, non-functional educational system, slow innovation tempo, unwillingness to cooperation.
- 5) The specific problems of the textile and clothing industries are noneffective labour market, high price of work, disproportionate growth of input costs, dependence on the imports of raw materials, low investment activities and the image of the industry.
- 6) The input of foreign capital brought positive trends, however, it did not reach the assumed capacity. It was more significant in the textile than in the clothing industry.
- 7) The textile and clothing industries in the Czech Republic have difficult conditions for influencing a legal frame for their business activities by harmonized EU legislation. There is no uniform policy in EU countries, which causes the split between the northern and southern parts due to diametrically opposed approach to the textile and clothing industries.
- 8) The textile industry will probably have a better future than the clothing industry.

The future of the textile industry should concentrate on:

- 1) Technical textile in contrast to the traditional textile industry (which can be prosperous if it manages a specific business function).

- 2) The trade and manufacture model of “North Europe” predetermined by long development and connection to the International Corporation, the size and structure of manufacturing capacity, product structure, active access to the monitoring and creation of conditions for the reallocation of manufacturing.
- 3) The rearrangement of the priorities of activities and processes in favour of pre- and post-production stages as well as more involvement of the great majority of manufacturing companies in protecting their own interests (Hospodářská komora, 2013).

3.2 Innovations

The term “innovation” occurred in the 20th century. The originator of the term was interested in this concept. His name was Joseph Schumpeter from Austria with Moravian roots (Žižlavský, 2011). According to Schumpeter, an innovation is the commercial application of an idea and its introduction into a market (Jacobs, 2014).

3.2.1 Invention versus innovation

Invention and innovation are not synonymous concepts. An invention can be defined as a device, method or process developed by study or experience. A common dimension for both of them are human capabilities and environment. Human inputs, such as talent and experience, are the stimulus of invention and innovation. Invention and innovation are also a result of imagination, ingenuity, hard work, and other traits that are directly connected with human capital. Invention and innovation are directly and indirectly influenced by cultural, organisational, economical, political, social and technological conditions. Innovations usually occur through a series of events with a common influence. Innovation is a result of invention (Mayers, Hoskins, 2013).

3.2.2 Industrial innovations

Innovation processes are generally considered the key to economic and social development. Innovation processes are important to the endogenous growth of entrepreneurship subjects, great value for customers and great income for entrepreneurs. Innovation is one of the element features of initiative. According to J. Schumpeter, innovations are characterized by restoration abilities of capital for making profit and an exchange of old capital to new one for creating high values. In the 21st century, innovations have become essential element features of the growing world economy. Innovative SMEs have represented a basic source for prosperity,

competitiveness and standard of living in modern economy based on knowledge. Present time has brought new challenges that have influenced innovative processes. The development of new technologies and faster tempo of the international economic integration are significant tendencies.

It is possible to keep pace with the world's best companies thanks to the continuous improvement of customer-oriented processes, services and innovative products as well as the implementation of additional services.

Innovation is derived from the word “innovare”, which means news, novelty or recovery of human thinking, especially in production. “The Theory of Innovations” came into being before the First World War. J. A. Schumpeter considered innovation as the manufacturing of a new product or the new quality of an already existing product, new manufacturing process or a method of manufacturing, use of unknown sources of raw materials or semi-products, new organisation of production, and/or a new market.

The aim of innovation is to increase competition of products. Competition is based on three important factors: quality, delivery date and prices. Those three factors are “the magic pyramid”.

Depending on the application of an innovation process in a specific area, innovations are divided into the following types: product innovation, material innovation, technological innovation, organisational and marketing innovation.

Common features of innovations include:

- Deliberateness;
- Favourable change in the current state;
- Any change has to find its use and has to be new in an enterprise. Products, services or manufacturing processes are subject to changes;
- The aim of any change has to be technical, economic or a society-wide benefit. Innovations become the bearers of technical development in case they bring an economic effect;
- Innovations need technical, market, economic or psychological skills and experience.

Each innovation is a favourable change in the current state. According to the OECD, innovations are classified as technical and non-technical innovations. Technical innovations include innovative products and process innovations. Non-technical innovations are especially organisational and entrepreneurial (managerial) innovations.

Another classification of innovations distinguishes between incremental (creative improvement of an original product), radical (based on the recovery of an original solution by principally different one) and systematic innovations (significant changes in thinking and activities).

Minimization of a risk and willingness to take a risk is essential to gain a high profit. Valenta distinguishes between three forms of human creativity. Those three forms are fantasy, invention and management.

Developmental distance is a difference between the original state of a product and its state after innovation. The difference is called the “magnitude of innovation”. In the past, for instance, electrical engineering and the replacement of steam engine by electric engine represented significant magnitude of innovation while the discontinuation of weaving and knitting due to the production of unwoven textiles was considered less significant magnitude of innovation (Heřman a kol., 2008).

3.2.3 Recent history of innovations in the textile industry

Substantial demands on relatively less qualified workforce and less demands on basic funds and resources for research and development are common features of the textile and clothing industries. The textile industry is more complex than the clothing industry.

The majority of advanced capitalist countries desired modernisation which was manifested by creating an international research programme called BRITE (Basic Research in Industrial Technologies for Europe) in 1984. The basic aim of the programme is to create new technologies for traditional industries such as the textile industry. The textile industry belongs to those industries with moderate demands with regard to research and innovations.

Faster modernisation of manufacturing equipment and the improvement of purchase were a turning point in capitalist countries in the 1980s.

The implementation of innovation activities into each of the production areas is a general tendency of further development. The most investments were brought to the textile industry by Italy, Germany, Great Britain and France in 1984, 1987 and 1988. Italy dominated just in 1984. There were three characteristic tendencies with regard to technical basis. First, the substitution of technologies to achieve the most efficient production. Second, the flexibility of using technology with regard to final production. Third, the achievement of high utility parameters of final products.

Tendencies towards rapid onset of non-orthodox weaving techniques break through in weaving all over the world. Grippers, rapier looms and especially jet weaving (water-jet, air-jet and multiphase weaving) techniques found great utility. Highly effective accessory techniques (Jacquard and Dobby looms, shuttle-chargers, etc.) were customised due to the rapid improvement in the performance of weaving machines. The process improvement of those techniques resulted not only in the improvement of quality and performance but solved also the problem of handling materials and waste heat recovery with a sizing machine. The technique came close to its physical limits with regard to the maximum performance exhausting progression and different combinations (bigger width, middle pick, etc.) (Hartmanová, 1991).

There are two major periods of radical technical changes. The first period lasted from 1814 to 1824 when a power loom and water-powered integrated spinning and weaving plants were introduced. The Second World War was a period when significant technical changes and innovations took place in the textile industry. The pace and nature of changes characterised the industry between those two periods. Disciplines, such as aerodynamics, chemistry and electronics, brought technical knowledge to technical changes. The textile technology was improved by close cooperation between textile machinery manufactures and man-made fibre producers. Significant innovations have occurred in the primary process of spinning as well as in the secondary process of weaving, knitting and finishing. Innovations have been more radical in nature since 1968. The use of advanced machines has been accompanied by more frequent use of machinery. The principal significance of the last innovations of looms (shuttle, shuttleless and multiphase looms) has led to narrowing the gap between weaving and knitting (United Nations, 1987).

3.2.4 Entry of Asian countries into the international market

The United States is the most important country where innovations took place, followed by the Federal Republic of Germany, the United Kingdom and Switzerland. Japan and Czechoslovakia were significant countries with regard to two major innovations, such as open-end spinners and water-jet looms. Since the mid 1970s, the Federal Republic of Germany and Switzerland have been the world's largest exporters of textile machinery (United Nations, 1987).

In general, textile related innovations have spread less rapidly and less widely in developing countries than in developed countries. There were several factors that created obstacles for innovations in developing countries. Those factors and obstacles include the transfer

of old equipment to subsidiaries in developing countries. Relatively low prices in many developing countries could pressure textile manufactures to introduce innovations which would be labour saving. Innovations are likely to be adopted more rapidly and widely by textile companies in a country where they originated. New textile technologies may be able to strengthen the position in international competition of those textile producers of developing countries who create favourable conditions (technical capabilities, with respect to factor endowments, and actual or potential market size). On the other hand, developing countries not able to adopt new technology may suffer from the international competitive disadvantage.

Textile firms in small domestic markets in developed countries relied more on technological innovations which would enhance the flexibility of textile design and manufacturing and allow them to focus more on fashion and higher value added (United Nations, 1987).

The migration of textile and apparel production to areas with lower labour costs began when the “Big Three” Asian producers – Hong Kong, Taiwan, and Korea – became the major exporters of low cost apparel (Zoellick, 2004).

During the 1960s and 1970s, the expansion of the capacity and production levels of new Asian textile producers was very rapid. The United States was the most important export market, while Japan experienced a decline due to the competition of East Asian producers. The Republic of Korea, Hong Kong and Taiwan Province have become the major textile exporters. This group of countries is much more homogeneous than emergent textile exporters. The three largest textile industries in the world (China, India and Brazil) were typified by emphasis on the domestic market and by a large unorganized sector (United Nations, 1987).

3.2.5 Development of modern weaving machines

Two diverging trends in the development of modern weaving machines can be observed:

- In conventional weaving, increasing productivity is achieved by maximum automation, maintaining great versatility and ease of operation.
- Several types of weaving machines with stationary weft supply have been developed. This method of weaving is classified into three major groups (free flying projectile, rigid or flexible rapier and air-jet or water-jet weft insertion).

The non-conventional weaving methods are distinct from standard weaving (NPCS Board of Consultants & Engineers, 2000).

3.2.6 Innovation processes in European Context

The European Union has supported and monitored the development of innovation activities over 35 years. Innovations are one of the most political priorities and the purpose in whole Europe. A programme called SPRINT was the first strategic project for innovations and technological transfer.

The Lisbon Strategy determined priorities in five areas for particular member states. The member states have to make progress in their own economy and keep the European economy strong. Those five areas include knowledge economy, finishing the internal market and supporting competition, creating a climate favourable to economy and enterprises, flexible and integrated work market, and emphatic environmental protection (Heřman a kol., 2008).

3.2.7 Technical and non-technical innovations

Innovation business activities are classified as technical and non-technical innovations. The innovation of a product and the innovation of a process are closely linked and referred to as the technical innovation of a product and a process. Marketing and organisational innovations extend many innovations specified in a manual. They belong to non-technical innovations.

Companies can use new knowledge or technology for the innovation of products and services. Innovations can be also based on the new usage or combination of already existing knowledge or technology (Ondřej Žižlavský, 2011). New products and services in the textile industry include textiles with special features (resistance to different impacts). New fibre CraiLar Flax can be used in all cotton and polyester spinning, knitting and weaving systems. CraiLar Flex is as soft and durable as cotton, showing additional performance attributes (strong, quick-drying, moisture wicking, shrink resistant, adding a soft, natural hand to both polyester and manmade cellulose) (Fabric link, 2014).

Process innovation means a new method or significant improvement of methods for production or supplying services. They can include substantive changes in devices, software, procedures or techniques. Making changes inside a company is usually caused by requirements from the external environment as an adequate reaction to customer needs, wishes and requirements or an efficient reaction to competition activities (Žižlavský, 2012). External requirements are usually accompanied by internal requirements. Innovation processes include new technology machines for new fabric widths, nanotechnology, and B2B e-commerce technologies (UBL XML, 2010).

Marketing innovation is necessary for addressing customer needs, opening new markets or a new location for products on the market with the aim of increasing the sales. Marketing methods are an important part of marketing innovation. A marketing method can be developed by an innovative enterprise or be undertaken by other enterprises and organisations. Marketing innovations include changes in product design and new sales channels (for customers).

Organisational innovation is the implementation of an organisational method which has been used for the first time and is a result of a strategic decision made by management. This innovation is aimed at improving the learning and sharing knowledge inside an enterprise, dividing work inside and between business activities, and establishing new cooperation with suppliers or departments (outsourcing). Neither changes to business practices nor mergers or takeovers are considered organisational innovations (Ondřej Žižlavský, 2012).

The management of innovations means the integration of all functions and fields participating in an innovation process. It involves principally the marketing of innovations, including the research of future markets, market research with regard to innovations, the communication of innovations, technology management, the management and organisation of innovations, and innovation controlling (Trommsdorff, Steinhoff, 2009).

3.2.8 Innovative direction with regard to inputs

Innovation activities can be divided into two directions.

The first one concentrates on inputs, which means any change in parameters of materials and processes entering individual steps of textile production. In particular, this includes the development of new textile fibres or their modification, making textile production more efficient by using new flexible technologies, the improvement of management processes and production using more information and communication techniques, deeper cooperation with other departments with the aim of using synergic effects in development in order to achieve new qualities of textile structures (Czech Invest, 2011).

3.2.9 Industries collaborating with the textile industry

No industry is a self-contained entity. It requires inputs manufactured by other industries (Singleton, 2012). The textile industry cooperates with other industries. Some of them are more or less traditional industries. This cooperation can bring different innovation activities in a different area of research and development.

1. Textile engineering (adjustment of existing installations, reducing energy intensity of textile machines, and ecological aspects of textile machines – noise, vibrations);
2. Agriculture (active use of local raw materials, extraction of bio-substance, study of waste recovery and by-products of the agricultural-food complex, and transition from food to technical crops);
3. Chemistry and biotechnology (ecologization of products, new characteristics of fabrics, development of multi-ingredient products, new refinery processes, new final adjustment of textiles, and biodegradable materials);
4. Electrical engineering (reduce a human factor in operating machinery, automation of production processes, control mechanism of production processes, and application of electronic elements to textile construction);
5. IT Technology (continuous collection of data with regard to process of production, evaluation, effective forwarding of data, and feedback) (Strategická výzkumná agenda, 2010).

Cooperation between chemical suppliers, textile mill companies and makers of textile machinery is of great significance. Italy is a country where related industries, such as clothing, weaving, leather, synthetic fibres, textile and leather-working machinery and design services, have extended (Singleton, 2012).

3.2.10 Innovative direction with regard to outputs

The second part of interest involves outputs, which means the application of textile products. Cooperation with other industries tries to find new ways of using textile products. The cases of new application can be reflected in one of many areas, for example, antistatic curtains or non-soiling materials used in the household (Czech Invest, 2011).

3.2.11 Forces for innovation

Michael E. Porter presented five forces that influence the marketplace:

- Buyers;
- Suppliers;
- New entrants;
- Substitute products;
- Rivalry.

These five forces determine the competitive intensity and the attractiveness of a particular market. Some of the drivers can be explained by this forces approach. A more recent force for innovation includes globalisation (Horne, 2012).

3.3 Textile enterprises

3.3.1 Relationship between entrepreneurship and innovation

Entrepreneurship has been framed as a set of mechanisms and strategies that make the application of innovative products and processes to the conditions and environments possible. Thanks to entrepreneurship in its various forms, the value propositions (economic, political, cultural, social and technological) linked to innovations have been realised - otherwise society would remain stagnant.

According to Fagerberg, “Invention is the first occurrence of an idea for a new product or process, while innovation is the first attempt to carry it out into practice“. Entrepreneurship is a process that gives a boost required to put innovations into practice. Entrepreneurship is a market-based strategy. Entrepreneurship makes effort to generate and accumulate economic wealth (Mayers, Hoskinson, 2013).

3.3.2 Competences of the textile industry in EU

According to current trends and high- and low-cost areas, it is possible to identify skills development in the EU.

The skills development involves:

- Technology and application oriented engineering in specialty textiles;
- The rising importance of marketing and sales;
- Value chain management on global TCL markets;
- Relocation of machine operating and assembling function;
- Rising importance of environmental aspects.

The emergency competences are divided between high- and low-cost areas into particular departments of an enterprise.

High-cost areas have a leading position in quality and innovative products. They have a weak cost position on mass markets in particular. Those areas make use of efficient production networks, machinery producers and skilled labour force. They can keep their advantage by a strong market position and an opportunity found in environmental aspects. They provide limited values. Asian competitors, in particular, threaten them. The high-cost areas include Austria,

Belgium, Denmark, Spain, Finland, France, Georgia, Ireland, Italy, Luxembourg, Netherlands, and Sweden.

Low-cost areas make use of competitive wages, experience labour force. The proximity of large consumer markets bring benefits to them. The disadvantages are a weak market position of producers, weak innovative culture, lack of skilled professionals and high transport costs. The advantages to producers in those countries include their location and short-distance transportation which may be supported by the Europeanisation of demand and cost advantage. A clear strategy for the development of the textile and clothing industries in those countries is also important. The low-cost areas include Bulgaria, Czech Republic, Cyprus, Estonia, Greece, Lithuania, Hungary, Malta, Poland, Portugal, Romania, Slovakia, Slovenia (Texmedin, 2007).

3.3.3 Small and medium-sized enterprises (SMEs) in the textile industry

Small and medium-sized enterprises (SMEs) represent 90% of all business and also the same percentage in the textile in Europe. The number of employees and the turnover or balance sheet total are the main factors determining whether a company is an SME. SMEs employ less than 250 people and have an annual turnover not exceeding EUR 50 million and/or annual balance sheet total not exceeding EUR 43 million (European Commission, 2015).

An innovation is a motivator for many SME owners. There are five key influences on a small and medium business: market, independence, personal influences, flexibility and innovation. Flexibility is a key characteristic of SMEs and means adaptability to changing circumstances. Innovation is also a key characteristic of SMEs. The main attitude to innovations comes from an owner/manager (Levy, Powell, 2005).

Small and medium-sized enterprises have continued to play a major role in the textile and clothing industries until recently.

Those enterprises are capable of competing with managerial competition but a reduction of 12% in subsidies by 2000 may be a threat. Small companies, which are often dependent on innovations, have to struggle with the investments and competitive ability of the most powerful companies in order to survive. It is much easier for big companies to finance their own projects, which results in less cooperation and knowledge sharing in Europe (R&D knowledge is not communicated within Europe). In other words, the fewer the projects are financed, the more the knowledge sharing in the textile industry will be reduced. International cooperation can properly present project goals, and thereby helps companies to receive subsidies.

According to Horizon 2020, preference for applied research rather than basic research is an expectation of SMEs because they need money to survive and make profit through new products and services (Horizon 2020 projects, 2013).

3.3.4 Particular departments and their orientation to textiles enterprises in high- and low-cost areas

Table 5: Particular departments and their orientation to textiles enterprises in high- and low-cost areas

Source: (www.texmedin.eu)

	High-cost areas	Low-cost areas
Marketing, sales	Technology-oriented International High standard-client services	Rapid delivery Price oriented
Engineering, production, logistics	Small batches Flexible production Strong customer orientation Sound understanding of processes and quality requirements	Efficiency oriented Large scale production Standardised production
R&D, Design	Interdisciplinary research Application oriented Cross-border thinking	Process innovation
Management	Change management Technological leadership Quality oriented	Efficiency and price oriented

3.4 Two enterprises that have survived various obstacles until the present time

Although the companies are specialised in upholstery fabrics like Microtex a.s., they have not been named in this thesis for competitive reasons. The main reason for this is their long flourishing operation on the market. Similarly to Microtex a.s., also those companies have survived various obstacles until the present time. Microtex a.s. and those two European companies have a strong position on the market, with long history of prospering for many reasons.

The reasons why Microtex a.s. overcame difficult times for the European textile industry could be as follows:

- History of textile manufacturing in Lomnice;

- Strategic decision and a good prediction about the future of the current situation. Ing. Lubomír Pařízek recognized bad management of other activities in Fatem which inhibited textile manufacturing in Lomnice. He resigned from his post as director;
- The clear purpose of manufacturing piled upholstery fabrics;
- Dynamic development thanks to modern and productive technology;
- Strategic decision to purchase and reconstruct the whole premises of the former state enterprise ARANA.
- Great business relationships with purchasers and suppliers from the beginning of the company. Long-standing and consistent purchasers provide sales certainty;
- Consistent quality at all stages of the creation process.

Those similarly focused European enterprises had also long history and could be presented here as representative cases of prospering corporations that had survived various external as well as internal obstacles.

3.4.1 Texol Olcina s.l., Spain

This Spanish company was established in 1967 in Alcoy, as a small family factory under the control of D. Casimiro Olcina. It changed to a limited company named Texol in 1983. The company has gained experience of production over a long period of time (40 years) by creating fabrics under the signature “made in Spain”. A basis for successful production is in paying attention to consistent quality at all stages of the creation process, using the best raw materials, the design department, weaving and in finishing processes. The company has a wide range of fabrics for tablecloth, bed covering, upholstery, etc. (Texol, 2015).

3.4.2 SedacTextiles, Belgium

Sedac Textiles is a Belgian textile company specialized in woven upholstery and curtain fabrics. The company was established in the summer of 1978, representing different Belgian weaving mills located in the south of West Flanders, known for its textile industry (SedacTextiles, 2015).

The company is a manufacturing enterprise. All of its production stages require quality processing and quality raw materials. The development and added value are necessary conditions for company growth. A strong chain between purchasers and suppliers is a good prerequisite for the development of the company in a highly competitive environment.

3.4.3 Link to the past

Each period prepares different conditions for its environment. Each change brings new circumstances which have different consequences on particular companies.

Let's get back to the history of Brno, approximately to the second half of the 19th century. There were several prospering companies in the South Moravian metropolis. Those companies had a good reputation across the world for their patented products. Modern trends were determined in Paris, however, Brno had certain independence in determining what chic was. Participation in the Great Exhibition in London in 1851 opened a journey to the international markets. Exporters from Brno won over 54 awards (i.e. Karl Offermann, Phillip Schoeller, etc.). However, the golden era of companies in Brno as well as in other countries only lasted for a limited length of time. The First World War resulted in a shortage of raw materials, loss of markets, loss of the monarchy, and transport problems. This downgrade was followed by a short period of success thanks to remaining contacts with foreign countries and refocusing the manufacture with regard to the international markets. This short glimmer of success faded, bringing about an economic crisis which culminated in 1935. The crises of the 1920s and 1930s were a big drain on many companies. On the other hand, there were companies that remained untouched and some of them (Stiassni and Kemka) even revitalised. Stiassni became number one in Brno with regard to production levels and the number of employees (Ruml, 2012).

4 Methodology

A primary goal of this thesis is to provide an analysis of why MICROTEx has been operating successfully in Czech conditions until the present time. The analysis will be used to make suggestions and recommendations for success development in the future. Literature review is focused on three basic items, in particular the textile industry, innovations and the enterprise itself and its activities in the textile industry. The review provide one of the method for achieving the previous goal. Practical viewpoints of European enterprises have been presented, besides that of MICROTEx itself, and their strengths which helped them to survive difficult times in the textile industry in Europe and to operate successfully at international level to the present time.

A secondary goal of this thesis is to choose a new weaving machine out of two brands, DORNIER and ITEMA, which are the best ones in their sector. The secondary goal is divided into two parts, marketing and technical analyses. A marketing analysis is preceded by the reasons of MICROTEx to purchase new machines, expectations of their operation and a SWOT analysis which implies that the company should extend its technological background in order to prosper. The second part is a technical analysis which is focused on the selection of the most suitable weaving machines for MICROTEx from those two brands. At first, specific criteria will be established to determine individual percentages according to their importance to MICROTEx. Offers from two different suppliers will be analyzed accordingly. The most suitable offer which complies with the criteria demanded by the company will be considered. Calculation will be done for two products which have been woven most frequently. An economic assessment of the investment will be the final step in this part.

A tertiary goal of this thesis is to discover cooperation between the company and its external environment and the relationship of the inhabitants of Lomnice towards MICROTEx and its employees. A discussion with the company owners about their contribution to good cooperation between the internal and external environments, such as the municipality of Lomnice where the enterprise has its seat, took place in order to accomplish this goal. An interview was also conducted with the mayor of Lomnice. Additionally, all employees of the company were asked a question and their answers were used to create a rating scale of the most appreciated values from their point of view on MICROTEx.

The last goal of this thesis is a discussion based on findings gained from the previous goals which will be assessed by the author.

5 My research

5.1 Characteristic of the company

5.1.1 Basic characteristic

Table 6: Basic characteristic
(Source: own work, data from MICROTEX a. s.)

Name of the company:	MICROTEX a.s.
Seat of the company:	Lomnice, Na Potůčku 107, 679 23
UIN-No.:	CZ26221179
Company shareholders:	Ing. Lubomír Pařízek, Chairman of Board of Directors Ing. Zdeněk Šikula, Vice Chairman of Board of Directors
Field of business according to CZ-NACE:	13990 – Manufacturing of other textiles

5.1.2 Brief history of the company

The manufacturing of upholstery fabrics started already in 1951 when a company called Moravan Brno specialised in manufacturing carpets and furnishing fabrics was established. The company focused first on the production of upholstery fabrics called Epinglé. In 1965, manufacturing in Lomnice became part of the national enterprise Bytex. The state enterprise Bytex was reorganised in such a way that the individual plants became independent production plants. Subsequently, the individual plants were further divided and privatised. Thus, MICROTEX spol. s r.o. (limited company) was established with specialisation in the manufacturing of piled upholstery fabrics and in the purchase and sale of upholstery fabrics for upholstered furniture. In 2000, MICROTEX spol. s r.o. was transformed into MICROTEX a.s. (joint-stock company), which is today's final form of the company. Its shareholders are two natural persons with equal shares.

5.1.3 Company profile

MICROTEX a.s. is a traditional manufacturing enterprise specialised in upholstery fabrics with a great influence on the domestic and international markets. As it was said before, the enterprise was established in 1994 and focused on textile manufacturing from the very beginning. Its product portfolio includes not only chenille fabrics but also other types, such as plush fabrics, one colour soft fabrics and fabrics with different effect yarns (soft and sample). During long-lasting operation on the international markets, the company was able to build up a stable and strong position among its competitors. In recent years, the company has significantly

extended its product portfolio which includes over 600 different types of samples. MICROTEx a.s. uses exclusively high-quality raw materials to manufacture its own products with added value. A primary goal of the management of MICROTEx is to satisfy all requirements of its key customers. The requirements have been changed according to current trends. The final production quality has to meet the most stringent criteria which are largely dependent on equipment quality. The equipment is of vital importance to manufacturing. Moreover, it has to ensure proper functioning of development which it makes possible and allows new products to be launched into international markets.

5.2 Basic reason for purchasing new weaving looms in MICROTEx

The basic subject of the thesis is the purchase of new weaving looms in the company. The owners made a decision based on their preferences for two types of weaving looms from different suppliers that meet their requirements in the best way possible. The thesis is focused on choosing the best one of them which will be the most suitable for the future use in the company. Those new weaving machines will be used for manufacturing fabrics with a new width of 290 cm.

5.2.1 Sustainability

The owners expect that the purchase of the most suitable weaving machines and their operation will result in consequent sustainability with regard to orders and functional equipment.

- Sustainability with regard to orders: The new weaving looms will allow the offered product portfolio to be extended and will make current production more effective, which will be unambiguously reflected in the strengthening of international competition. The sufficient amount of orders is necessary for ensuring financial return on the investment as soon as possible. Therefore, a marketing analysis specifying trends, market development and the number of customers has been presented below. MICROTEx has ensured sufficient sales of production at present, which is a good indication of the sustainability of the business plan with regard to the volume of orders.
- Sustainability with regard to device functionality: The purchase of new production technologies belongs to those investments which require preventive

maintenance and control. Service will be ensured by a designated employee responsible for the technical state of new machines.

MICROTEX employs theoretically and practically skilled and experienced workers, which is a necessary precondition for the consequent sustainability of the investment intention. The company has also assured enough financial resources. Thus, it is obvious that the company has been focused on investments which are sustainable in the long run and follow permanently sustainable development.

5.2.2 Expectations of new weaving looms

- Increase in company performance – The purchase of new technological equipment will increase production capacity of the company. Increasing sales and performance will have a positive effect on further development.
- Purchase of new production equipment – A highly sophisticated modern weaving workplace will be created, making use of high-tech and utility parameters.
- More efficient production processes – The production of upholstery fabrics will be made more efficient. In addition, fabrics with a width of 290 cm will be manufactured, which will allow all desired products to be marketed.
- Increase in company competitiveness – Thanks to new production, the company will be allowed to enter new markets, which will result in increased international competitive ability.
- Job formation and specialization – The purchase of new weaving looms will result in the stabilization of current job positions. Besides, at least three job positions concerning the introduction of new machines will be opened.
- Regional development – The purchase of new weaving looms will have a positive influence on regional development characterized by a higher rate of unemployment in the surroundings of Brno.

5.3 SWOT analysis of MICROTEX a.s.

Table 7: SWOT analysis

<p>Strengths</p> <ul style="list-style-type: none"> • A leading producer on the market • Own KNOW-HOW • Positive company growth • High level of technological equipment • Continuous modernization of production technology – improvement of product quality • Stable position on the domestic market • Rising position on the European market • Wide portfolio of own products • High level of outputs corresponding with the EU level • Very good knowledge of market • Wide customer portfolio • Independent of one customer • Long-lasting co-operation with significant purchasers • Long-time management activity in long-term practice in the industry • Promising and powerful team of specialists with an extensive theoretical knowledge • Many completed investing activities • Knowledge of foreign languages by the management • Sufficient manufacturing areas 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Necessity of continuous investments to the development of technology in the enterprise • Insufficient production capacity • Insufficient productivity of current technologies • Insufficient production effectiveness
<p>Opportunities</p> <ul style="list-style-type: none"> • Purchase of new technological equipment with good technical and utility parameters • Improvement of precision in production • More effectiveness of manufacturing processes • More flexible manufacturing process • Extended offer of current products • Increase in production capacity • Further extension of the portfolio of customers linked to international markets • Growing demand for company products • Strengthened position in the domestic market • Further company growth 	<p>Threats</p> <ul style="list-style-type: none"> • CZK/EUR exchange rate • Competitive pressure by new domestic producers • Increasing competition of EU member states • Customer pressure on better product quality • High tax burden imposed by the state • Increasing labour costs • Increasing material costs • Bad payment practices of customers • Decrease in sales in Eastern European markets • EUR/USD exchange rate

<ul style="list-style-type: none"> • Increasing competitiveness • Keeping existing jobs and creating new jobs • Support from SF 	
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Source: (own work)

5.4 Marketing analysis

5.4.1 Market specification

Textile manufacturing and textile products are divided into cotton, flax, wool and knitted fabric production according to applied technology and kinds of processed raw materials. Manufacturing in most textile companies consists of more technological levels. It includes several industries such as spinning, weaving, final treatment and ready-to-wear processing of textile. Considering its activity, MICROTEx is classified as a weaving company completely specialized in weaving.

Textile manufacturing and textile products belong to export-oriented industries with a short innovation cycle of product variations which play a significant role in the national economy of the Czech Republic.

5.4.2 Definition of customer segment

The most significant MICROTEx customer segments are corporations further processing woven upholstery fabrics and/or final users in less numbers.

5.4.3 Potential of the market and its development

- Market potential. There is a considerable amount of interest in the textile industry on the part of foreign investors. The main reasons for this are low production costs, close proximity of developed markets and qualified workforce. Emphasis has been placed on strengthening cooperation between manufacturing companies and research institutes by applying the results of research and development in practice. The textile and clothing industries have had a great potential especially in nanotechnological applications and in the use of carbon fibres. It is also essential to promote the image of the textile and clothing industries, which is currently associated with the decline of traditional textile manufacturing, while good experience with innovations that have great growth prospects creates job opportunities for qualified young people and gains a sustainable competitive

advantage against competition in developing countries. Textile producers have been currently leaving formerly common complex production based on different technological levels. Nowadays they concentrate on those processes which bring a high utility value. The manufacture of upholstery fabrics belongs definitely to prospective parts of the textile industry in the Czech Republic as well as in the European Union.

- **Market development.** The textile and clothing industries belong to processing industries which have found their use in all fields of human activity. In general, textile and clothing products are subject to latest fashion trends. There is great competition in the market. MICROTEX has operated on the market of woven upholstery fabrics where products are subject to trends similar those experienced in the clothing industry. MICROTEX products have been used especially in the furniture industry where high sales are ensured due to their daily use. The whole industry has currently been in the phase of technological restructuring because increasing customer requirements force corporations to bring high investments into new machines in order to be able to satisfy huge demand. The restructuring results in an increased competitive ability at an international level. The positive development of the textile industry has a significant influence on other industries focused on manufacturing daily use products, i.e. products with a high added value.

MICROTEX has definitely been operating in the market with positive prospects of further company growth.

5.4.4 Competition

The international and predominantly European markets are basic territories of MICROTEX. MICROTEX exports its own products to many countries abroad where they are popular particularly due to their assortment and quality.

The main export targets of the company are Poland, Belarus, Slovakia, Hungary, Germany, Romania, Croatia and Slovenia. By definition, there is a relatively great number of companies involved in similar orders and services, however, MICROTEX is the biggest manufacturer of woven upholstery fabrics in the Czech Republic.

DEKORA-JENÍČEK a.s. and KOLOVRAT ČM s.r.o. are the greatest competitors of MICROTEX in the Czech Republic.

Turkish corporations are foremost leaders in the European market. Those enterprises make usually use of development centres which bring new results applicable to manufacturing and determine trends in woven upholstery fabrics. For example, BOYTEKS with 133 weaving looms belongs to one of the biggest producers of upholstery fabrics. The company determines many trends such as permanent neutralization of odours, ideal temperature balance, naturally self-cleaning ability, miracle of negative ion, and naturally lasting touch. The company has presented its manufacturing and products as sparing to fresh air for healthy life. Harmony with nature is one of its business strategies (Boyteks Tekstil Uphlstery Fabric Introduction Film, 2013).

The disadvantage of Turkish enterprises consists in a higher price of products. Turkey and its economy structure has been significantly different from the countries of the European Union. Nevertheless, Turkey's area in Europe is a minimum percentage of that in Asia. Therefore, temperature conditions allow Turkey to manufacture upholstery fabrics with less manufacturing costs than in the EU.

Competitive advantages of MICROTEx:

- Its own KNOW-HOW;
- Fabrics which are technically difficult to manufacture;
- Flexibility of manufacture;
- Its own research and development department;
- Continuous development of manufacturing technology;
- Knowledge and experience of employees;
- Great marketing strategy.

5.4.5 Purchasers and suppliers

MICROTEx has several constant purchasers who ensure regular sales. Cooperation with some of them lasted for more than 15 years. An average period of partnership with key purchasers exceeded 11 years. The sales has been growing by 1 % to 2 % since 2012. At the beginning of 2014, the tense political situation between Russia and the West negatively influenced the sales, particularly due to the decreased value of the Russian Ruble compared to the Western European currencies. Exports to the east dropped by 50 % and the payment culture worsened. MICROTEx has responded to this situation by searching new purchasers from Western Europe.

MICROTEx has ensured partnership not only with customers but also with suppliers. MICROTEx has several key suppliers. Long-lasting business partnership and experience gained

over all those years have given the company a better chance of good business with regard to observing the delivery dates. Both parties want to keep their sales and not to disrupt their long-lasting mutual trust and confidence. In 2013, there was a slight decrease in deliveries due to the termination of some partnerships and the introduction of close relations with new yarn suppliers from Turkey. An increase in deliveries of about 3 % was experienced in 2014. An average period of partnership with thirteen key suppliers is also more than 11 years.

5.4.6 Possible substitute product

MICROTEX a.s. is specialized in manufacturing piled upholstery fabrics exploitable particularly in the furnishing industry. People will always need clothes. Likewise, furniture will always be produced and so will upholstery fabrics. A relevant substitute has not been available on the market with regard to the character of production.

5.4.7 Marketing strategy

MICROTEX has placed great emphasis on its marketing strategy because only a properly adjusted marketing strategy ensures required economic growth for the company. MICROTEX has created and chosen proper marketing tools. Moreover, the company has specified the method of marketing communication with customers in order to achieve the maximum sales of its own products and to keep purchasers satisfied. MICROTEX prefers to communicate by attending famous trade shows and exhibitions, for instance in Russia and Germany, where the company can introduce its products physically and learn more about portfolios of products from potential suppliers. Subsequently, the company can arrange personal meetings with a concrete vision of specific raw materials or products.

Description of products:

The range of products manufactured by MICROTEX includes several kinds of upholstery fabrics. Those are in particular plush fabrics, chenille fabrics, and jacquard fabrics.

Price:

The delivery price of its own products is based on the amount of material used and the estimated length of time and amount of work, taking into account the prices of similar products from competition. An itemized budget has to be prepared. The total number or series of ordered goods play a considerable role in setting a price for a product. Prices for regular customers are established individually.

Promotion:

MICROTEX promotes its own products in different ways. The company has its own website which provides a comprehensive list of all of its products. It has already been mentioned that the company participates actively in various international exhibitions. Each year MICROTEX attends MEBEL in Moscow which is one of the biggest furnishing exhibitions in Europe.

Distribution:

Products are delivered to the place of destination on the basis of orders according to customer requirements. Transport is ensured by the company itself using its own means of transport or by specialized transport contractors.

5.5 Machine selection from two weaving looms

5.5.1 Evaluation of criteria for selecting supplier

Table 8: Evaluation of criteria for selecting supplier technology
(Source: own work)

Evaluated criterium	Significance [%]	Dornier's offer	Itema's offer
1) Purchase price	30	0	30
2) Technical design			
Colour chase	2	1	1
Weft insertion	8	5	3
Noise level	2	1	1
Versatility	3	2	1
3) Service			
Cost of spare parts	5	1	4
Delivery time of spare parts	3	1	2
Representation in CZ	5	2	3
Warranty	2	1	1
4) Supplier's economic stability	5	2	3
5) Experience with the offered technology	10	10	0
6) Energy intensity	5	3	2
7) Delivery and payment terms			
Delivery time	2	1	1
Advance payment	5	2	3
Payment in instalments after delivery	10	0	10
Interest rate	3	0	3
In total (%)	100%	32	68

5.5.2 Technology assessment procedure

Each assessment criterion was associated with its percentage of importance according to the criterion significance to MICROTEx.

The sum of criterion significance was 100 %.

Based on the offers presented, the criteria were evaluated by comparing the parameters and data offered. The criteria were assigned a percentage value according to their advantage over the other offers.

If a certain criterion in an offer significantly differed from the same one in another offer, it got the whole percentage for that criterion.

If the significance or value of a certain criterion differed slightly or partially, the percentage value of that criterion was divided according to the difference.

Percentages assigned to individual criteria – Justification:

- 1) **Purchase price:** The purchase price of a Dornier machine is almost double of that from Itema, therefore 30% is given to Itema.
- 2) **Technical design:** **a)** Colour change: Both machines offer 8-colour weft change, therefore 2% are equally divided between both machines. **b)** Weft grip: Dornier offers positive weft hold during weft insertion, which has been patented. It is a great advantage for a general use of different thicknesses of weft threads. On the contrary, Itema offers weaving with the low shed, which results in less stress of warp threads, less thread breaking and more utility output. Therefore, the percentage was divided at a ratio of 5 to 3. **c)** Noisiness: The data is almost identical for both weaving looms. **d)** Versatility: The Dornier machine is more universal considering its positive weft insertion.
- 3) **Service:** **a)** Cost of spare parts: Itema's spare parts are much cheaper than those of Dornier. The useful life of basic spare parts is almost similar for both weaving machines. **b)** Delivery time of spare parts: Itema has a spare parts warehouse in the Czech Republic, and thus the delivery time of spare parts is much quicker than that of Dornier machines. **c)** Warranty: The warranty period is identical for both weaving machines.
- 4) **Economic stability of both suppliers:** Itema is economically more stable, selling annually three times more weaving looms than Dornier. The company has not recently show any decline in sales while the sale of Dornier dropped to a half over the last three years due to a high selling price.

- 5) **Experience of customers with the offered technology:** MICROTEx is currently equipped only with Dornier weaving machines for single width fabrics. IteMa weaving machines will need new training of operators and adjustors.
- 6) **Energy intensity:** The input power is almost identical for both weaving machines, however, it is slightly lower with the IteMa machine.
- 7) **Delivery and payment terms:** a) Delivery time is almost identical with both suppliers. b) Advance payment: Dornier asks by a purchase order an advance payment which is 5% higher than that of IteMa. c) Payment in instalments after delivery: This option has been offered only by IteMa. Dornier requires 100% payment after delivery. d) Interest rate: The possibility of payment in installments with an interest rate of 4% has been offered only by IteMa.

It follows from the above assessment that the weaving loom, IteMa R 9500, was chosen by 68:32 points.

5.5.3 Criteria for assessing the selection of technology

- 1) **Purchase price and rate of return:** These parameters are currently considered the most important indicators. It is assumed that there is no essential difference between both technologies in their technical design. Therefore, the purchase price and the resulting rate of return are essential parameters for making a final decision.
- 2) **Technical design of a weaving loom:**
 - Colour change: MICROTEx requires at least 8 colours for weft threads. It can be expected that this minimum requirement will not be an issue with any offer.
 - Weft insertion using a rapier: This method of weft insertion guarantees the versatility of a weaving loom which can use weft threads of various thicknesses from very fine to coarse yarns (20 Tex to 500 Tex). Besides, if a weft thread is actively gripped by a rapier, it guarantees that the weft thread will be securely clamped, inserted and picked up by the opposite rapier with high precision. This active weft grip is not necessarily a precondition, however, it is an advantage when compared with a weaving loom which does not have this option.

- Noise level: Noise levels have an influence on the health of people who work in a weaving room, the frequency of preventive medical examinations and the use of personal protective equipment. The occupational exposure limit for noise exposure in a weaving room is 100 decibel.
- Versatility: MICROTEx requires technology enabling 280cm wide fabrics for bed covers to be made. In addition, the technology has to allow the manufacture of two 140cm wide fabrics next to each other at the same time as well as the manufacture of heavy weight chenille fabrics which are the basis of the current product line. The offered technology has to be customized to meet those requirements.

3) Service:

- Cost of spare parts: It is a very important indicator. It involves the purchase price of basic spare parts and their consumption. This information will be provided by competitors who possess and use the technology. Some evaluation can be done by comparing the prices and consumption of the current technology with those of the selected technology if there is any difference.
- Delivery time of spare parts: This indicator has a significant influence on the useful output of a weaving loom and/or its downtime. Spare parts should be delivered no later than five working days after placing an order.
- Dealership in the Czech Republic: It is an important indicator for dealing with complex technical problems. In such a case, local service is quicker and more flexible than service engineers from abroad. Besides, there is no language barrier as it is usually experienced with foreign engineers who do not speak the language.
- Warranty: The warranty period is a significant economic and qualitative indicator by which a supplier shows how much faith he has in the quality of supplied technology and how seriously he takes the delivery. The cost of spare parts belongs to significant expenses in the future.

4) **Economic stability of a supplier:** This parameter is very important for future cooperation. It is necessary to consider whether a supplier is in a state of

insolvency or bankruptcy and/or whether a supplier shows economic stability, positive economic results and stability of sales.

5) Experience and practice of the customer with the selected technology:

The customer will choose technology with which he has long-term experience. Although it involves the introduction of a completely new product line (double width fabrics), the technical design of a weaving loom can be similar to the weaving of single width fabrics. Training of operators, adjustors and managers in completely new technology is always a time-consuming and expensive process.

6) Energy intensity: The input power of equipment and the resulting energy consumption are significant economic parameters. MICROTEx puts emphasis on as low input power as possible because it has an influence on the annual contracted power supply as well as the capacity of its own transformer station which is currently quite limited.

7) Delivery and payment terms:

- Delivery time: Standard delivery time which is acceptable to the customer is three to four months after placing an order. Long delivery time can cause problems with the planning of purchase financing as well as with the start of production and sale.
- Advance payment: Standard advance payment which is common for the purchase of technology amounts to 10% maximum and is due at the time of placing an order. Considering relatively long delivery time, a high percentage of advance payment is economically disadvantageous.
- Payment in instalments after delivery: MICROTEx prefers this financing method in the form of a supplier credit which eliminates a complicated process of asking Czech banks for a bank credit with disadvantageous security instruments. The repayment period and frequency are also significant factors. This financing method is advantageous at current low interest rates and favourable with regard to the stable cash flow of the company.
- Interest rate: The interest rate of a supplier credit ranges from 3 to 6% p.a. for international deliveries. This indicator is also a significant economic criterion.

5.5.4 Description of a DORNIER NP P1 rapier weaving machine, model PTS 8/JC

This type of a weaving machine was presented on the International Textile Machinery Exhibition (ITMA) in Milan, Italy, in May 2015. DORNIER is a world-class producer of high-technology weaving machines for household, clothing and technical textiles. MICROTEx has already been in close contact with the company because it has purchased a total of 22 weaving machines from the company so far but only for a ready-made fabric width of 142 cm.

Basic description: The weaving machine is provided with eight weft thread winders for different colours and levels of fineness. The nominal width is 340 cm. The maximum reeded width is 331 cm. The minimum reeded width is 252 cm. The above values indicate that the width of a cutting head can vary from 252 to 331 cm.

- 1) Machine frame and drive motor: The machine frame is made of first quality grey cast iron enabling various phase weaving machines to be attached. Technical specifications include the above widths. An additional transformer station may be required if the power network is different. The loom and the shed are driven by two separate servo-controlled synchronous motors. Both drive motors work synchronously at controlled speed to allow the operation of the loom as well as its motion at slow run. The main motor drives an oil pump and oil filter. The weaving width can be changed by stepless, easily accessible rapier stroke adjustment. The shed, warp beam regulator and weft setting run synchronously with reverse motion.
- 2) Warp thread system – Basic warp: Versatile mounting of the warp beam with a disk diameter up to 800 mm. The maximum weight of the warp beam is 1500 kg. A versatile 55x55mm carrier is square. This mounting is designed for the versatile basic warp beam of the WM – 13 – 862 H02 type without holes for warp knots. The tube is 216 mm in diameter. The basic warp let-off motion is controlled electronically by a servomotor through a revolving measuring system. In combination with absolute sensor technology it guarantees constant warp guidance with automatic control of warp tension at forward and backward run. Changes in warp tension levels can be programmed depending on the patterns to be made.
- 3) Back rest assembly: The back rest assembly is continuously adjustable both horizontally and vertically relative to the warp threads used and the pattern

woven in the fabric. The back rest roller is 105 mm in diameter. Its surface is treated in a special way by gas nitriding and polishing with cork to make the surface as smooth as possible. This characteristic is very important otherwise warp threads can break.

- 4) Warp threads are controlled by an electric GROB warp stop motion system, type 5620, which is adjustable both horizontally and vertically on scales. The system includes six contact bars. Individual bars are provided with a control unit to monitor any warp thread break on the right and on the left, with a 25mm scale division, continuously adjustable and symmetrically divided. The sensitivity of the control unit of the warp stop motion system is continuously adjustable. The warp stop motion system is provided with an absolute sensor, type 300. The weaving machine is designed to enable operation with an electronically controlled Jacquard loom. The servo-controlled motor works synchronously with the main motor driving the loom. Harness board: Stationary mounting, no harness board frame. Weft picking system: The weaving machine is equipped with an ELTEX electronic weft stop motion system to control both single and multiple weft picking across the entire width of the fabric. The weft stop motion system is of standard design.
- 5) Weft insertion – APS weft insertion system: The weaving machine is provided with automatic switching to a reserve bobbin in case the weft thread breaks before the decoiler. The thread is inserted from the left-hand side of the machine. The weft thread is transferred safely and gently to the centre of the shed by positively controlled rapier clamps. Multiple weft picking is also possible. The shed remains open throughout the entire insertion phase. The rapier head is flat, made of aluminium with titanium clamps. Rapier rods are made of carbon profile. Plastic rack rods are reinforced with carbon fibre. The rapier heads are plated and provided with smooth, replaceable hard metal clamps mounted on elastic carrier material. The patented weft insertion guidance system, DORNIER AirGuide, uses no guidance elements during weft insertion. This highly sophisticated aerostatic system offers contact-free guidance of the rapier rod. Compressed air is used for automatic lubrication of rapier rods. Lubrication is monitored by a level sensor in an oil tank. Air nozzles used to blow off rack rods are mounted on

the right and on the left. The reed is seated on a shaft, in ball bearings with short reed supports. A weft thread cutter is mechanically controlled. Weft let-off into a 15 liter tank takes place on the right and on the left.

- 6) Cloth take-up: A bar temple is mounted in a steel trough which is hinged and prepared for conversion to a full-width bar temple. A spreader bar is provided with right-hand thread. Bar temples are 280 mm long. They should be replaced depending on the kind of fabric and its square weight in the warp and weft threads used. Cloth take-up motion is controlled electronically. Control by a servomotor through a revolving measuring system guarantees resolution up to 0.001 pick/cm at normal operation. The adjustment of various weft setting options with the DORNIER ErgoWeave system is controlled by the main computer or directly depending on the pattern. Weft setting, which is a very important technical parameter, is adjusted in bars 3 to 62 pick/cm at 500 rpm. Cloth wind-up: A cloth roll is mounted on a 35×35mm square provided with a release pedal for the cloth roll on the right. The biggest diameter of cloth winding is 540 mm.
- 7) Selvage formation: Selvage cutters are of standard design. A semi-leno heald controlled by a selvage device is on the right and on the left. Catch selvages are removed by a cone to a vessel. Leno thread bobbins are placed on the left and on the right. There is a space for 2 leno thread bobbins. An independent, mechanically controlled, easily adjustable mini selvage device is located on the left and on the right.
- 8) Other data – Motor and gearbox: Frequency: 50 Hz. Operating voltage: 400 V. Maximum speed for the product line: 460 rpm. Machine colour: Green, RAL 6021. Noise level: 80 decibel. Input power of the weaving loom: 7 kwh. Weft feeder: The weaving machine is provided with an electronic colour changing unit for eight colours driven by a stepping motor. A point feeder is a part of the treatment of coarse as well as fine yarns. Any colour sequence is possible during operation. The weaving machine is provided with eight cartridges of colour change. With regard to its conception and design, the safety of the weaving machine conforms to all relevant provisions of the following EC directives and standards: Directive 2006/42/EC on machinery, Directive 2006/95/EC on low

voltage, and Directive 2004/108/EC on electromagnetic compatibility. Data transfer is done with the help of twoflash disks.

- 9) Price and payment terms: Price: 113 495 EUR/machine. Payment terms: Advance payment of 15 % of the contract price at the time of placing an order and 5% upon the machine receipt and signing a Commissioning Justification. Delivery time: within four months after signing the contract. Warranty: 12 months after the receipt of the weaving machine.

5.5.5 Parts of each complete Jacquard weaving machine

Each complete Jacquard weaving machine includes a Jacquard frame, Jacquard machine and Jacquard attachment.

- 1) Jacquard frame: The purpose of a Jacquard frame is to attach a Jacquard machine above a weaving loom. A Jacquard frame is made of steel beams. It is modified for MICROTEx so that two Jacquard machines can be attached. Height G is a crucial indicator for the long-lasting correct function of a Jacquard machine and for the long useful life of a Jacquard attachment. Height G is 4650 mm for MICROTEx. Height G is also the distance between a Jacquard machine and the floor. The greater the value of height G is, the higher the Jacquard machine is situated and the smaller the angle between Jacquard cords and the axis of Jacquard attachment, which means that Jacquard cords are less stressed by friction. Beam bases are fixed to the floor with bolts. A walkway with a guard rail makes a Jacquard machine easily accessible. The walkway is connected to the floor by means of a service ladder. A Jacquard frame is usually green. The price of a Jacquard frame for two Jacquard machines is EUR 10,600.
- 2) Jacquard machine: A Jacquard machine is a part of each complete Jacquard weaving machine. The purpose of a Jacquard machine is to create a pattern in a fabric during weaving by using Jacquard cords and then warp threads which are tied above the weft thread. Jacquard machines from Stäubli (France) are considered for MICROTEx. The company has already several Stäubli Jacquard machines. Considering their quality, those machines currently represent the cutting edge in Europe and are also favourable with regard to the price/performance ratio. Stäubli LX 1602 electronic Jacquard machine has been chosen. Basic characteristics of the machine: A total of 5120 hooks, 16

module rows, 4800 hooks per pattern, pattern repeating in four pattern widths, 46 hooks on the right and 46 hooks on the left for selvedges, and two hooks on the right and two hooks on the left for leno. Height G is 4650 mm. The Jacquard machine is driven by a Cardan shaft. The maximum speed is 500 rpm. The weaving widths include a reed width of 290 cm and a useful width of 285 cm. The warp setting consists of 67.5 warp threads/cm. Modules are cooled with fans.

- 3) Jacquard attachment: A Jacquard attachment is the last part of each complete Jacquard weaving machine. The purpose of a Jacquard attachment is to connect hooks of a Jacquard machine with healds holding warp threads in order to create a pattern in an upholstery fabric. The Jacquard attachment is a part of the delivery of the Stäubli Jacquard machine to MICROTEx. The Jacquard attachment has been specified for the manufacture of household textiles. Basic description: Cords for a pattern are yellow, other cords are blue. There are 19,200 cords for a pattern, 46 cords on the right and 46 cords on the left for selvedges, and two cords on the right and two cords on the left for leno. Healds for household textiles are of standard design. The reed width is 290 cm. The reverse motion of Jacquard cords is enabled by springs. PES silk 110 dtex and PES silk 167 dtex are used as warp material. The price of the Jacquard attachment is EUR 16,900/machine.

5.5.6 Description of ITEMA R 9500 weaving machine

Itema R9500 is a rapier weaving machine designed for the manufacture of clothing, technical and household textiles.

The arrangement of the weaving machine is adapted to Jacquard weaving with 5120 hooks.

The Jacquard machine is driven by a Cardan shaft. The nominal width of the machine is 3200 mm, which complies with the requirement of MICROTEx for weaving fabrics with a reed width of 3000 mm.

The Itema R9500 weaving machine consists of the following basic parts:

- 1) Machine frame and drive motor: The frame is made of cast iron and consists of two sides connected with a beam.

- 2) Warp thread system: Versatile mounting of warp beams with a disk diameter of 800 mm. Warp let-off: The warp beam regulator is electronically connected with the fabric take-up regulator. This connection guarantees constant warp tension and continuous withdrawal of a woven fabric. Changes in warp tension levels can be programmed depending on requirements for a specific pattern and tension. Changes can be done continuously during weaving on a touch screen of the control panel. The machine is equipped with four warp beams.
- 3) Back rest assembly: This part of the weaving machine controls warp tension during weaving. The position of the back rest is continuously adjustable both horizontally and vertically.
- 4) Warp control: Warp breakage is controlled by an electric warp stop motion system whose sensitivity is continuously adjustable. The system consists of six bars provided with metal warp blades. The bars are divided to monitor any warp breakage in the left or right half of the warp by lighting up a respective indicator. A total of 20,000 warp blades are a part of the delivery.
- 5) Weft insertion: A weft package is placed in a weft bobbin creel for 16 bobbins (eight functional and eight reserve bobbins). The weft thread is guided by a weft feeder (eight in total) which ensures the supply of weft thread required for picking. The weft feeder is LGL Progress Vector. The weft thread is further guided through a weft stop motion system, which stops the machine upon weft breakage, to 8-colour weft change and presented with the help of a weft feeder from the left to an inserting rapier. The weft thread is inserted by this rapier into the open shed and in the centre of the fabric it is taken over by a receiving rapier. The rapiers are made of a very thin carbon fibre profile to enable weaving with the low shed, which results in less warp tension and reduced thread breakage rate.
- 6) Cloth take-up: The cloth is guided through a divided bar temple which consists of pinned rings and rubber rings. This avoids the mechanical damage of selvages. The cloth take-up motion is controlled electronically by a cloth regulator. The cloth is rolled up on a tube which is placed over a cloth roller. Each loom is provided with two cloth rollers.
- 7) Selvedge formation: A device for catch selvedge forming on the left and selvedge cutters are of standard design. Leno thread bobbins are placed on the left and

on the right to strengthen the selvages. Catch selvages are removed by a withdrawal device to a vessel.

- 8) Other data: Frequency: 50 Hz. Operating voltage: 380 V. Maximum speed for the product line: 500 rpm. Controller: in Czech. Data transfer: using flash disks. Machine colour: green, RAL 6021. A basic tool kit and basic spare parts are a part of the delivery. Noise level: 79 decibel. Input power of the weaving machine: eight kwh.
- 9) Price and payment terms: The price is EUR 62,000/machine. Payment terms: Advance payment of 10 % at the time of placing an order, 10 % within seven days after the date of receipt and 80 % in eight quarterly payments with the first payment within 90 days after the date of receipt. Interest rate: 4 % p.a. Delivery time: within three months after signing the contract. Warranty: 12 months after the date of receipt.

5.5.7 Characterization of selected fabrics woven by the ITEMA weaving machine (useful width of 280 cm)

Based on a marketing campaign in furniture stores (ASKO, SKONTO, MÖBELIX, and KIKA) and negotiations with sales representatives of double bed producers (BLAVARŇ NÁBYTEK, BETA TRENČÍN, NEW DESIGN OSTRAVA, PRO LOOM Germany, and OSCHMANN COMFORT MÖBEL), it was decided to purchase weaving machines for upholstery fabrics in a width of 280 cm. Those fabrics are used to make so-called DAYBED COVERS, bedspreads which are a part of a double bed. As those fabrics have a pattern repeat (pattern width) of 70 cm, textile designers have the chance to use the pattern forming technology of a Jacquard machine as well as different textile materials (yarns) to the maximum. This results in a fabric which covers a double bed and brings a desired added value to the product in a store. The patterns vary in different regions or countries where furniture is sold. Considering the fact that MICROTEX has no competitors for that product in Central Europe (the nearest producers are in Turkey or Spain), the company is able to respond promptly to customer demands. The useful life of a product line at furniture manufacturers is usually one year. If the sales of a product are successful, the pattern may be offered in the following period and will not be withdrawn from the product line.

MICROTEX has its own design centre. The company participates actively in various international exhibitions (HEIMTEXTIL Frankfurt in Germany and EVTEX Istanbul in Turkey).

By attending those exhibitions, which are the top trade shows in their sector worldwide, MICROTEx acquires information on designs, trendy colours for a certain period, patterns, yarns used and so on.

The colours of fabrics change every year. Trends are determined by the world's leading editors and companies manufacturing upholstery fabrics have to follow the trends and actively respond to them. Various kinds of striking yarns, glossy yarns and chenille yarns are used for those products.

Specimens of fabrics in which furniture manufacturers (TIBERIUS and URANUS FLOWER) show interest are presented for illustrative purposes.

5.5.8 Materials used and their suppliers

Warp threads: Polyester TXT 110 dtex/36 filaments, semimatt; polyester TXT 167 dtex/48 filaments/350 twists; and polyester 110 Dtex/48 filaments/350 twists, super glossy.

Weft threads: Polyester TXT 330 dtex/96 filaments, super glossy; polyester TXT 330 dtex/96 filaments, slightly whirled semimatt; acrylic chenille yarn 167 tex, colour; polyester yarn BD, 50 tex, colour; polyester silk 330 dtex/0 twist, super glossy; and polyester yarn 110 dtex, air shaped.

Suppliers: Sinterama S.p.A. (Italy), Symaco NV (Belgium), Legs Sp. z o.o. (Poland), Erdem Soft (Turkey), Gürteks (Turkey), Chemosvit SVIT (Slovakia), and AVS Spinning (Belgium).

5.5.9 Calculation for two most frequently woven product

Two fabrics have been chosen as representatives of the assortment of woven products, namely:

- Uranus flower, Desen HA 50078
- Tiberio, Desen JM 6714

In addition, cost calculations for both fabrics have been presented (see Appendix 2).

The calculations will be also used to calculate the rate of return on the chosen investment.

Explanation of calculation:

Weft count:

- The number of weft threads per 1 cm of woven fabric;
- Weft count is a value set on a weaving loom;

- Final weft count is the final number of weft threads per cm after setting the fabric aside (this value is greater because fabrics crimp).

Material:

- Description of warp and weft threads used, including their prices per 1 kg. Tex is the mass in grams per 1 km of yarn. Dtex is tex x 10.

Parameters:

Total warp count for the full width of fabric as calculated.

Final weft count per 1 cm; Further division of individual weft threads out of the final weft count.

Consumption of warp threads in grams is calculated by the formula:

Total warp count × tex (in grams)/1000

Consumption of weft threads, weft 1:

Final weft count/cm × Length of weft thread to be woven × 100

Weight:

The weight of a running meter of fabric (2.8 x 1 m) has been presented. The cut-off selvages have been subtracted from the total of weft threads.

Composition:

The percentage composition of individual materials used in a running meter of fabric has been presented.

Total price:

The total price has been compounded of the price of warp and weft materials, indirect costs of a particular weft count, and adjustment costs (see the "2015 indirect costs" table in Appendix 1).

5.5.10 Cost of the chosen investment

Itēma R 9500 weaving machine: EUR 62,000 x 4 = EUR 248,000

Stäubli LX 1602 Jacquard machine: EUR 61,200 x 4 = EUR 244,800

Stäubli Jacquard attachment: EUR 16,900 x 4 = EUR 67,600

Lietti frame: EUR 10,600 x 2 = EUR 21,200

Total cost: EUR 581,600

Exchange rate: 1 EUR = 27 CZK

Total cost: CZK 15,703,200

Calculation of the capacity of 1 loom per month

Speed (number of weft threads) = 300 rpm (revolutions per minute)

Average weft count: 30 picks/cm

Calculation of capacity:

Formula:

Speed/min x 60 x hours/day x days/month x useful output in %/30/100 = Number of metres of fabric per 1 loom per month

Calculation:

$300 \times 60 \times 15 \times 21 \times 0.9/30/100 = 1,701 \text{ m}$

Monthly capacity of 4 looms: $1,701 \times 4 = 6,804 \text{ m}$

Annual capacity of 4 looms: 81,648 m

5.5.11 Economic evaluation of the rate of return on the chosen investment

The economic evaluation of the rate of return is based on the total cost of the chosen investment, the annual capacity of four looms and the anticipated profit from the sale of a running metre of fabric.

The total cost of the investment is approx. CZK 16 million including unexpected expenses.

The annual capacity of four looms at an anticipated average weft count of 30 picks/cm is approx. 80,000 running meters of fabric.

**Table 9: Rate of return
(Source: own work)**

Average cost of 1 running meter (see the calculation):	CZK 146
Average anticipated selling price:	CZK 206
Profit from the sale of a running metre of fabric:	CZK 60
Profit from the sale of 80,000 running metres/year:	CZK 4.800.000

An interest rate of 4.5% p.a., which is approx. CZK 320,000 (an average of 2% of the investment), has to be added to the total investment.

Rate of return: Total investment/Annual profit = Number of years

Rate of return: 16,000,000/4,800,000 = 3.33 years

5.6 Relationship between MICROTEX, its employees and the municipality

5.6.1 Lomnice u Tišnova

Lomnice with an area of 1453 ha is located in Brno-countryside district in the South Moravian Region. The first written mention goes back to 1265.

Lomnice has a population of 1374 (the biggest population since 1974) (Městys Lomnice, 2015).

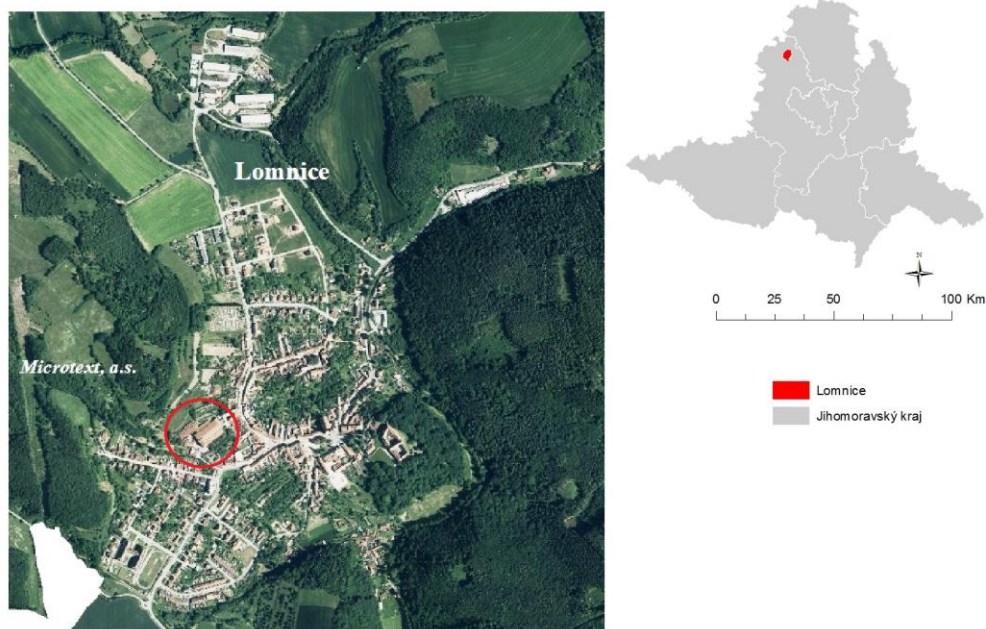


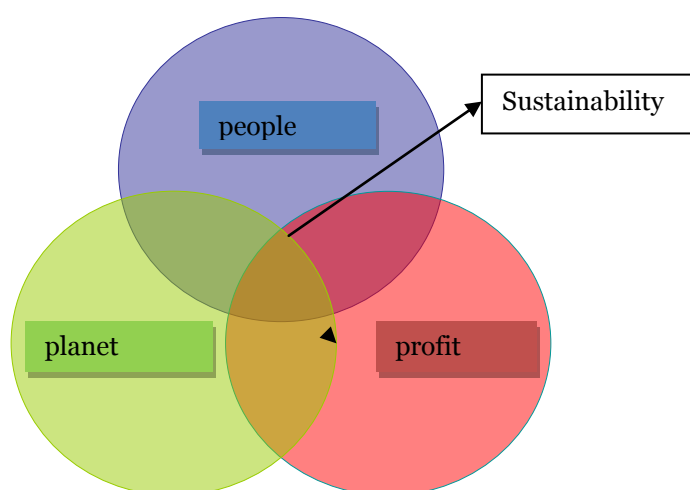
Figure 4: Localisation of MICROTEX in Lomnice and position of Lomnice in South Moravian Region

5.6.2 MICROTEX and its attitude to its employees and to the municipality where the company resides

It has already been mentioned in the Methodology chapter that debates and inquiries involved three groups of respondents, in particular the company owners, the mayor and employees who were also the inhabitants of Lomnice at that time. All respondents have a direct

relationship with Lomnice and an impact on the municipality. There is no doubt that they want to have a good life and to experience a quite course of events in Lomnice. Therefore, this part is focused on the enterprise and its impact on the municipality.

It is quite clear from the viewpoint of the enterprise that good conditions and smooth and untroubled operation of the company in Lomnice are necessary for its prosperity. The owners of Microtex have naturally built their business on general prosperity. They have made a great effort to approach their business in a complex manner. For a complex business, the management has been running the company in such a way to achieve sustainable development. It is directly associated with the social responsibility of the company, which is a modern concept of business with three fundamental pillars. This framework is called the triple-bottom-line which includes an economic pillar (profit), a social pillar (people) and an environmental pillar (planet) (Kunz, 2012).



**Figure 5: Triple-bottom-line
(Kunz, 2012)**

The economic pillar has not been taken into account because this sub-chapter deals with relationships between the enterprise and its external environment. Profit and prosperity, two basic and general goals of all companies, have been addressed in a part of the thesis concerning the above-mentioned introduction of new machines into production at MICROTEx which will

strengthen the competitive advantage of the company on international markets and contribute to sustainable development.

The social and environmental pillars are significantly integrated by MICROTEx into its business.

MICROTEx is an essential employer in the municipality of Lomnice. The company has always chosen new employees according to legislation currently in force, putting special emphasis on an equal approach to female and male applicants. The management of MICROTEx has treated all employees with maximum respect and consideration. A good relationship between the top management and employees is essential for all of them because almost all employees come from Lomnice and know the employers for a very long time. Thus, it can be said that a long lasting working relationship between employers and employees has created a good and friendly working environment. MICROTEx has realized that long-term educational development of employees brings great benefits with regard to productivity and quality of work. Therefore, MICROTEx has always paid attention to regular and effective education of its employees. Employees attend various training courses and managers create a systematic long-term training plan for their subordinates which leads to their development. Employees' health and safety are ensured in compliance with standards for safety at work. Weaving rooms are provided with safety systems and employees wear personal protective equipment such as ear protectors against extreme noises in weaving rooms.

The environmental aspect has neither been overlooked by the company. All modern machines have been purchased in line with environmental criteria. Environmentally friendly technologies have been implemented into the manufacturing process. MICROTEx has primarily focused on reducing energy consumption, waste and emissions.

The headquarters and the production plant are currently situated in a nice building which absolutely does not interfere with the integrity of the surroundings. No noises can escape and get outside through the walls of the production plant. Thus, nothing can be held against MICROTEx in this respect.

The enterprise already made several gift aid donations to the municipality and participated in various cultural and sports activities. A notable example is a local football team representing Lomnice which has been sponsored by MICROTEx.



Figure 6: The residence of MICROTEX
(Source: own work)

5.6.3 Interview with the mayor: Ing. Milan Vojta MPA

An interview with the mayor of the municipality of Lomnice was conducted to find out an overall view of MICROTEX in connection with the municipality where Mr. Vojta has been a mayor and an inhabitant of Lomnice at the same time.

Considering that Mr. Vojta has been a mayor for several years, he has got a clear overview of MICROTEX and its operation in Lomnice. As a competent person, the mayor has been in close contact with MICROTEX. Therefore, his answers to the following questions clearly express the relationship between MICROTEX and the municipality and its inhabitants.

What is the significance of textile manufacturing to Lomnice at present?

Textile manufacturing represented by MICROTEX has had great significance to Lomnice. The inhabitants of Lomnice have appreciated that MICROTEX gradually reconstructed all manufacturing and storage areas and fundamentally modernized the whole production. In their view, MICROTEX represents a top enterprise in its business sector. Employment has also been of great significance although the total number of employees is not as high as in the past. After all it is understandable because today's manufacturing cannot be compared with manufacturing in the past.

How do the enterprise and the municipality build mutual relationship?

To put it simply, the relationship between MICROTEX and the municipality has been very good because whenever any of the parties turns to the other party for help, its request is

satisfied, if possible. MICROTEx has financially supported associations and sports activities in Lomnice and in the neighbourhood.

What economic, cultural and social effects does MICROTEx have on its surroundings?

An economic effect is clear. Taxes paid by MICROTEx are significant financial assets to a municipal budget. Additionally, a considerable number of employees receive regular salaries and wages, and thus they can participate in the development of the trade sector by spending their money in Lomnice.

Financial support of associations can be classified as a cultural influence.

A social influence is similar to an economic influence. Satisfied employees are also satisfied inhabitants creating good relationships in their families.

Have you noticed any problem with environmental pollution caused by MICROTEx (release of hazardous substances, noise or impairment of the aesthetic character of the municipality and the surrounding landscape)?

The mayor has not noticed any problem with environmental pollution.

Would you welcome any extension of production considering the municipality size?

There would not be any problem with extending production with regard to the municipality size. The municipality would certainly welcome if MICROTEx extends its production because it would have a positive effect on employment in the whole microregion.

5.6.4 Employees and their attitude to MICROTEx

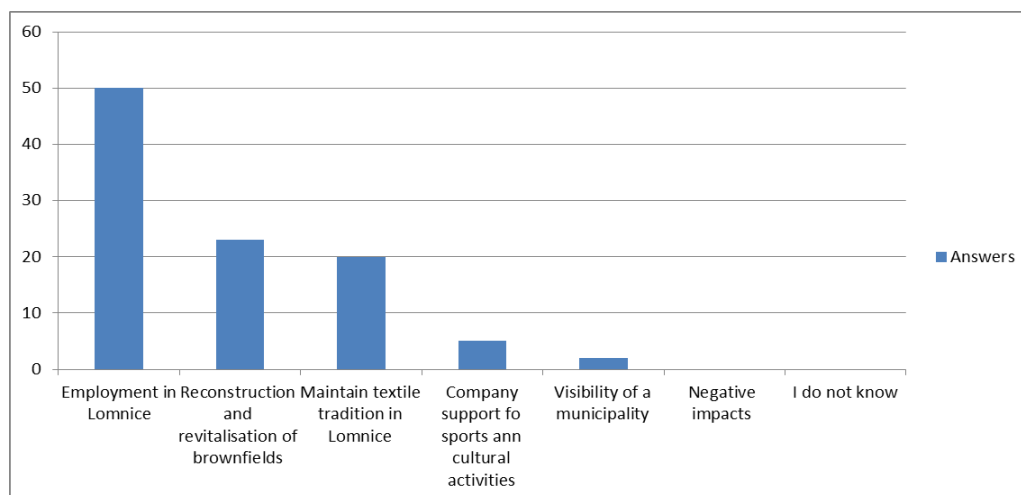
All employees of MICROTEx were interviewed by asking them a question about their attitude to the company where they have been employed. Employees who were also the inhabitants of Lomnice at that time were asked to answer just one question which gave them the opportunity to state quite openly their reasons for appreciating and respecting MICROTEx and its operation in Lomnice and/or to specify anything they would like to change in the relationship between the company and the municipality. Respondents had to give at least two examples of a positive influence of MICROTEx and its operation in Lomnice but they could also present some negative impacts. All employees answered the question in writing and anonymously. The business owners were not included in the inquiry.

The majority of employees have worked at MICROTEx since its beginning in 1996. Employees with the longest work experience in the company are those who came from bankrupt FATEM s.r.o. to MICROTEx s.r.o. It was impossible to offer jobs to all people originally employed at FATEM but a half of them, 50 people, were given an opportunity to work in a new company named Microtex in their municipality. Most of them were born in Lomnice and have

been living there till now. Their parents and grandparents were also employed in the previous textile manufacturing company in Lomnice which provided work to people for over 300 years. There is no doubt about the significance of textile manufacturing in Lomnice and its surroundings both in the past and at present. It goes without saying that any comparison between the past and current manufacturing is absolutely impossible because the conditions and circumstances were totally different. Nevertheless, it is essential that the long lasting textile tradition has persisted to the present time thanks to MICROTEx, which has been confirmed by the following answers given by the mayor and employees who are also the inhabitants of Lomnice.

MICROTEx is your employer and a business subject with its seat in the municipality of Lomnice where you live. I would like to ask you kindly to answer my question about the impact of the company on you and your surroundings. Could you please specify and describe at least two examples of positive and/or negative impacts you associate with the company having its seat right here in Lomnice? Each respondent gave at least two examples, none of them being negative. The three most frequent answers mentioned by respondents were employment, reconstruction and revitalization of brownfields in Lomnice, and textile manufacturing tradition. Regarding their great importance, the last two answers mentioned above were analysed with help from the mayor and the shareholders.

The following graph shows most frequent answers given by respondents.



Graph 3: Employees perception of MICROTEx toward Lomnice
(Source: Own work)

It is evident from Graph 3 that employees who are also the inhabitants of Lomnice have most appreciated three things with regard to the company and its benefits to Lomnice.

Respondents have most appreciated job opportunities provided by MICROTEx and a pleasant work environment right in the municipality thanks to the enterprise. The second most frequent answer divided the opinion of respondents into two almost equal parts. A total of 23 respondents have welcomed the reconstruction, revitalization and modernization of the original building and all areas at the manufacturing site. The third most frequent answer was maintaining the textile tradition in Lomnice. The local people have always been very proud of the tradition which has persisted thanks to MICROTEx to the present time in a representative way giving a good impression of Lomnice.

Based on the second and third most frequent answers mentioned by respondents and opinions given by the mayor, it would be useful to analyze all the findings in more detail in the text below with assistance from the mayor and the shareholders and by using archived records because MICROTEx and its manufacturing site, along with the school building and the parish, are famous landmarks in Lomnice. The 300-year-old tradition of textile manufacturing is of great significance.

5.6.5 Reconstruction and modernisation of the site

The reorganisation of Bytex started in July 1990. The particular works became autonomous production enterprises. The last works of the state enterprise ARANA (plant in Lomnice) was sold to FATEM s.r.o. Ing. Lubomír Pařízek was appointed as managing director. The enterprise changed the production of upholstery fabrics from epinglé to plush sawn fabrics. The enterprise had 100 employees between 1993 and 1995. The reconstruction of buildings started at that time.

The second manufacturing programme in a different field (food packaging) was introduced in 1994. Those activities gradually reduced the development of textile manufacturing in Lomnice due to bad management and caused economic problems.

Textile manufacturing did not disappear from Lomnice in that period. In 1995, the textile production management in Lomnice and business partners in Brno had different views. Ing. Lubomír Pařízek left his post as managing director of the enterprise. All workers were fired in 1996. Half of them went to work at Microtex s.r.o. while Faltem s.r.o. was going into liquidation.

At first, Microtex s.r.o. was exclusively a business company specialized in household linen. Microtex bought six used textile machines for manufacturing upholstery fabrics. The manufacturing was located in a small production plant in Lomnice u Tišnova. The company

replaced old technology by new modern machines and the production plant was extended. The dynamic development of the company needed a bigger space. In 2003, Microtex s.r.o. bought part of a weaving room, treating room, storeroom, boiler room, and adjacent estates of the state enterprise Arana. The company started multi-phase reconstruction of the whole premises in 2004. The whole reconstruction took almost four years, including the building of new rooms. Almost all activities moved to a new administrative building, while fabric treatment, output control, storeroom for finished products and the manufacture of samples for customers stayed in the original areas. Those steps restored the tradition of textile manufacturing. The whole premises after reconstruction created a dignified environment for the future development of textile manufacturing.

5.6.6 Tradition: History of textile manufacturing in Lomnice since 1945

The tradition of textile manufacturing is almost 300 years old. Lomnice was desolate after the Thirty Years' War (1618 – 1648). The owner of the manor, František Serenyi, brought many settlers from his manor in Zlín to rebuild the small town and crafts. He built 25 houses for them. Almost all settlers were hosiers and drapers. A new trading order replaced the original association in 1859 (guilds). The establishment of the association was the beginning of a textile manufacturing tradition, first as handicraft, later on as manufacture and finally as industrial manufacturing in Lomnice.

Emanuel Hechten and Otto Kuhnen set up small hand weaving workshops.

Another industrial building for the manufacture of knitted clothes (underwear) was constructed in 1880. The factory was not successful. Arnošt Körner bought the factory in 1889. From that time, the factory went through a boom with kerchiefs, scarves and knitted products. Those products expanded to all countries of Austria-Hungary. A huge demand for products required other looms, weft and warp for handlooms in the household.

In 1905, the factory needed more employees both in the factory and at home. The factory employed around 500 people, which was the biggest number that factory reached.

The First World War caused a decrease in manufacturing and the factory finally closed down in 1915. In 1919, it was sold to a newly established corporation called Textile Works specialized in cotton, silk and knitted products.

Processing machines, such as hydraulic presses and ironing machines, were purchased at that time. In addition, a new building was constructed to serve as a warehouse and a new

engine room producing electricity. The whole factory was heated by a central steam heating system.

The chenille manufacturing of kerchiefs and scarves was transferred from a subsidiary in Teplice. Employment was increasing in Lomnice and its close surrounding thanks to the purchase of knitting machines. The World economic crisis reduced manufacturing. Employment was again growing in 1933.

The fascist occupation affected also this work. Only a very small portion of total production was manufactured in Lomnice. Knitting was orientated especially on knitted products for the German army. Silk kerchiefs were exported to Sweden and Germany. Cotton kerchiefs were supplied in limited quantities to Slovakia.

All of those circumstances influenced employment. After 1945, the works employed around 150 people.

5.6.7 Tradition: Works development since liberation in 1945

Almost two months later, looms and knitting machines worked for the welfare of the nation.

Manufacturing was opened without bigger problems thanks to preserved resources such as materials. The works in Lomnice filled up empty shops with its products. New orientation was to kids clothes. It was a positive period of development.

Automation was increasing due to new machines and production capacity was growing. Foreign production orders were ensured and the state gained desired foreign currency.

National authorities allowed the enterprise to keep its status until 1949 when it was nationalized after the socialization. The enterprise first became a part of Mona in Ústí nad Orlicí and later on of Bruna in Brno. Finally, it was incorporated into Modeta in Jihlava. Modeta was a specialised knitting enterprise. Therefore, an effort was made to cancel weaving looms.

After long proceedings, the enterprise was definitely incorporated into Moravan Brno. A decision was made about its specialisation in household textiles.

In 1957, two automated machines were purchased to be used for furniture fabrics called epinglé.

Bytex Rumburk and Moravan Brno moved to Lomnice. A lot of repairs were done and the original plant was extended for that purpose. Sixteen full-automatic weaving machines for the manufacture of epinglé fabrics and another five machines from Bytex Rumburk were installed in new weaving rooms.

Manufacture in the works under the name of Bytex, Plant 6 in Lomnice continued from 1965 to 1990. The continuous flow of material was solved thanks to structural changes between 1965 and 1966.

In the first quarter of 1966, machines for final adjusting of furniture fabrics were introduced. The following years were characterized just by supplementing and replacing those machines.

The modernisation of all operations was prepared in 1977. Predicted costs were around 95 million Czechoslovak crowns.

No large construction projects were possible because of a total shortage of building sites. Preparations started in 1984.

6 Discussion

In order to be able to put this thesis together, I had to learn more about the company and to spend more time there. The owners introduced me to the company and its history, showed me production, explained the operation of weaving machines to me, and presented the product portfolio of the company to me. Above all, they gave me sufficient and valuable information thanks to which I was able to get an overview of the way how the company had operated so far and to understand the plans of the company in the future. The form and concept of this thesis was discussed with the owners after the general introduction of the company. We choose a project which would summarize, update and analyse all the information prior to the introduction of the chosen investment in the company. I strived to make this thesis useful to the company as well as to meet the requirements of the thesis. The form of this thesis was chosen on the basis of a concrete innovation which was the object of this thesis. The preference of a concrete technical innovation chosen to benefit the company involved the purchase of four weaving machines for new widths of fabric which would be used to make bedspreads for double beds.

All the necessary information and concrete ideas of the owners were important to me as an author of this thesis. A general marketing analysis of the company was put together based on the company requirements. Besides, I was involved in several negotiations with sales managers representing the producers of double beds. The technological part of the thesis included the selection of an appropriate weaving machine and its parameters from the right supplier as well as the presentation of technical parameters of the selected weaving machines and their economic evaluation. In addition to the above topics, which are naturally a part of this thesis, the theoretical part describes the textile industry in the Czech Republic and in Europe, innovations related to the textile industry, illustrations of textile centres and companies preferably focused on household fabrics in graphic and tabular forms as well as a detailed description of weaving machines, justification of selected criteria and, last but by no means least, the relationship between the company and the municipality where it resides, impact on employment and other positive effects as identified by interviews with the employees and with the mayor of Lomnice. All those parts were appreciated by the company. An analysis of companies with a similar production line and their position in the European market was useful to MICROTEX as it learned some completely new or less famous companies. The combination of all those parts was a basis for an internal company document as well as for this thesis. The above discussion preceded the compilation of this thesis. Individual parts of the thesis are discussed in the following paragraphs.

The question is why the company wants to buy four new weaving machines to be used to make new products if it prospers very well even without them. It has already been said that technical and household textiles, including upholstery fabrics in the event of MICROTEx, are a business area with great innovative potential. Besides, MICROTEx is aware of the significance of its development. Therefore, the thesis prepared a basic document for purchasing new sophisticated weaving technology with reduced material and energy consumption thanks to which MICROTEx would be able to manufacture new widths of fabric and new products, and thereby extend its product portfolio. The future prospects of the company include the possibility of connecting new widths of fabric with its own designs or various technical properties. Thanks to its own design centre and an interaction between production and development activities, the company can make good technical progress which will be reflected in the characteristics of new products. Thus, the company can diversify its production from other textile manufacturers who make usual kinds of fabrics in large volumes as well as satisfy and strengthen business relationships with its customers to whom the products will be supplied. There is no guarantee of absolute success but this is the only chance to face the mass production of other companies and to make its own product line with a broad spectrum of fabrics unique. Unique production principally reflects technical development and utility properties of fibres used. The specification of demand is associated with sensing signals in global or specific markets and with market research which is done on a continuous basis in order to define market needs. The importance of the technical and technological development of production determines the future economic standard of the society.

Many issues have already been mentioned in a marketing analysis but the discussion should also mention competitors of MICROTEx or companies with a similar product line. MICROTEx has almost no competition in the Czech Republic and in Eastern Europe. An analysis of companies in Western Europe manufacturing similar upholstery fabrics as MICROTEx has revealed that most of them are in Spain. MICROTEx has established business relationships with the sufficient number of domestic and European customers. Thanks to them, MICROTEx does not consider other similarly focused companies as direct competition because the sale of its fabrics is primarily based on long-lasting business relationships. In case any customer breaks off collaboration with MICROTEx, it does not mean a threat to the company as there are still many others. Besides, the company naturally seeks new customers who may become long-lasting business partners in the future or the business relationship is one-time-only.

Based on the evaluation criteria, the Itema weaving machine is considered to be the most suitable technology for a number of reasons as mentioned elsewhere in the thesis. The total investment amounts to CZK 15,703,200 which is almost the half of the price of the Dornier weaving machine. The weaving machine is of high quality and according to other selected criteria very useful to the company. MICROTEX considers purchasing four weaving machines so that the investment would provide more benefits. The monthly capacity of four looms is 6,804 m of fabrics and the annual capacity of four looms is 81,648 m of fabrics, which is a sufficient quantity of fabrics to cover the demand of furniture stores and producers of double beds. At this rate of sales, the total investment would return to the company in about 3 years and 4 months, which means a high rate of return on the investment back to the company.

The last part of this thesis focused on the relationship between the company and its surroundings. MICROTEX is an essential employer in the municipality of Lomnice. The execution of an investment plan will result in an increased number of employees. Thus, the investment plan can be very beneficial to the municipality as the current jobs will be stabilised and new job opportunities will be created at the same time. Four or five new employees will be necessary considering the number of purchased machines.

Research, development and production are essential preconditions for keeping the competitive ability of the company and for manufacturing new kinds of fabrics.

Achieving more efficiency and a high level of performance relate closely to the execution of development plans as well as to the ability of the company to seek new opportunities and markets and to meet the increasing demand. The aim of the purchase of new technology is to provide a broader and more significant spectrum of orders with regard to volume. Another aim is to achieve a higher level of performance, better production and capacity possibilities and the ability of restructuring and optimising. Thus, it can be said in conclusion that this thesis has strived not only to improve the performance of the company but also to increase the ratio of the value added to the production unit and to be able to choose products different from the current product portfolio.

7 Conclusion

MICROTEX is a real example of a textile company which has successfully operated in domestic and European markets for more than 20 years. Entrepreneurship in the textile industry may seem to be curiosity in Europe but the truth is quite different. Technical and household textiles in particular are very promising products for many European countries because their research and innovations currently represent the cutting edge in Europe thanks to which companies keep a great competitive advantage. The quality, functionality and timeless design of textiles are basic elements which individual companies would like to achieve, and thereby strengthen their position in the market.

Prior to introducing a new machine, production technology or a new finished product, each company has to identify and learn the demands in its market sector. Each country has its own preferences. Each company has to know closely all markets where it operates.

The knowledge and experience can help companies to find new unoccupied markets or markets where the supply of a demanded product is not fully satisfied. Therefore, the top management of MICROTEX constantly follows and evaluates market trends and customer demands and launches new products of its own design and technically improved functional textiles into a market. The current intention and the ultimate goal of the thesis was to put together a basic document before new machines would be introduced into the company. After a market analysis and the assessment of the possibilities analysing whether the company can afford the investment and whether the company will be given credit, the following step was selecting the right supplier who would offer the best conditions to the company. After choosing the most appropriate supplier, the weaving machine was economically evaluated to show the company how long it would take to get the investment back. The primary and main intention of purchasing new machines includes naturally their benefit to the company with regard to stabilisation and further strengthening of the economic base of the company and an expected positive impact on the competitive ability of the company in domestic and international markets. Leaving aside the benefits to the company itself, there are also other benefits to be mentioned, such as benefits to the municipality and the surroundings. It means exactly those benefits at regional and local levels that are associated with keeping current jobs and creating new job opportunities, which contributes to the stabilisation and further development of the region with a relatively high rate of unemployment. Consequently, benefits will also be noticeable at international level thanks to the strengthened position of the company in international markets and an opportunity to start

deliveries to new customers. Furthermore, the company has met environmental criteria thanks to modern environmentally friendly technologies. All those circumstances create favourable conditions for the coexistence of the company and its surroundings, which particularly applies to a company like MICROTEX that carries on the long lasting tradition of the textile industry in the region.

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9 Appendix

Appendix 1. 2015 indirect cost

Table 10: 2015 indirect costs based on weft counts
(Source: own work based on data from MICROTEx)

		Indirect costs based on weft counts			
Weft count/cm	CZK/m	Weft count/cm	CZK/m	Weft count/ cm	CZK/m
10	17.5	21	37	32	56
11	19.5	22	38.5	33	58
12	21	23	40.25	34	59.5
13	23	24	42	35	61.5
14	24.5	25	44	36	63
15	26.5	26	45.5	37	65
16	28	27	47.5	38	66.5
17	30	28	49	39	68.5
18	31.5	29	51	40	70
19	33.5	30	52.5	41	72
20	35	31	54.5	42	73.5

Appendix 2. Calculation

Table 11: Calculation of URANUS FLOWER HA 50078 double machine

Source: (own work, data source: MICROTEx a. s.)

Type:	URNUS FLOWER HA 50078 double machine		
Weft count: 38 adjusted; 40 done			
Material: Warp:	PES 110tex/350 SBR	214	
Weft:	PES 330 Dtex/96 LNTR SBR	135	
	PES 330 DtEx	100	
Parametres:	Total number of threads	20000	from that: 26.7 LNTR SBR 330/96
	Weft count	40	13.3 PES 330
Warp:	220 g = 47 CZK		
Weft:	PES LNTR $26.7 \times 3.2 \dots 282$ g = 38 CZK		
	PES TXT $13.3 \times 3.2 \dots 141$ g = 14.5 CZK		
Weight:	643 - 15 = 628 g		
Composition:	100 % PES		
Price:	Warp:	47	
	Weft 1:	38	
	Weft 2:	14,5	
	Adjustment:	10	
			Weft count 38 = 173.50
	Costs:	70	Weft count 36 = 167.50
			Total price: 179.50

Appendix 3. Calculation

Table 12: Calculation for a TIBERIO JM 6714 double machine, stripes
(Source: own work, data from MICROTEx, a. s.)

Type:	TIBERIO JM 6714 double machine, stripes		
Weft count: 20 adjustment; 21 done			
Material: Warp:	PES 110 DTex/36 black	178	
Weft:	PES LNTR SBR 330 DTex	135	
	Chenille PAN167 Tex	177	
Parametres:	Total number of threads	20000	from that: 19.95 PES
	Weft count	21	1.05 chenille
Warp:	220 g = 39.50		
Weft:	PES: $19.95 \times 3.2 \dots 211$ gr = 28.50 CZK		
	jaquard: $1.05 \times 3.2 \dots 57$ gr = CZK		
Weight:	488 g - 25 = 463 g		
Composition:	88 % PES, 12 % PAN		
Price:	Warp:	39.50	
	Weft 1:	28.59	
	Weft 2:	10.00	
	Adjustment:	10	
	Costs:	37	
			Total price: 125.00

Appendix 4. Figures



Figure 7: The residence of MICROTEx a. s. (Source: own work)



Figure 8: Overall view of the ITEMA weaving machine (Source: Own work)



Figure 9: View of more ITEMA machines (Source: own work)



Figure 10: View of a fabric being woven (Source: own work)

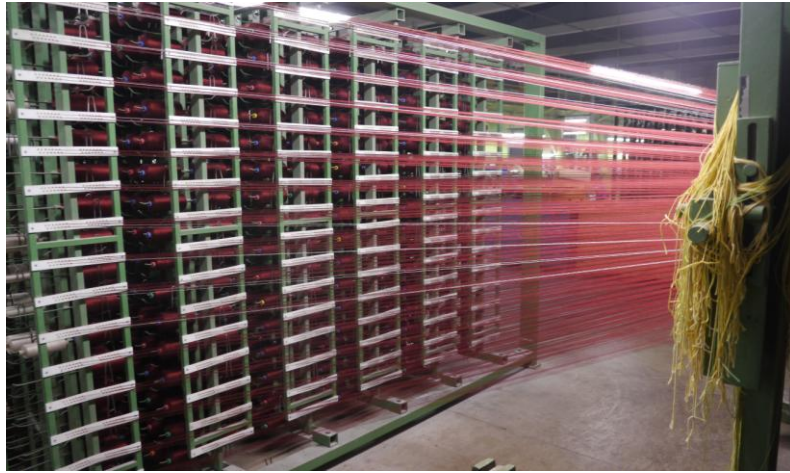


Figure 11: View of bobbin creels (Source: own work)



Figure 12: Machine control panel including a monitor and weft dispensers (Source: own work)



Figure 13: View of materials preparation (Source: own work)