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I dedicate this thesis to my mother and father.

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List of abbreviations

CEE	Central and Easter Europe
EMS	Electronic Manufacturer Services
EU	European Union
EUR	Euro
FDI	Foreign Direct Investment
INC	Incorporation
INT	International
MNC	Multinational Company
NEG	New Economic Geography
OEM	Original Equipment Manufacturer
USD	US-Dollar

Introduction

Multinational companies acting globally nowadays are exceptionally exposed to competition. This not only leads to extremely challenging competition but to a high competitive pricing policy among companies. Producing industry is especially affected by this kind of development. Because of that, the question about an investment into a new location is today one of the most central questions, which confront many enterprises.

Opening service markets, compatible currencies, high technology and also fast traffic between all points of the earth, accessible for almost everyone, have sped up this process leading to a rising global competition. Due to the EU enlargement of 2004 and of 2007, post-communist states joined the European Union. As rapidly as the political situation is changing so does the economy of these new member states remarkably affecting in both directions the shape of the overall European market. Opening borders, the free trade of goods and liberalized capital market is boosting competition as well pressure on production industry.

Which advantages drive companies to choose a location in a developing region in Eastern Hungary? Which microeconomic factors affect those decisions in Eastern Hungary? Which of those factors really matter in a real life situation? How does the ‘human’ factor affect location decision?

These were the questions I asked myself and I was interested in before I decided to choose the topic “Location choice of multinationals in Hungary based on microeconomic data on the case of Flextronics International Ltd.”. I travelled regularly to Flextronics factories in Hungary and carried out several interviews in Vienna with current and previous employees of the company.

Literature review

My thesis should reveal the process of choosing locations in Hungary by a Flextronics International Ltd. Not every location factor can be discussed in detail but the most actual, relevant research findings will be presented. An emphasis is given on those locations factors which are also frequently considered in the practice. I also want to reveal why certain location factors are important, and I want to show the development of certain location factors and the influence of the economic and political environment on these location factors.

I have always viewed the whole thesis topic from the point of view of a company that considers establishing a plant in Hungary. I tried to show advantages and disadvantages of the location, always considering what different motivation and aims such a company should have. The case study of the Flextronics International Inc. choosing a location in Eastern Hungary follows this idea.

The structure of my thesis is as follows:

In the first chapter I focus on the location theory and factors. I deal with the historical development of established theories and study main factors as well components used in location theory. I highlight here also the common sense between theory and the Flextronics case study which I present in my thesis.

In the following chapter, I introduce the manufacturing company Flextronics as a company in Hungary, emphasizing Hungary as a potential location for corporations. I deal with the decision process by Flextronics and compare selected Hungarian cities based on microeconomic data set where the company was planning to build a plant.

In Chapter Three I evaluate the decision with empirical methodology and make a theoretical conclusion from it. I show the location decision via the calculation with the methodology of Decision Matrix and Steiner Weber Model – common methods for decision making based on micro economical data set.

1. Location decision theory

In this section of my thesis I will show first how the historical development of different theories has been established between the 19th and 20th century. In further sub-chapters I will analyze what criteria Flextronics used to select my hometown Nyiregyhaza among other cities such as Miskolc and Debrecen. For this comparison I will use panel data from these three different cities. Each factor will be described theoretical in comparison with Flextronics location choice. Also the established theories from the past until present will be introduced shortly and how they could fit into the location choice of Flextronics. The result of these theoretical models will be summarized in a table at the end of the chapter and interpreted as to what that means. Model-based calculation with the Decision matrix and Steiner-Weber model can be found in chapter 3.1 and 3.2. The established theory to both methods will be considered in subchapter 1.9.

1.1 Historical development of established theories

The first models dating from the nineteenth century are focused primarily on the agricultural sector, while later a shift of focus occurs towards the industrial sector but today more priority given to the tertiary sector. The breakdown into those three economic sectors can not capture today's standards in our globalized world. Service sectors would need to be broken down into separate industries as well as a distinction between normal growth industries and non-growth industries are also conceivable. Further distinction between location- and non-location bound industries lose on relevancy through the time.

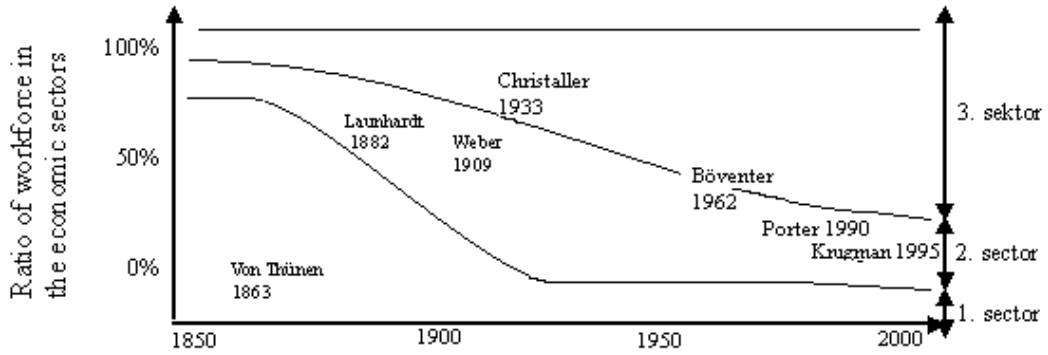

Figure 1: Models against the background of economic change[1]

[1] Bodenmann (2006), p. 7.

Flextronics location choice in Hungary is primary reflected by the models that were established for two or three economic sectors. The combination of the three sectors should reflect the “free economic globalisation markets” today where Flextronics is a global player.

1.2 Economic environment

Later on in the 19th century, models were focusing on farming and industry, where transport costs played a significant role. Various models created depicting the interaction between market participants in a given environment proved that all interactions between cities at growing distances to each other continuously decrease, operationalizing this conclusion in a model. As production size increases, internal savings come into play. By attributing operational fixed costs for machinery, work space or infrastructure to a larger number of production units, a lower product price is achieved, which makes for a competitive edge for the company. The external savings continue to be subcategorised in localisation and urbanisation savings. Localisation effects are site-external of agglomerations but occurring inside the sector. Urbanisation effects are within the sector, between different activities as well.[2]

Porter’s diamond concept (1990) used the competition between local rivals and local environment. He enables in his work suitable investment options, by using quantity and costs of production factors and clusters existence as model variables. His model consists of production cost, size benefits, sectoral structure, state intervention and further factors. The concept here is due to scale-, localisation- and urbanisation economies and savings. The companies belong here to the same or differing sectors and will concentrate at certain locations. All variables are of explanatory kind and developed for two or three economic sectors. [3]

[2] Näf-Clasen (2004), p. 74-89.
[3] Wagner (1994), p. 150-175.

Presenting agglomeration effects in a model with a concrete variable is difficult. For this reason, the studies dealing with agglomeration effects use a diversified range of indicators. The forefront is occupied by the resident population, population density, labour force, employment per industrial sector, employment in growth industries or agriculture, innovations, and so on. Von Böventer (1975), for instance, aligns agglomeration factors with city size (resident population) where he divides the agglomeration factors into 3 stages as intra-urban, intra-regional and inter-regional. To measure the sectoral differences, he looks at the employment structures, growth effects in individual sectors and on workforce shift from less- to more productive industries. For this he uses the difference in the workforce proportion employed in the agricultural sector to the total number of those employed in all economic sectors. An alternative way of modelling the external and partially internal agglomeration effects is being applied today in economic structural analyses. The shift-share analysis makes possible the distinction between a factor of sectoral structure and a location factor and is based mainly on existing data.[4]

Christaller (1933) was the first model researcher who uses explanatory variables for three different economic sectors with centrality as the main driving force behind his model as dependant variables.

Related to the weighting of distance, three main approaches are examined: the Central Locations Approach, the Isochrone Approach and the Potential Approach. The Central Locations Approach is based on the model by Christaller (1933) and measures the average travel costs from one given location to selected locations which are fulfilling functions of central locations. This approach is comprehensive and easy to calculate. The results do not provide full coverage and ignores traffic behaviour. The Isochrones Approach measures the number of activity points within a certain travel time around an examined starting point. This approach is often used in connection with location choice of multinational companies or the building of shopping centres.[5]

[4] Frey and Schaltegger (2002), p. 55-75; Bodenmann (2006), p. 15-16.
[5] Bodenmann (2006), p. 18-19.

The Potential Approach assumes that man behaves rationally and always strives to maximise his/her benefit while the activity points are weighted according to their attractiveness (number and averaged travel cost). The related weighting is applied via a negative exponential function. Therefore activities in direct proximity of the studied point will receive a much stronger weighting than points at a greater distance (always computed in averaged travel costs). Several quantifiable phenomena, such as land prices, rent or development activity, correlate with the availability thus computed. When it comes to showing distances and averaged travel costs in one model, the Potential Approach seems to be the most suitable and achieves a good practical using in reality (as long as the available data allows for this).[6]

Lösch (1940) used economies of scale, localisation and urbanisation economies where external savings are mentioned in the analysis but ignored in the model. He uses also like Christaller (1933) centrality as dependant variable with size benefits and sectoral structure for two or three economic sectors.

Zipf (1949) was the last one who uses centrality as dependant variable with resident population as explanatory for two or three different economic sectors (compare for dependant variables Christaller (1933) and Zipf (1949)).

The results however are more difficult to explain to a larger audience. While the results of the Isochrone Approach are measured in persons and the Central Locations Approach in minutes respectively, the Potential Approach merely states a figure which was notably derived from a reasonably involved calculation. As rule of thumb new locations are not too far away from the existing site, otherwise they risk loss of their networks and qualified workforce (Sedlacek, 1994; Pellenbarg, 2005).[7]

Flextronics considers the distance between the border and other distribution centers. It was vital for the company that the border to Romania and most importantly Ukraine was close to its further factory because of transportation costs. Debrecen and Miskolc are further away from the borders Romania and

[6] Bodenmann (2006), p. 19-20.
[7] Zhao & Decker (2004), p. 17-22.

Ukraine than Nyiregyhaza and this was a positive argument for Flextronics to settle down in Nyiregyhaza. Romania and Ukraine are two of the most important free economic markets for Flextronics and the nearness to these countries with an own custom division in the industrial park of Nyiregyhaza was another very good fact against Debrecen and Miskolc.

1.3 State interventions, local taxes and regional policies

Porter's research study has recently been dealing with the impact of state intervention on location choice and is particular an in-depth contribution to the competition between regions and countries. Gatzweiler et al. (1991) names taxes, infrastructure and legislation as key areas of impact where infrastructure can be further specified as capital equipment-oriented and human capital-oriented. Household-related public goods are necessary importance of human capital as a production factor is ever increasing while the recreational and schooling provisions for children play a particularly significant role. Grabow et al. (1995) arrives at the joint conclusion that capital equipment-oriented infrastructure includes traffic-, communications-, supply- and disposal facilities. These factors have a much greater impact on the choice of location than human capital-orientated infrastructure, which stands for the education level or knowledge transfer facilities.[8]

Geiger (1973) obtained his results from data where he used situation and economic rent (land prices) as dependant variables and as explanatory ones like transportation costs, state intervention, location features. It was created for two or three economic sectors with resident population and sectors considered in the accessibility calculation. He looked into the capitalisation of public investments in land prices, landed property and rents and to this end compared various research works. As result he finds evidence of the impact of tax rates and improvements in traffic infrastructure on the attractiveness of a location. Little evidence was found suggesting an impact achieved through location-bound subsidy payments. [9]

[8] Frey and Schaltegger (2002), p. 75-85; Bodenmann (2006), p. 18-22.
[9] Bodenmann (2006), p. 18-22.

Smith (1971) replaced some variables by energy costs like electricity, land prices and sales costs as model variables to obtain empirical results. He used as dependant factors situation and economic rent as profit zone. Explanatory variables are price end products, production and transportation costs, size benefits, sectoral structures, resident population and some further factors. He develops his model for two economic sectors.

In several CEE countries, special industrial zones are favourable who were created to attract foreign investors.[10] In order to represent the location choice of enterprises it should, be easier and more to model the effected infrastructure (changes): smaller generalised transport costs and thus an improved availability and a better provision of education on primary, secondary and higher level (measured in teachers/tutors). Indicators regarding the supportiveness of authorities of the economy as well as the processing of applications would have to be inquired in a separate poll.[11]

Local taxes have been found to be a deterrent force for firms and they have a particularly adverse effect but the coefficients are negligible in most cases. The impact of the state is depicted mainly through the tax rates for natural and legal persons as well as the investments in infrastructure while land prices and rents are directly dependant upon the attractiveness of location. Sensitivity was rather low and highly variable among industries and size while local personal property tax rate has a negative effect on establishment growth but local government expenditure variables show little or no correlation with firm development.[12]

Flextronics decision to invest in the North-East of Hungary has further reasons also. State intervention happens as the typical taxes for land and buildings, especially factories, diminish from one month to another one. The tax rate for companies in Hungary was very favourable with 16% - it was lowest rate at this time in whole middle Europe (see Table 4). Local taxes and regional policy were very favourable for Flextronics because the local personal property tax was lowered form 10% to 1% for the whole region after the investment of Flextronics. The industrial park has a big impact on investments in Nyiregyhaza when access

[10] Zhao and Decker (2004), p. 15-17.
[11] Bekes (2006), p. 7-10.
[12] Bekes (2005), p.7, 22-24.

and agglomeration controlling occurs – Flextronics investment attracts other firms to settle down or build up some distribution-/logistical centres or warehouses like TESCO and ALDI did in recent years.

1.4 Labour market effects

Lower wages reduce production costs and higher unemployment provides the necessary labour supply for new investments in the theory and both effects should attract FDI. Studies of international location choice certainly support this position. Woodward (2002) shows in his study that local wages have the expected signs while Holl (2004) shows in his study that insignificancy of wage coefficient is given.[13] The migration of labour within one country would explain these differences while different industries would use different labour types for skills and profession. The number of blue-collar workers may vary among sectors and their wage depends on their skill. The industry profile of a region may well influence the average wages implying that superior technology is bought in by investors and require more skilled, educated sort of labour. This is reflected in higher wages while this sort of labour is more expensive for the company.[14]

The price for human capital is lowering by moving from West to East. As Flextronics main approach was to lower manufacturing costs by lowering salaries it found Eastern Europe and so Eastern Hungary very attractive. The unemployment rate was the lowest in Nyiregyhaza (6.70%) against Debrecen (7.50%) and Miskolc (8.70%). In absolute terms this means that Nyiregyhaza (5,341) has here also the lowest unemployment rate against Debrecen (9,351) and Miskolc (7,773). Another big advantage was that the gross salaries have been the lowest (€/month) for white- and blue-collar workers in Nyiregyhaza (577/269) against and Debrecen (800/402) and Miskolc (762/391).[15] These all together were further positive factors for Flextronics to make the choice for Nyiregyhaza.

[13] Zhao and Decker (2004), p. 20-21.
[14] Bekes (2005), p. 5-6.
[15] KSH (2007): http://www.ksh.hu.

Isard (1956) used localisation- and urbanisation economies as well as state activities as model variables to get empirical results in equilibrium. He encountered his model for two or three different economic sectors. Von Böventer (1962) used the population density, labour force, sectored employment, transportation modes, distance and accessibility as model variables in equilibrium. He considers here two or three economic sectors.

1.5 Market access and agglomeration effects

New economic geography models aim the essential reasons behind agglomeration and dispersion of economic activity by taking into account geography features (e.g. access or proximity to potential consumers, suppliers of intermediate goods for production). Agglomeration externalities were first described by Marshall. Labour migration is an agglomeration force while an increase in population generates a greater demand inviting more firms to settle in larger city and this determines a lower import bill and living costs at a lower level.[16] The potential of supplier-buyer link between firms (one firm's output is the intermediate good of another one) is another reason for agglomeration effect. Firms try to locate close to other firms to lower the transaction costs for production and transportation.[17]

Another reason for agglomeration could be named the presence of knowledge spillovers. Here the proximity allows exchanging inventions while technology spillovers help to increase productivity using other firms' knowledge.[18]

Krugman (1995) used transport costs, real wages, spending power, economies of scale, localisation- and urbanisation effects, number of produced goods and expenditure in the growth industry for localisation- and urbanisation effects as model variables. These were all equilibrium variables for two different sectors under explicit inclusion of labour cost and transportation costs approaches. This model is one of the last developed for two economic sectors. His studies considered countries of similar size and population to Hungary, where

[16] Fujita, Krugman and Venables (1999), Chapter 16; Bekes (2006), p. 2-3.
[17] Krugman and Venables (1995), p. 98-107; Bekes (2006), p. 4-5.
[18] Amiti and Pissarides (2001), p. 35-38.

multinationals' location choice in Ireland was studied to find that proximity to major ports, airports and agglomeration effect forces location choices.[19]

The density of the actual location as urbanization attracts agglomeration by helping at face-to-face communication or the spillover knowledge while higher land prices and congestion are deterrent factors for multinationals. There is a positive effect of urbanisation on location of manufacturing plants and also the proximity to businesses that provide services for manufacturing firms (banks, accountancies).20

Another reason for Flextronics decision was that the GDP county based ranking was the best for Nyiregyhaza (12) against Debrecen (17) and Miskolc (16) out of 19 in whole Hungary. The FDI rate (% related to the total FDI in country) was for Nyiregyhaza (19%) the lowest while for Debrecen (21%) and Miskolc (29%) were significantly higher. But the management board saw this as a "hidden capacity" - possibility for the whole region to boost up the regional development. The numbers of economically activity shows the same result while Nyiregyhaza (120,000) has the lowest one against Debrecen (350,000) and Miskolc (175,000) – big capacity and possibility for new white- and blue-collar workers. The average population density and the area did not played a big role in the decision role for Flextronics against the theory description (Nyiregyhaza 452.92 people/km² - 274.46 km², Debrecen 442.53 people/km² - 461.25 km², Miskolc 736 people/km² - 236.69 km²).[21]

[19] Barrios, Strobl and Görg (2003), p. 17-25.
[20] Coughlin and Segev (2000), p. 33-37; Bekes (2005), p. 4-14.
[21] KSH (2007): http://www.ksh.hu.

1.6 Geographical transportation- and production area network

Public infrastructure and educations are attracting forces for new investments while proximity of main export is targeted by investors and road network is the most favourable attractions for foreign investment. The impact of road infrastructure on new manufacturing establishments on regional municipalities is very high following the study of Holl (2004).

Infrastructure development affects regional municipalities differently even within one region and agglomeration forces operate within a relatively small geographic scope. A new motorway will positively affect productivity of firms while the share of educated workforce and proximity to major cities attracts new investments aparting from settlement size.[22]

Von Thünen (1842, 1863) uses situation and economic rent as well as land prices, rents as dependant variables. Price end products (incl. labour input), production costs and transport costs have been used as explanatory ones. This model was created under the explicit inclusion of labour cost for one economic sector. He was the first important researcher and developer in the 19th century. The most varied of research studies point out that the costs of land, property or facilities for rent are instrumental in a company's location choice as well as in the inhabitants' choice of place of residence. Actual land pricing is much more complex in the practice as reality than the models can ever assume.

Production factors primarily cover all those costs involved in production as wages, energy, infrastructure, human capital and required work space. As far as infrastructure and taxation are concerned, a natural overlapping with state intervention occurs. The following production factors seem to play a reasonably important role at location decision: availability and labour cost (broken down into educational levels), availability and cost of work space, infrastructure as well as taxes. Residential population and population development make a contribution regarding the availability of human capital. Private households have impacts on

[22] Zhao and Decker (2004), p. 17-18.

the location choice of companies and points out a connection between population density and frequency of workplaces.[23]

GDP is frequently used as the statistics on taxable income on national level to estimate the wage level of natural persons. Today, the availability of work space is seen as quite an important factor. This has been the main reason for relocations for several decades' stresses on the basis of several data surveys. Larger-sized companies look for site locations that are large enough to accommodate expansions of the operational facilities and this shows also that availability of land, particularly in top situations, can be scarce. The companies are forced to move to the surrounding areas. In order to depict the relevant mechanisms in a model, the availability of vacant building lots must show as a factor.[24]

Launhardt (1882) uses price end products (incl. labour input) as dependant variable while production- and transport costs were considered as explanatory ones. This model was created under the explicit inclusion of transport costs for two economic sectors. He was the second earliest researcher and theoretical model developer in the 19th century after von Thünen.

Different variables (factors) like situation, location, quality, site development, permitted usage, permitted degree of building activity, produced qualities as investments, social assessment, expected level of profit, supply and demand determine the price of land or buildings.[25] Land price can be seen as an exogenous location factor on one hand, determined by the land and property market and as an endogenous variable due to the location preferences of the various market players. It affects the distribution of use and users, degree of building activity and social segregation. The fact that land price can be illustrated by other location factors make it indispensable and thus it can be used as a tool for the verification of models.[26]

[23] Kim (2005), p. 56-65.
[24] Pellanbarg (2005), p. 88-107; Sedlacek (1994), p. 96-111.
[25] Häusermann and Siebel (2004), p.131-135.
[26] Vettiger (1994), p. 5, 17, 28-49.

Weber (1909) uses population density, transport cost rates and manufactured product rates. Situation and economic rents, end product prices (incl. labour input), size benefits, state intervention, and further factors are explanatory variables. Rents and land prices are dependant ones from the resident population covering in this model. He was the first famous researcher and model developer in the 20th century.

Labour migration is essential for agglomeration forces. An increased population generates greater demand inviting more firms to settle in a larger city. This allows for a lower import bill and lower living costs in general. In the long run, labour migration will be rather low in continental Europe. One possible solution to low migration propensities is the incorporation of input-output (I-O) linkages that explicitly capture trading costs between firms. Wages are important for firm location. As industry specific wages are used, the impact of labour and the addition of blue-collar wage costs that reflect the heterogeneity in skills and training of a relatively immobile or of a homogenous workforce. Most of the governments emphasise the construction of major East-West- or North-South-axis. Burgess (1925) used situation and economic rents as dependant variables. He explains with production- and transport costs, resident population as explanatory variables his model for two or three economic sectors. Building roads within a county fosters the FDI inflow very strong.[27] Industries have a very strong tendency to settle down where other similar firms have already settled. Spending money on incentives to have them established elsewhere may be inefficient. Labour migration should be made easier via development of temporary housing conditions and subsidies to large firms may be efficient as they lure in similar firms. The improving of the relationship between suppliers and multinationals is a key to forcing more investment. Telephone, road network and other communications infrastructure confirms the importance of local infrastructure.[28]

[27] Zhao and Decker (2004), p. 23-24.
[28] Bekes (2006), p. 6-24.

Van den Bergh (1996) and other researchers used one year after Krugman (1995) investments in the transport infrastructure, externalities (e.g. environmental pollution, congestion), labour market dataset and state interventions (e.g. customs, fee, taxation and subvention to get optimal empirical market solutions with these model variables). They used it all as equilibrium variables for three different sectors. They also used additional factors like transport costs, real wages, spending power, economies of scale, localisation- and urbanisation effects, number of produced goods and expenditure in the growth industry for localisation- and urbanisation effects as further model variables. It is the latest development on theoretical research considering all this facts.

Access impact to transportation channels is a key and may not serve as an attraction force, but recent models of new economic geography suggest a new transportation linkage between a rich and a poor region leads to new investment in the agglomerated area and having a greater divergence.[29]

Competition presents a deterrent force but at a lower level of aggregation and it overweighs these externalities. The estimation of the impact of road density is another way for looking at the transportation infrastructure. Good transportation along regions allows for agglomeration externalities to yield greater profits from specialisation and economies of scale or technological spillovers.[30]

Production factors were among of the main decision factors for Flextronics because that they were not very high in comparison to other countries and Hungary has not joined that time the European Union. The purchase land price EUR per m² was in average the lowest for Nyiregyhaza (15-30) against Miskolc (20-40) and Debrecen (10-40).[31] Each of the three cities has a railroad- and highway access. Nyiregyhaza and Debrecen has both airport while Miskolc has none and so Mikolc falls out of the decision process. While a good transportation infrastructure was given in all cases at the end the nearness to Ukrainian border was again the strongest impact for Nyiregyhaza (M3).

[29] Baldwin, Forslid, Martin, Ottaviano and Robert-Nicoud (2003), p. 34-36; Bekes (2005), p. 4-5.
[30] Head and Mayer (2004), p. 49-51.
[31] KSH (2007): http://www.ksh.hu.

1.7 Management and location theory

In this sub-chapter the managerial view about location decision will be considered in more detail and summarizing those finding hereby.

The management is in great difficulty choosing the best and optimal location at every location decision while but it will be executed by them step by step successively. A location is then optimal if all relevant location factor of the chosen plant show in a way, that comparing with other alternatives it is still proving the best satisfaction level (Nickel 2003).

Costs, profitability and profit are major factors for management driving the company. Stand only cost-based pricing models has been the most influenced approach, whereby turnover was neglected in the older literature about location decisions (Weber 1909). The planned economy supported the predefining of production and sales. After the Second World War has this view changed in the newly democratized Western European nations as sales and not only costs affected the choice. Profit maximization is the highest priority for corporations in the free market economies. This principle to follow, a location is only then optimal, when the profit in total in a time period is higher than by other locations alternatives.

In order to find the top location the management is always in the process to find criteria, based on they can decided for the best possible location. To fulfil that, various location factors has been introduced, based on decision can be make more accountable.

Location decision can be carried out via analytical optimization models or heuristic ones. The analytical optimization has clearly the advantage that optimal location can be quantifiable. Disadvantage of the analytical model is the rising complexity of calculation as the model's range increases and subjective attributes can not be considered as by heuristic models. The reason for not taking into account these subjective attributes is the non-measurability of them. With help of the heuristic model however some fiscal location factors can be included. This type of model has been favoured the most among my interviewees,

though they agreed that this methodology can't guarantee the exact location either.

On the other hand, there are many options of combining both analyses with each other. First of all, by taking into consideration both methodologies at the same time there is the option to take a quantitative analysis and then testing that result with qualitative methodology. Secondly, there is the option to take a quantitative analysis and then testing that result with qualitative methodology. Following this idea another option is also available when a qualitative analysis will be executed first and the result out of it can be later verified by quantitative analysis.

Based on my interviewees from Flextronics the last option from the above mentioned paragraph is meant to be the most goal oriented way since the most relevant location factors should be (pre)defined first and then it should be evaluated with other quantitative models. Therefore in many cases the qualitative methodology used as filter to select from location options and quantitative methodology is to be meant to ensure the best optimal location.

1.8 Conclusions

The economic space is the result of a trade-off between various forms of increasing returns and mobility costs. The dispersion of production and consumption is fostering by price competition, high transportation costs and land use. Firms are likely to cluster within large metropolitan areas, if selling differentiated products with low transportation costs. Cities provide a wide array of specialized labour markets and final goods that make them attractive to consumers and workers. The agglomeration effect is the outcome of cumulative processes determined by product supply and product demand. The economy of space is the outcome of interplay between agglomeration and dispersion forces within a general equilibrium structure accounting clearly for market failures and historical industrial accidents under imperfect competition. This means that, on the whole, production factors can be modelled respectively by the costs, availability of the workforce and work space. Suitable indicators are the average taxable income of natural persons per inhabitant, the rate of unemployment, the

land (rent) and property prices from these, and in addition, the unused building area.[32]

Table 1 below summarizes the different theoretical models developed by historical researcher and developer during the last two centuries. As main message for the location choice of Flextronics only that models could be considered theoretically that were developed for two or three economic sector. Globalisation is a phenomenon of the late 20th century and 21st century. The most common models named here could not be considered practical reasons because they have not used enough variables to estimate models like today.
The only two models that could be considered in the theoretical view of Flextronics choice are that of Krugman (1995) and Van d. Bergh (1996). They used a lot of important variables (price end products, production-, transportation cost, resident population etc.) that describe a model in a very practical sense ("useful in a globalized world") for two or three economic sectors. Another fact is also very important to be named that these models have been created with all variables in equilibrium stage. These models are not perfect to describe a location choice of a multinational company – but as more variables are considered in a model in equilibrium for more economic sectors, the better can they reflect our global economy market with multinational players. In the next subchapter the theory to calculation models (Decision matrix and Steiner Weber model), which I used for the location choice of Flextronics, will be described. I used these two models for my calculation because they are useful and more common in the practice than the theoretical ones that are summarized below here.

[32] Bekes (2006), p. 25-28.

Model Concept	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Situation / Economic rent	Price end product	Production cost	Transport cost	Centrality	Size benefits	Sectoral structure	State intervention	Location features	further factors	Resident population	1. Economic sector	2. Economic sector	3. Economic sector
Von Thünen (1842)	A	E	E	E								(n)		
Launhardt (1882)		A	E	E									(n)	
Weber (1909)	E	A[1]		E[2]		E	E			E	E[4]			
Burgess (1925)	A	E	E	E							E		E	E
Christaller (1933)					A									E
Lösch (1940)	E				A	E	E[3]						E	E
Zipf (1949)					A						E		(n)	(n)
Isard (1956)		G		G		G	G	G			G		(n)	(n)
von Böventer (1962)		G		G		G	G				G[4]		G	G
Perroux (1964)										E				
Smith (1971)	A[5]	E	E	E		E	E			E	E		E	
Geiger (1973)	A			E				E	E		E[6]		E[6]	E[6]
Porter (1990)			E			E	E	E		E			E	E
Krugman (1995)		G	G	G		G	G			G		G	G	
Van d. Bergh *et al.*(1996)		G	G	G		G	G	G		G	G	G	G	G

Table 1: Parameters on the location choice of companies[33]

A dependant variable
E explanatory variable
G equilibrium
(n) use to be explained implicitly

[33] Bodenmann (2006), p. 4-5

Explanation of the variables

1 Situation and economic rent as well as land prices, rent
2 End product price including labour input
3 General production cost
4 Generalised transport cost: including accessibility
5 Centrality ie central facilities (cf. Christaller's model)
6 Scale economies
7 Localisation economies, urbanisation economies
8 State activities such as taxation, legislation, subsidies, and infrastructure
9 Location features such as sloping, exposition, view and housing quality
10 Further agglomeration factors

[1] Under explicit inclusion of labour cost
[2] Under explicit inclusion of the approaches related to transport cost
[3] External savings mentioned in the analysis but ignored in the model
[4] Population
[5] Profit zone
[6] Considered in the calculation of accessibility

1.9 Calculation methods for my analysis

In this subchapter the theory to my calculation models (Decision matrix and Steiner Weber model) will be explained.

In chapter 3.1, I use the Decision matrix to reflect the location choice of Flextronics. In Table 14 the individual data (results) from my research and appreciations of my interviewees from Flextronics International are summarized. Each potential location factor (Debrecen, Miskolc and Nyiregyhaza) will be evaluated with various weighting points on the basis of Table 14. The weighting points are shown in Table 13 for different factors as "key location factor with 40%", "key influences with 40%" and further "plus point with 20%". The grading scales are from 1-10, meaning 1 as the worst and 10 as the best grade. Those individual data will be multiplied with those various weighting points. The sum of the individual factors makes in turn an again outcome between 1 and 10. The

result of this decision matrix illustrates the optimal location for Flextronics International in Eastern Hungary (see the calculation in Chapter 3.1 and further details for the weighting points in Table 13).

In chapter 3.2, I have chosen the Steiner – Weber Model to calculate various transportation costs because taking into account a quantitative model to prove the location decision by Flextronics. Transportation costs have been indicated as major key quantitative factors for the decision as well.

A solution technique is used to find the location of a warehouse for instance that services a number of demand centres and that receives its products from a single supplier or of a multinational company for the production in a region. The model objective is to minimize the summation of inbound and outbound transportation costs.

Notation for the Steiner Weber model:

$$a_p = \sqrt{(x - x_p)^2 + (y - y_p)^2}$$

The transportation volumes of the demand centres are exactly defined. Taking the example, the transportation quantity between the supplier and the warehouse is set equal to the total demand quantity. When the inbound transportation costs per-distance and the transportation costs per-unit between plant and warehouse are set to zero, then the plant has no effect on the optimal location of the warehouse. The variable a_p measures the distance between plant and the selected destination in km while the other variables x and y are respected geographical coordinates of two points. The geographical coordinates are determined by the transportation costs for the different calculation cases.

The Steiner Weber model has some disadvantages e.g. nonlinear equations in the optimality condition. Numerical solution is possible as well as approximations with the Newtonian Iteration. The Newtonian Iteration is the basis for the so named “Centre of Gravity” calculation. The “Centre of Gravity” minimizes the sum of the weighted squared distances and is an iterative solution technique to find

the location with the lowest costs. Effective solution could be found easily by Excel Solver or Mathematica because the optimisation problem is often nonlinear by minimizing the squared distances between possible locations. The advantage of the Steiner Weber Model is the possibility to add further variables to the calculated model (see the calculation in Chapter 3.2 with further details to the transportation cost for my calculation).

2 The Case Study: Flextronics' location decision in Hungary

Location decision is very complex, lasting for several years and involving many issues. However as any kinds of strategic decision-making, it is also influenced by the personalities involved. Location decisions for corporations are similar to other major projects of significant investments, but with the difficulty of geographic variability. They are further complicated by the intense lobbying on agencies part and human factors.

This chapter of my thesis addresses the issues that are important to companies making location decision. To address those issues I illustrate my arguments based on the location choice mechanism of Flextronics International Ltd. With the help of my case study I examine the roles of management members who are taking part in the decision-making process and compare those three Eastern Hungarian cities which the company selected for further investments.

First of all I introduce the company Flextronics International Ltd. Provide information about the company's history, profile and its competitors. Following that I introduce Hungary based on microeconomical data as country for Forign Direct Investment. In the next main subchapter after that I compare the selected Hungarian cities based on similar criteria's as basis for the calculations in the chapter following that.

2.1 Company profile: Flextronics

2.1.1 Company history

Flextronics International is headquartered in Singapore. It is a leading provider in the market of communications, networking, computer, medical and consumer electronics, from Electronics Manufacturing Services (EMS) to Original Equipment Manufacturers (OEMs). It is the number two global operating firm with design, engineering and manufacturing operations in over 30 countries and four continents. [34] Flextronics provides IT expertise, design and manufacturing services and coordinates innovative product design.

Flextronics International Ltd. claims to be the second largest electronic manufacturing services provider worldwide in terms of revenue, with estimated fiscal 2007 revenue by USD$ 18.9 Billion.[35] The company has more than 16 million m² of facility space and some 80,000 employees worldwide. Flextronics expanded significantly by acquiring other manufacturers, like recently when the company bought Solectron for USD 3.6 Billion and at the same time taking advantage of the desire of original equipment manufacturers to outsource manufacturing and sell off their manufacturing facilities.[36]

2.1.2 Company overview

Flextronics is provider of electronics manufacturing services to original equipment manufacturers and design in the following markets:[37]

• Computing, which include a variety of products like desktop, notebook computers, PCs, electronic games;
• Mobile communication equipments;
• Digital devices for consumers like set home entertainment equipment, printers, copiers;

[34] EMSnow: http://www.emsnow.com.
[35] Flextronics International(1): http://www.flextronics.com.
[36] Flextronics International(2): http://www.flextronics.com.
[37] Flextronics International (2007) (3), p. 3.

• Industrial, Semiconductor and White Goods like home appliances, industrial meters etc.;
• Components, instrument for the Automotive, Marine and Aerospace industry;
• Infrastructure products such as cable modems;
• Medical devices, such as drug delivery, diagnostic and telemedicine devices.

Flextronics's services include:[38]

• Fabrication of Printed and Flexible Circuit Boards;
• Assembly and Manufacturing of Systems;
• Logistics;
• After Sales Services;
• Design and Engineering of Services;
• Original Design Manufacturing Services;
• Design and Manufacturing of Components.

Major global customers of Flextronics include industry leaders such as Casio; Epson; Dell; Ericsson; Hewlett−Packard; Microsoft; Motorola and Sony−Ericsson.[39]

2.1.3 Competitors in the electronics manufacturing

In Table 2 I summarized the main competitors of Flextronics in the year 2005 and 2006. Foxconn Ltd. is the biggest global player in the electronic industry followed by Flextronics.

[38] Flextronics International (2007) (3), p. 3
[39] Interview with Mr. Meszaros.

2006 Rank	2005 Rank	Company	2006 Revenue	2005 Revenue	2005-2006 Annual Change
1	1	Foxconn	$39,253	$27,315	44%
2	2	Flextronics	$17,773	$15,582	14%
3	4	Solcetron	$11,103	$10,226	9%
4	6	Jabil	$11,087	$8,095	37%
5	3	Sanmina-SCI	$10,872	$11,343	-4%
6	5	Celestica	$8,811	$8,471	4%
7	7	Elcoteq	$5,139	$5,002	3%
8	8	Benchmark	$2,907	$2,257	29%
9	9	Venture	$1,971	$2,007	-2%
10	10	Universal Scientific	$1,676	$1,622	3%
		Top 10 EMS Total	$110,592	$91,920	20%

Table 2: Top-10 EMS Providers in 2006 (Ranking by Revenue in Millions of U.S. Dollars)
Source: EMSnow[40]

2.1.4 Industry overview

Flextronics is following the trend that outsourcing for advanced manufacturing capabilities, design and engineering services and aftermarket services continues to grow rapidly. The company believes that this demand continues to increase for several reasons, as competition in the electronics industry, increasing complexity and sophistication of electronics products and reducing product costs by shortening product life cycles. The OEMs that utilize EMS providers as part of their business and manufacturing strategies continues to increase.[41] Utilizing EMS providers allows OEMs to use the advantage of supply chain management expertise of EMS providers and global design manufacturing. It also enables OEMs to concentrate on product development, marketing, research and sales.

[40] EMSnow:http://www.emsnow.com.
[41] Flextronics International: Flextronics International Annual Reports 2007, p. 4.

OEM's like Flextronics realize the following benefits through their strategic relationships with EMS providers:[42]

• Reduction of design-, development- and production costs
• Accelerated time−to−market and time−to−volume production
• Reduced capital investment requirements and fixed costs
• Improved inventory management and purchasing power
•Access to worldwide design, engineering, manufacturing, and logistics capabilities

2.1.5 Flextronics in Hungary

Flextronics story in Hungary started in the years of 1993 when the Singapore-based multinational company acquired the Hungarian Neutronics with its existing infrastructure. With this move Flextronics became the number one contract manufacturer of electronic parts in Hungary. Neutronics Ltd. had manufactured products for Philips at three Hungarian locations such as, Sárvár, Tab, and Zalagereszeg and also operated the Sárvár industrial park, which hosts many international companies as well.[43]

By taking over those three locations in Western Hungary, Flextronics expanded those already existing factories in Tab and Zalaegereszeg and then built up a brand new factory in Nyiregyhaza. That expansions, also allowed Flextronics to diversify contract manufacturing like Epson and Hewlett Packard. The Hungarian expansion shows also clearly the management's strategy to make Flextronics one of the premier international contract manufacturers. The company increased its worldwide revenue of USD 93 million in 1993 to around USD 15 billion in 2001, giving it the second largest piece of the global EMS business with 11% behind that of corporate giant, Solectron's 17%.[44]

[42] Flextronics International: Flextronics International Annual Reports 2007, p. 4.
[43] Penz, Balazs (2002), p.13.
[44] Penz, Balazs (2002), p.14.

2.2 Country overview: Hungary

The Austro-Hungarian Empire collapsed at the end of World War I. After World War II, fell Hungary under the rule of Communist. In 1956, a revolt and an announced withdrawal from the Warsaw Pact were defeated by a massive Russian military intervention. In 1968, Hungary started liberalizing its economy, introducing so-called "Goulash Communism".[45]

1990 held Hungary its first multiparty elections and initiated in this way a free market economy. The country has consolidated a stabilization program in 1995 and undergone enough restructuring to become an established market economy. The country accomplished a period of sustainable growth with gradually falling inflation and stable external balances. The government's main economic priorities are to complete structural reforms particularly the implementation of the first pension reform act from 1997 in the region, taxation reform, planning for comprehensive health care, local government finance reform and the reform of education at all levels.

Through 1997 the foreign investment has totalled an amount of more than $17 billion HUF.[46] In 1996, the major credit-rating agencies listed Hungary's foreign currency debt issuances as investment grade. Budapest and the IMF agree that there is no need to renew the current IMF stand-by arrangement that expired in February 1998. The OECD welcomed Hungary as a member in May 1996 and in December 1997 the EU invited Hungary to begin the accession process. Hungary has been an EU member since the 1st of May 2004.

[45] CIA Facts book (2).
[46] Hungary overview: http://www.world66.com.

Factors	2002	2003	2004	2005	2006
Gross domestic product (%)	3.5	3.4	4.6	4.2	4.2
Industrial production (%)	2.8	6.4	8.3	7.0	7.0
Exports (% - volume)	5.9	8.8	18.4	11.0	11.0
Imports (% - volume)	5.1	10.1	15.2	7.0	11.0
Consumer prices (%)	5.3	4.7	6.8	3.6	2.0-2.5
Balance of foreign trade*	-3.4	-4.2	-3.9	-3.0	-
Current account and capital account balance*	-4.7	-6.4	-6.9	-6.5	-7.0
FDI*	3.2	2.0	3.7	3.5-4.0	4.0
Unemployment rate	5.8	5.9	6.1	7.0	7.2

Table 3: Dynamic Macroeconomic Growth in Figures

Source: Hungarian Central Statistical Office, National Bank of Hungary, GKI Economic Research Institute of Hungary in EUR billion

2.2.1 FDI Structure in Hungary

While privatization in some of the neighbouring countries is still under way, a different process is taking place in Hungary. High tech investment accounts for an increasing share in foreign direct investment which is followed by a wide-ranging research and development activities relocated to Hungary. While in 1990 only 231 hundred percent foreign-owned companies and 5,462 companies partly founded with foreign capital were operating in Hungary, the number of the former now approaches about 17,000 and the latter nearly amounts to 10,000.[47]

[47] The Hungarian Investment and Trade Development Agency (2004): p. 24.

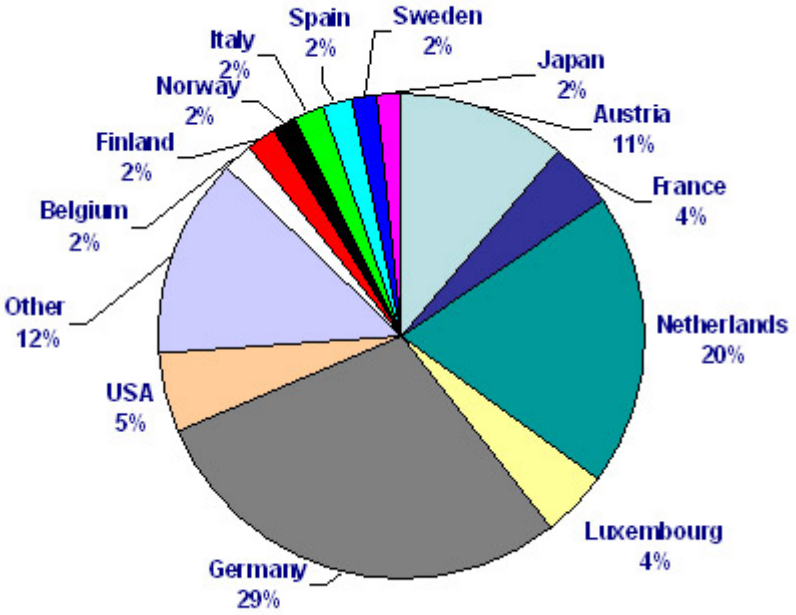

Figure 2: Cumulated FDI in Hungary

Source: ITD Hungary[48]

2.2.2 Local Agent

After the political changes in the nineties several so called “agencies” have been established in the country. Their mission is till now to help Hungarian small and mid-sized enterprises to strengthen their position in the global market. To achieve this mission, those agencies are highly involved fostering entrepreneurial spirit, promoting regional development and expanding international relationships.

Local agents also facilitate the investment process and encourage capital import/export. These activities promote new enterprises, expansion, diversification and boosts activity in existing sectors. Local agents also strongly influence foreign investors not only by promoting Hungary around the globe but also support decision makers in location decisions as they did in the case of Flextronics as well. That’s why it’s important to mention few words regarding its role and task.

[48] ITD Hungary (1): http://www.itdh.com.

Local agents are usually active in two of the following areas:

1. Trade development, in order to support local corporations in there export trade activities and strength there market position within Hungary.
2. Investment promotion, which includes services to prospective investors such as infrastructure/sites, tax/legal advice, business introductions and market information.

Tasks of the local agents to promote investment in Hungary:[49]

- Support contacting for decision-making, identification of Hungarian suppliers (sub-contractors) for foreign investors looking for investment opportunities in Hungary
- Information provision on Hungarian investment, legal, taxation and financial conditions
- Advice on government programs to support investment
- Information management for supporting decision-making
- Identification of available sites and recommended investment locations
- Preparation of municipal governments for arrival of investors
- Management of regional projects
- Maintenance of company databases
- Publication of printed and electronic promotional materials in multiple languages

In Flextronics's location choice the Hungarian Investment and Trade Development Agency (ITDH) played the role as local agent. Based on my interviewees, ITDH supported the management at the very early stage to promote those three Hungarian cities as investment locations, furthermore helped to organize various pre-meetings with city officials.

[49] ITD Hungary (2): http://www.itdh.com.

2.2.3 Location for electronics manufacturers in Hungary

Hungary offers several benefits to foreign companies settling down in the country. The country is located in middle Europe and it can be easily reached from all directions. Therefore, Hungary is seen since the fall of communism as a base for further expansion for those who later on want to expend to more remote areas. Due to Hungary's EU membership, investors settling there find themselves on the Southern and Eastern borders of a market of 455 million people. In recent years foreign investors have shown mainly interest in 4 industrial segments.[50] Products range manufactured by entertainment, engineering and telecommunications electronics continues to move to high-tech products. One reason behind this trend is the excellent access to well-qualified labour in Hungary.

Hereby a paper done by Srholec (2005) findings suggests also the previous written statement that developing country typically attracts manufacturing-based fragments of global production networks in electronics, however technology-intensive activities remain concentrated elsewhere.[51]

2.2.4 Key investment incentives in Hungary

Hungary within the European Union offers the lowest corporate tax (with the exception of Ireland) rate to companies choosing the country. The 16% rate is low on its own and even more so if accompanied with various available state and local benefits. Still companies moving to Hungary receive more incentives such as:[52]

Tax benefit for development
Tax free investment reserve
Gradual reduction of the cost of wages
Subsidy to establish company premises
Direct infrastructural subsidiary

[50] The Hungarian Investment and Trade Development Agency (2005): p. 5.
[51] Srholec (2005), p. 29.
[52] The Hungarian Investment and Trade Development Agency (2005): p. 6.

Subsidy to create jobs

Training subsidy

Subsidy for intellectual investment

Construction of ring roads around university towns

Local benefits

Corporate tax in some countries	**2006**
Austria	25%
Czech Republic	24%
France	33,33%
Germany	38,34%
Hungary	**16%**
Poland	19%
Portugal	27,5%
Slovakia	19%
USA	40%

Table 4: Corporate tax in some countries

Source: KPMG's Corporate Tax Rate Survey 2006[53]

2.2.5 Labour force

Hungary's population of about 10 million is highly educated and highly skilled. Education level is above the average of the European countries. 67% of the work force has completed some form of secondary, technical or vocational education. Hungary has great traditions and high standards in many areas including economics, ecology, engineering, medicine, and sciences. The skills in foreign language are becoming more widespread, especially among younger Hungarians, many of whom speak German and/or English. Foreign manufacturers with factories in Hungary have taken full advantage of learning new skills and flexibility of the local workforce. An annually 10% rise in productivity during the last ten years compared to other Easter European countries has taken place in Hungary.

[53] KPMG's Corporate Tax Rate Survey (2006): p.12-15.

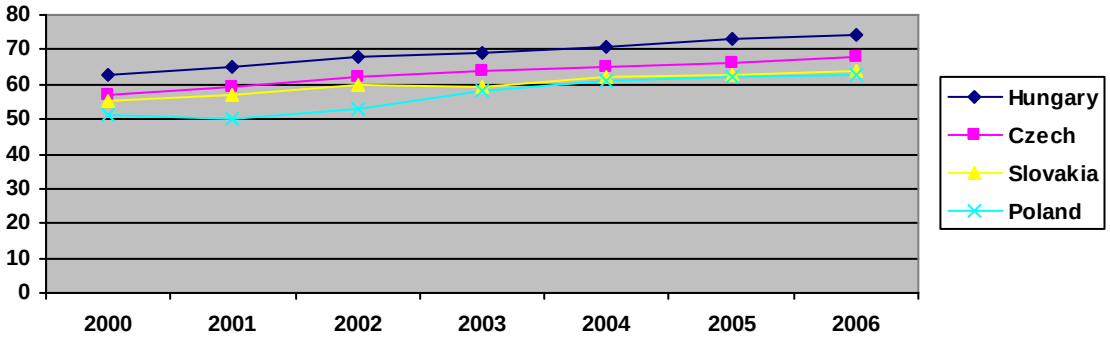

Figure 3: GDP in Purchasing Power Standards per person employed relative to EU-25
Source: ITD Hungary[54]

Wages in Hungary are lower than those of Western Europe. In addition Hungary has the lowest earnings in CEE region for productivity on a very high level. Mostly equally well-trained, labour in the Eastern part of Hungary is cheaper than in the Western part, thanks to the positive influence of educational institutions in cities like Debrecen or Szeged.

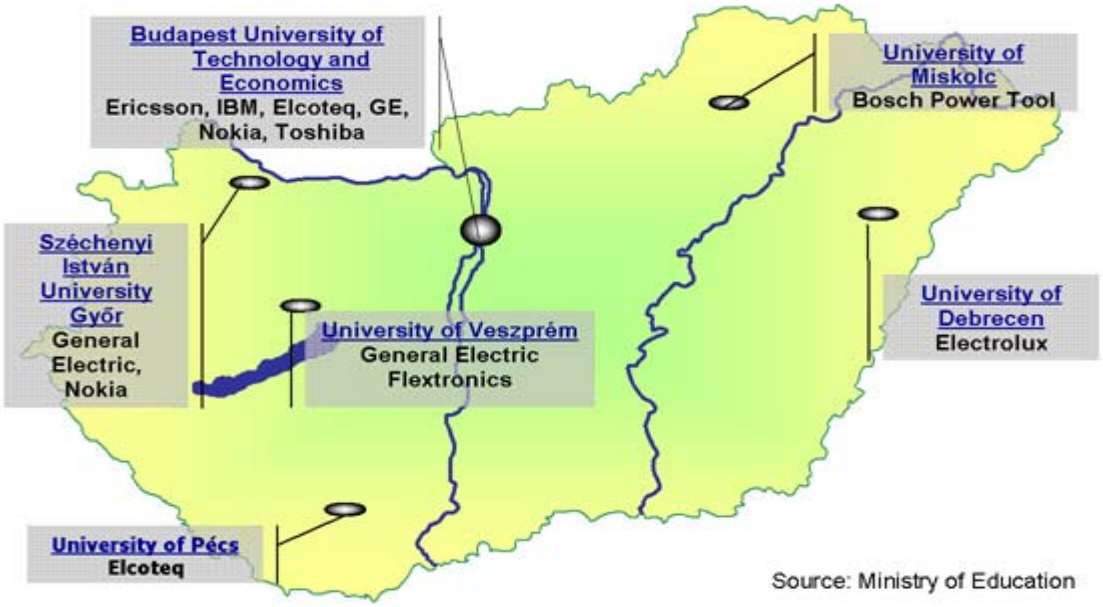

Figure 4: Universities and Corporate Research Centres in Electronics
Source: ITD Hungary[55]

[54] ITD Hungary (4): http://www.itdh.com.
[55] ITD Hungary (5): http://www.itdh.com.

2.3 How Flextronics makes location decision

In the previous subchapter it was explained why Hungary remained the target for investment. In this section of my thesis I will analyze what criteria Flextronics used to select my hometown Nyiregyhaza among other cities such as Miskolc and Debrecen. A comparison of those individual cities will be introduced based on the location factors presented in this chapter and among factors listed by Flextronics managers. In this part of my thesis those listed cities will be analyzed based on same criteria. Information and data come from various international organisations and from ex Flextronics employees. The result of this analysis in chapter 3.5 will be summarized in a decision matrix, and in the Steiner Weber Model.

As I described Flextronics as a corporation previously, it can be understood that the a company offering a 'all-inclusive' range of worldwide supply chain services that simplify the global product development process and provide time and cost savings to OEM customers. To achieve the lowest possible cost saving, the strategy of cost-efficiency is clearly visible and helps in the understanding why the company expanded in Hungary, where labour cost is much reasonable than in the Western Hemisphere.

The location decision for a corporate unit is based on combinations of location factors discussed previously in chapter two. The problem might be conceived as simple, to choose the location which will produce the maximum profit. Of course the problem in reality is complex. Different locations have the potential to impact significantly on a company's performance, thus affecting revenue, costs, service levels and most importantly profitability.

New jobs were accounted by large companies in the developed economies and although some small firms are important agents of change, frankly the large companies carry the main responsibility for maintaining employment. That's why a location decision of a big corporation is always followed by close public 'eyes'. The same happened when Flextronics announced on 22 November 1999 that it would open an additional business park in Nyiregyhaza, Hungary. The $24m

initial investment came on top of $70m it had already spent in the country at three other sites such as Tab, Zalaegerszeg and Sarvar in the previous 12 months alone.[56]

Flextronics has invested in manufacturing facilities in low-cost regions of the world to provide customers with the lowest manufacturing costs. The integrated vertically end−to−end services help Flextronics to cost effectively design, build and ship complete packaged products. As of March 31, 2006, more than 75% of Flextronics's manufacturing capacity was located in low-cost locations, such as Brazil, China, Hungary, Malaysia, India, Mexico, Poland, and Ukraine.[57]

Flextronics approach establishing factories in those countries happened in terms of green field investments which took place in an area where no previous buildings existed, on a green field such as farmland outside or within a city's agglomeration circle.

The green field investment decision in the Eastern part of Hungary was made in September 1999 when the Management of the Eastern European Division of Flextronics International in Swechat, Austria decided to extend its business parks. Two of my Interviewees, Mr. Peter Baumgartner and Mr. Gyula Mészáros, were also involved in that decision making. Mr. Peter Baumgartner was at that time Human Resource Director of the Eastern and Middle European Flextronics Division and Mr. Gyula Mészáros managing director of Flextronics Eastern-Hungary. These two gentlemen not only took part in the location decision, they significantly influenced the final decision.

The goal of Flextronics headquarters in Swechat was clear: Expand its operation in Hungary and move it manufacturing plant towards the East close to the Ukrainian and Rumanian border. Furthermore, a very important goal was directed at its competition, strengthening Flextronics position in the market. Competitive advantages can be factors such as price, quality, and flexibility as well reliability and service quality. Labour availability and labour costs are the

[56] Flextronics Employee Magazine (11/2002), p. 12.
[57] Flextronics International (2006): Flextronics International Annual Reports.

most significant factors, due to the type of manufacturing sector Flextronics is in, for a manufacturing plant - emphasized by both of my interviewers.

The Hungarian Location decision-making in the case of Flextronics involved 4 people on the strategic level and around 10-15 on the operative level.[58] A location decision attracts a great deal of interest-both from within the company and from competitors.[59] Not surprisingly, location decisions are made at the senior level also at Flextronics. The key decision-making role is taken by the president together with the managing director. Divisional heads and finance directors regularly also form part of the location team. Legal and property experts and special consultants typically provide technical advice but are not necessarily permanent members of the decision-team. The responsibilities of the key participants are determined by their positions in the company and their role in the location search.

For Flextronics, emerging markets (Asia, Eastern Europe) are the main investment areas. By the end of the twentieth century when Flextronics decided to move within Hungary towards the East, the closeness to Ukraine and Rumania was a very important criterion. After that inexpensive qualified labour was the most important factor for Flextronics and that's also very typical for manufacturing industry.[60], Both of my interviewees emphasized the lack of infrastructure and openness for FDI on the political level at that time as the reason why Ukraine or Rumania were not chosen as the location. On the other side a location in Asia was not favourable either since the European presence was the primary interest of the management.

The location decision by Flextronics involved a number of stages. My interviewees informed me about the following location-decision milestones:

- The conception stage – recognized that there is a need to change production capacity and so a proposal is formed to evaluate an investment

[58] Interview with Mr.Gyula Meszaros on 12.06.2007, Nyirbator, Hungary.
[59] Ernst & Young (1995), p. 23.
[60] Lengyel (2004), p. 103.

- The defining stage – various forms of investing options will be taken into account and projects as well goals are defined.
- Negotiations – agreement on labour, incentives, taxations etc.
- The decision stage – locations are evaluated and a decision is made.
- Implementation – beginning of operations.

In terms of the decision stage on the regional level, Mr. Mészáros listed herewith factors which contain the background for the next sub-chapter where these location factors will be used in the decision matrix calculation. 'Key location factors' are defined here as factors of absolute importance with a high degree of reliability. 'Key influences' are factors which are less important but significantly influence the decision making. Finally, so called 'plus points' which are significant in view of the overall project if the circumstances of the other criteria are fulfilled:[61]

Key location factor	40%
Labour cost & availability	25%
Industrial park availibility	10%
Road/Air transport	10%
Key influences	40%
Education	20%
Site cost	5%
Location of supplier	5%
Forign direct investment in the area	5%
Plus Point	20%
Availability of specific skills	5%
Industrial relations	5%
Human factor/Local government attitude	10%

Table 5: Selection criteria and there weight in % in the location decision

On the level of choosing a region or city the study of Ernst & Young[62] shows a similar grouping as well, meaning dividing the factors into 3 main categories. The individual selection criteria are then weighted here based on the preference of the Flextronics management.[63] This methodology can be called also the efficiency model. However criteria such as human factor / local government attitude can not be measured objectively. This kind of factor has been evaluated

[61] Interview with Mr.Gyula Meszaros on 12.06.2007, Nyirbator, Hungary.
[62] Ernst & Young (1995), p. 28.
[63] Interview with Mr.Gyula Meszaros on 12.06.2007, Nyirbator, Hungary.

based on subjective impression of my interviewees who took part in the location decision and influenced the outcome.

2.4 City comparison

In this subchapter a comparison of pre-selected cities for a new location for Flextronics will be presented. The following approach is the outcome of the factors listed by Flextronics managers and will be used to analyse those cities as potential locations for a plant. The results of the comparison will be afterwards summarized and compared in a decision matrix which will evaluate the consolidated findings. In this subchapter cities will be approached step-by-step, meaning each city will be analysed on the same criteria. Criteria explanation and summary can be seen below. Most of the information comes from the Hungarian Statistical Bureau but also from employees of Flextronics and from city authorities of those cities.

Overview

The section 'Overview' provides macroeconomic information summery about the pre-selected cities. Data regarding, area, population, average population density, unemployment rate, GDP ranking based on county, FDI in % related to the total FDI of the country are indicators based on cities which were taken into account as possible location for Flextronics Int. and were introduced to me by my interviewees from Flextronics.[64] This overview should also reveal the reader of this thesis the most important economical and development facts about the city.

Labour cost and availability

Labour availability and labour costs are very important factors for companies studying the economic possibilities of a region before venturing into it. Flextronics has taken advantage of lower wage costs in developing countries on a global level to shift production as it stated already in the previous chapter. In this section I provide a compact overview on the particular city's labour market including a standardized diagram with the most important labour data needed for city comparison.

[64] Gyula Mészáros und Peter Baumgartner.

Employee training and student education

As we can see more knowledge based economy, every company requires technical literacy at all hierarchy level for a good location to have a critical mass of employable persons. Attractiveness of a city for companies includes a good elementary and secondary school system with resources for the support of the continuation for education and training. The section “education and training” of the location comparison takes into account how many / what kind of educational facilities the particular city has. It provides information also about the number of higher education facilities and about the subject area they focus on.

Industrial Parks

High-tech manufacturers in general are to be found in suburban industrial parks than for instance in industrial districts.[65] That is due to cost factors or / and the difficulty of assembling enough land to accommodate future expansion. Therefore for Flextronics the presence and the quality of suburban industrial park is a “must”.[66] This part of the comparison includes information about the availability of industrial park, contains data of property price and size.

Infrastructure

Bridges, railroad, roads, highway telecommunication and airport are still key elements in the location decision (traditional physical infrastructure). Both of my interviewees stated the key aspects of this location factor. Therefore in this section I introduce what traditional infrastructure a city can provide in aspect of Flextronics’s need.

Location of suppliers and competition

Location of suppliers and competition around the planned factory is a key aspect. Proximity to suppliers for a high-tech company as for Flextronics is one of the most important factors. This section helps to provide information about the destination of suppliers from / to the particular city and lists possible competitors including firms who settled trough FDI to the region.

[65] Interview with Peter Baumgartner.
[66] Interview with Peter Baumgartner.

Living environment

Attractive living environment is a major issue compared to other factors but it is certainly an issue companies do care about, since it affects there employees well being and so there working attitude. Both of my interviewees listed 'living environment' among the selection criteria as "plus point". In this section of my thesis I summarize under 'living environment' information about the rental price, about the school types which may support the education of expatriate's children and about the city as interests' place.

2.4.1 Debrecen

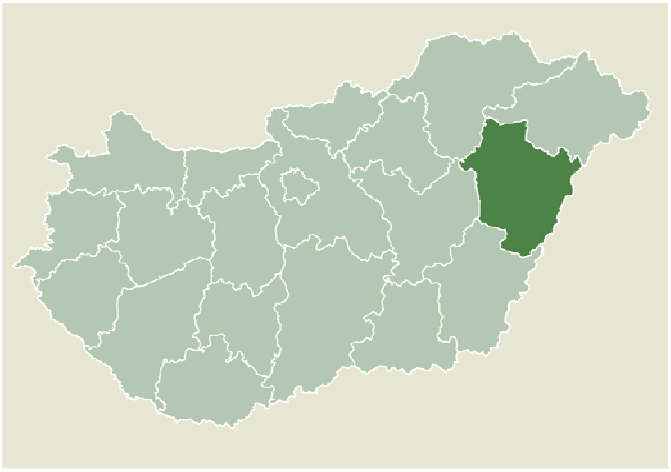

Figure 5: Map of Hungary

Source: CIA Fact Books[67]

2.4.1.1 Overview

Area: 461.25km²

Population: 350,000 (2006)

Average population density: 442.53people/km²

City unemployment rate: 7.5%

GDP ranking based on county: 12 out of 19

FDI in % related to the total FDI in the county: 29%[68]

[67] CIA World Facts book (2).
[68] KSH (2007): http://www.ksh.hu.

Debrecen is the Capital of the North Plain Region, called Hajdu-Bihar. Debrecen is the second largest city of Hungary, with 350000 people. Debrecen was two times the capital city of Hungary during history. The city has an old tradition in food-, machine- and chemical production. The machine and chemical industries are concentrated in Debrecen City and in the surrounding area. The University of Debrecen and local government development have a long term strategic focus on technology industries such as IT and biotechnology.[69]

2.4.1.2 Labour cost and availability

Overall size of the labour pool is the second largest in Hungary: 350,000 people live in one hour travel time. Hajdu-Bihar County had about 30,000 registered unemployed (13%), approx. 20,000 unemployed people live in Debrecen or in one-hour-travelling. More than 50% of these employees has vocational or high school degrees, and almost 5,000 unemployed people have electronic/machine/chemical industry related skills or work experience.[70]

	County	**Debrecen**
Economically active	552998	350000
Uneployment	30000	9351
Uneployment rate	13.90%	7.50%
Gross wage	€/month (1€=258HUF)	
white-collar	767	800
blue-collar	360	402

Table 6: General labour data of the county and Debrecen

2.4.1.3 Employee training and student education

Debrecen has eleven professional schools with 11,000 students. The University of Debrecen was established in 1538 as a protestant college. It has almost 30,000 students, studying, among others things, engineering and business administration.[71]

[69] Invest in Debrecen (2006), p. 6-9.
[70] KSH (2007): http://www.ksh.hu.
[71] Invest in Debrecen (2006), p. 10.

2.4.1.4 Industrial Parks

Debrecen had four industrial parks, including the Delog Logistics Centre and Industrial Park and the Debrecen Innovation and Industrial Park. The Airport Debrecen Business Park is the newest among the industrial park with its 350 hectares, offering opportunities for technology-focused big investors. There is another industrial park, which is owned by the University of Debrecen. The industrial parks are fully equipped, the purchase prices are between 10-40 EUR/m², the warehouse hall rent prices between 4-5 EUR /m²/month.[72]

2.4.1.5 Infrastructure

The International Airport Debrecen can be reached via highway M35 from downtown. M35 has been built at the end of 2006 to Debrecen. Budapest can be reached directly with the Inter City connection with a travel time of 2.5 hours. The city itself has an excellent public transportation to its conurbation. Most of the leading Hungarian and international logistics companies are present in Debrecen.

2.4.1.6 Location of suppliers and competition

40% of Flextronics's suppliers are located in Western Hungary, mostly around the Zala and Tab., where the company already operates. Access to these suppliers by highway is essential. In case of Debrecen this access can be guaranteed. Travelling time to those locations from the city is around 4-5 hours.

There are several foreign direct investors in the area. Herewith the Figure 17 summarizes the list of those companies based on, in which city they are, there country of origin and finally in which sector they operate.

Company	City	Country	Sector
National Instruments Ltd.	Debrecen	U.S.A	Informatics
BUMET Hungary Ltd.	Debrecen	Holland	Machine engineering
Lasselsberger Hungária Ltd.	Debrecen	Germany	Concrete products
Celic Ltd.	Debrecen	Holland	Part production
M. E. Industrial, Supplier and Commercial Ltd.	Debrecen	U.S.A	Pieces for automobiles
Reichert Hungary Ltd.	Debrecen	U.S.A	Production of machines
Globiz International Ltd.	Debrecen	Slowakia	Assembling of electronic
FAG Magyarország Ipari Ltd.	Debrecen	Germany	Manufacturing

Table 7: List of companies' in Debrecen trough FDI

[72] Invest in Debrecen (2006), p. 12-14.

2.4.1.7 Living environment

The average apartment rent in the city is between 4-6 EUR /m²/months, in the premium areas of the downtown the price is by 20-30% higher. Debrecen operates one bilingual grammar school and five secondary schools. As a bath city and as the capital of the Hungarian “puszta”, Debrecen is visited by large number of tourists

2.4.2 Miskolc

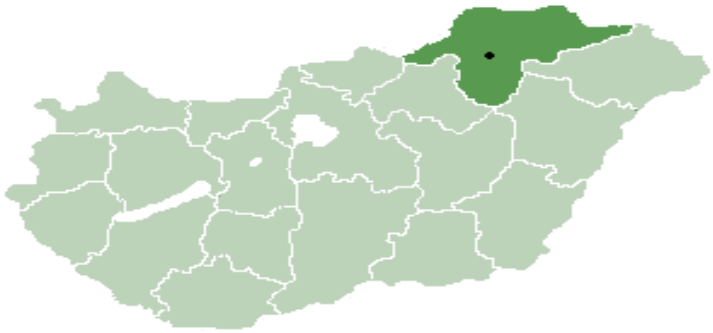

Figure 6: Map of Hungary
Source: CIA Fact Books[73]

2.4.2.1 Overview

Area: 236,69km²

Population: 174.416(2006)

Average population density: 736 people/km²

City unemployment rate: 8,7%

GDP ranking based on county:16 out of 19

FDI in % related to the total FDI in the county: 21%

Miskolc with a population of 174,000 is the third largest city in Hungary situated in the North part of Hungary. Here the valleys of Sajó and Hernád rivers meet each other. It was an important commercial centre due its geographical location in the 19th century. During the 1920’s, the importance of coal and ore mines grew, and Miskolc became so the industrial centre of Hungary's northern region.

[73] CIA World Facts book (2).

Miskolc is developing today rapidly due new incentives for the future in economical and industrial sense (e.g. R&D, tourism).[74]

2.4.2.2 Labour cost and availability

Overall size of labour pool is the third biggest in Hungary: ~270,000 people live within one hour travel time. Borsod-Abauj-Zemplen County had about 65,000 registered unemployed (14%); approximately 35,000 unemployed people live in Miskolc or within one hour. About 65% of these employees has vocational or high school degrees, and almost 25,000 unemployed people have mainly machine/chemical industry related skills or work experience.[75]

	County	**Miskolc**
Economically active	271,000	108,921
Uneployment	55,433	9,351
Uneployment rate	12%	8,70%
Gross wage	€/month (1€=258HUF)	
white-collar	759	762
blue-collar	393	391

Table 8: General labour data of the county and Miskloc

2.4.2.3 Employee training and student education

1949 the Hungarian Parliament ordered that a university should be established in Miskolc. The university should be one for the heavy industry to improve higher education in technology and engineering in the county. The new university of technology has the Faculties of Mining and Metallurgical Engineering, and a tradition of 250 years in the Borsod industrial region. The Miskolc University has the largest campus in Hungary. Robert Bosch Mechatronical Faculty was established in the University, with the cooperation of four Robert Bosch companies settled in North-East Hungary. The whole investment had an amount above 1 Billion HUF. The research centre is equipped with the most modern instruments applied for research and development in mechanical industry.

[74] ITD Hungary (1): http://www.itdh.com.
[75] KSH (2007): http://www.ksh.hu.

2.4.2.4 Industrial Parks

Miskolc had in 1998 two industrial parks to offer for Flextronics. One called 'Miskolc Industrial Park' and another one 'Industrial area no.5'. These fields were located by the city border but without any infrastructure and mainly in a very early stage of planning.[76] The city would have offered those fields for Flextronics for a symbolic price of 1 HUF.

2.4.2.5 Infrastructure

M3, M30 Motorway from Budapest had reached Miskolc by the end of 2004 but not at the time of the location decision. As a result, Miskolc can be reached from Budapest in 1.50 hours by car. The Miskolc surrounding road is actually only now under construction. The state-owned road network has a radial structure around Miskolc.

Train service can be considered as very well between the capitol in international dimensions as well. There are 27 pairs of train services and the average journey time is 2 hours. Daily 13 pairs of Inter City train service provide non-stop connection. The journey takes a time of 1.50 hours. Domestic traffic of the county is provided by Inter Pici train services. The task of these services is to ensure collecting and distributing connections to Inter City services. Such train services are operated between Miskolc-Ózd, Miskolc-Tiszaújváros, Miskolc-Sátoraljaújhely. City Tokaj is connected with Budapest via Miskolc by one pair of IC train service daily.

The city does not have any airport fields.

[76] Interview with Mr.Gyula Meszaros on 12.06.2007, Nyirbator, Hungary.

2.4.2.6 Location of suppliers and competition

40% of Flextronics's suppliers are located in Western Hungary, mostly around the Zala and Tab., where the company already operates. Access to these suppliers by highway is essential. In case of Miskolc this access can be guaranteed, travelling time is around 4-6hours.

There are several foreign direct investors in the area. Herewith the Figure 9 summarizes the list of those companies based on, in which city they are, their country of origin and finally in which sector they operate.

Company	City	Country	Sector
Ross Modul Ltd.	Miskolc	U.S.A	Glass Industry
Remy Automotive	Miskolc	U.S.A	Auto industry
Robert Bosch Ltd.	Miskolc	Germany	Electronic industry
RWE Umwelt Ltd.	Miskolc	Germany	Waste indutry
Jabil Circuit	Tiszaujvaros	U.S.A	Electronic Manufacturing
Sanmia	Alsózsolc	S.Korea	Electronic Manufacturing
AES	Tiszaujvaros	Germany	Energy provider
ZF	Eger	Germany	Electronic Manufacturing
GE	Òzd	U.S.A	Electronic industry

Table 9: List of companies' trough FDI

Source: Own chart

2.4.2.7 Living environment

The average apartment rent in the city is between 3-5 EUR /m²/months, in the premium areas of the downtown the price 10-20% higher. Bilingual education is available in Primary Schools in English and German languages, in Secondary Schools in English, German, Spanish, French and Polish languages.

2.4.3 Nyiregyhaza

Figure 7: Map of Hungary
Source: CIA Fact Books[77]

2.4.3.1 Overview

Area: 274.46 km²

Population: 119,867 (2006)

Average population density: 425.92 people/km²

City unemployment rate: 8.9%

GDP ranking based on county: 17 out of 19

FDI in % related to the total FDI in the county: 19%

The city of Nyiregyhaza is located in North-east Hungary and with a population of 117,000 it is the seventh-largest city in the country. The city promotes itself for foreign investors as the location the most developed strategic point in one of the main European transport corridors in the vicinity of three Eastern European country borders. The performance of the county's industry lags behind the rest of the country and the product structure is unfavorable with not enough high quality, high value-added products. That's why the city made a strong commitment to promote FDI's into the city and built the first fully equipped industrial park by 1997.[78]

[77] CIA World Facts book (2).
[78] Introducing Nyiregyhaza, a town of county status (2006), p. 4-7.

2.4.3.2 Labour cost and availability

About 250,000 people live within one hour travel time from Nyiregyhaza. Szabolcs-Szatmar-Bereg County has about 125,800 registered unemployed (22%), approximately 15,000 unemployed people live in Nyiregyhaza or within one hour travel time. More than 40% of these employees have vocational or high school degrees, and almost 4,000 unemployed people have electronic/machine/chemical industry related skills or work experience.

	County	**Nyiregyhaza**
Economically active	572000	119000
Uneployment	41014	5341
Uneployment rate	8,90%	6,70%
Gross wage	€/month (1€=251HUF)	
white-collar	461	577
blue-collar	230	269

Table 10: General labour data of the county and Debrecen

Source: Own graph

2.4.3.3 Employee training and student education

Nyiregyhaza is a student town. Almost 30% of the citizens are pupils; its secondary and technical schools offer high-level education. Around 18000 students study in the three colleges of the town. The region's most recognised institute is the College of Nyiregyhaza. The most important faculties are mechanical engineering and economics at the college.[79]

2.4.3.4 Industrial Parks

The Industrial Park is located 7 km from the centre of Nyiregyhaza. M3 motorway runs by the Park and direct road connections are constructed to it. Main road Nr. 4 is parallel to the Park. Local road with Nr. 4925 is also available in the park. The industrial park is fully equipped and the train connection to it is ensured as well. Since Flextronics was the first foreign investor planning to invest in the industrial park and assuring the city it would employ from the county labour pool, the city of Nyiregyhaza offered the site for a symbolic price of 1 HUF.[80]

[79] Introducing Nyiregyhaza, a town of county status (2006), p. 8.
[80] Interview with Mr.Gyula Meszaros on 12.06.2007, Nyirbator, Hungary.

2.4.3.5 Infrastructure

The railway line Budapest-Nyíregyháza-Záhony is near the Park, the high-speed development of rail system started in 1998. Railway connection with the Park is ensured by the Nyíregyháza - Vásárosnamény railway line. An industrial railway is connected to the Park from this line. There is a direct Inter City connection to Budapest, travel time is 3 hours. The city itself has excellent public transportation to its conurbation.[81]

The city has a civilian airport. It was renovated in 1998.

2.4.3.6 Location of suppliers and competition

40% of Flextronics's suppliers are located in Western Hungary, mostly around Zala and Tab., where the company already operates. Access to these suppliers by highway is essential. In the case of Nyiregyhaza this access can be guaranteed by the highway M3.

In this area foreign direct investments are strongly allocated through the north-east axis. Herewith Figure 20 summarizes the list of those companies based on in which city they are, their country of origin and finally in which sector they operate.

Company	City	Country	Sector
Michelin Group	Nyiregyhaza	France	Rubber type production
Phoenix-Huebner	Nyiregyhaza	Germany	Rubber type production
Butler	Nyiregyhaza	U.S.A	Steel production
Dunapack	Nyiregyhaza	Austria	Paper packaging production
Berwin-Grait	Nyiregyhaza	U.K	Clothing production
United Leaf Tobacco	Nyiregyhaza	U.S.A	Tobacco
VoestAlpine	Nyiregyhaza	Austria	Steel production

Table 11: List of companies' in Debrecen trough FDI

2.4.3.7 Living environment

Nyíregyháza is reach in values of natural and tourist art. The holiday centre of the town, Sóstó, which was renovated and developed in the past few years, is a great family destination all year around**.**

[81] Introducing Nyiregyhaza, a town of county status (2006), p. 9.

3. Result and analysis of the city comparison

The choice of Flextronics in 1999 from among the cities listed in the previous sub-chapter is well known. The management of the European Division decided on Nyiregyhaza, for an Eastern Hungarian city, where this was actually the first major FDI in its history, worth an estimated 75 million USD.[82] In this sub-chapter I take a closer look of that decision using calculation models and draw conclusion out of it.

For Flextronics to achieve lower manufacturing costs, lowering the salary costs was the significant motivation to move production to the Eastern part of Hungary. In order to strengthen its position, and keep competitive prices on its products, ensuring quality was an important issue for the company. To achieve that, Flextronics was looking for a location where there was low-cost labour which was qualified as well. In terms of costs, the price of human capital is lowered by moving from the West to the East.[83]

On the other hand, the availability of labour, especially skilled labour, is more important than cost, though the two are unusually inter-related. A low cost location which cannot provide the appropriate skill levels may lead to considerable resources being spent on training, on recruiting from elsewhere and on moving employee's from other parts of the organisation.

[82] Login Park investment Group - http://www.loginpark.hu
[83] Interview with Mr.Gyula Meszaros on 12.06.2007, Nyirbator, Hungary.

Herewith again summary of the city comparison from the previous sub-chapter:

Factors	Debrecen	Miskolc	Nyiregyhaza
Area	461.25 km²	236.69 km²	274.46 km²
Average population density	442.53 people/km²	736 people/km²	452.92 people/km²
GDP ranking based on county	12/19	16/19	17/19
FDI in % related to the total FDI in the county	29 %[84]	21 %[85]	19 %[86]
Economically active	350,000	175,000	120,000
Uneployment	9,351	9,351	5,341
Uneployment rate	7.50%	8.70%	6.70%
white-collar gross wage	800 €/month	762 €/month	577 €/month
blue-collar gross wage	402 €/month	391 €/month	269 €/month
Industrial Parks	4	2	1
Purchase price EUR / m²	10-40	20-40	15-30
Airports	1	0	1
Railroad	yes	yes	yes
Motor-highway	M3, M35	M3, M30	M3

Table 12: Summery of location factors

In the choice of Flextronics of Nyiregyhaza, there was another major factor to consider. The closeness to the developing markets of Ukraine and Rumania was a highly weighted key point. Both of my interviewees acknowledged the view that basically this fact caused them not to consider Miskolc as city for a green field investment anymore after all the point of location factors were taken into account. Miskolc has a high potential as an industrial location, and the city has a great industrial heritage, but logistically it is far from those developing markets.

3.1 Flextronics' location choice by decision matrix

In subchapter 1.9, I described shortly the theory for the calculation via the decision matrix and now I introduce the main part of the calculation based on the data set from Table 13 and Table 14.

Here on the basis of Table 14 each potential location factor will be evaluated with various weighting points from Table 13. As described in subchapter 1.9 the grading scales are scaled from 1-10, meaning 1 as the worst and 10 as the best

[84] KSH (2007): http://www.ksh.hu.
[85] KSH (2007): http://www.ksh.hu.
[86] KSH (2007): http://www.ksh.hu.

grade. The individual data will be multiplied with those various weighting points and the sum of the individual factors gives again an outcome between 1 and 10. The result of this calculation via decision matrix illustrates the optimal location outcome (choice) for Flextronics in Hungary (Nyiregyhaza).

Key location factor	40%
Labour cost & availability	25%
Industrial park availibility	10%
Road/air transport	10%
Key influences	40%
Education	20%
Site cost	5%
Location of supplier	5%
Forign direct investment in the area	5%
Plus Point	20%
Availability of specific skills	5%
Industrial relations	5%
Human factor/Local government attitude	10%

Table 13: Selection criteria and there weight in % in the location decision

The generally low wages in Eastern Hungary and the accessibility of the work force in the listed cities and surrounding areas, certainly allows a reduction of personnel costs. My interviewees in the location decision indicated a weighting percentage of 25% which truly shows the effect of that.[87] Translating the data into numbers shows furthermore that Nyiregyhaza and Miskolc in correlation with its high unemployment rates offers high labour availability on a more competitive market price then Debrecen for instance.

[87] Interview with Mr.Baumgarter on 23.07.2007, Vienna, Austria.

	Key location factors			Key influences				Plus Point			Total
	Labour cost & availability	Industrial park availibility	Road/Air transporat	Education	Site costs	Location of supplier	Forign investors in the area	Availibility of specific skills	Industrial relations	Human factor/Local government attitude	
Debrecen	5	7	9	10	9	8	8	7	7	3	7,1
Miskolc	7	2	3	7	7	4	7	8	10	7	6,15
Nyiregyhaza	8	9	9	7	8	7	6	7	8	10	8
	25%	10%	10%	20%	5%	5%	5%	5%	5%	10%	100%
Weight	**45%**			**35%**				**20%**			**100%**

Table 14: Decisions matrix

A country's and so a region's comparative advantage strongly depends on the skills offered by its management and labour.[88] According to my Flextronics contacts and to my own city analysis, the presence of educational institutions in the prospective locations plays a very significant role in the decision as well. The weighting of this factor with 20% indicates that too. By evaluating the numbers it can be seen that Debrecen as a city with the largest number of students among those cities indicates the strongest score in the education field.

Property and therefore industrial park issues may be a factor of overriding importance in a location search, either because of the unique scale of the site sought by the company concerned, or because of important time pressure[89]. Availability of a good industrial park for Flextronics had a 10% weight in the location decision. For the company it was important to find an industrial park with full infrastructure and utilities (water, gas, electricity, sewage and road). According to that, Miskolc was behind these requirements and Flextronics decided to reduce the potential consideration of industrial parks to Debrecen and

[88] Ernst & Young (1995), p. 45.
[89] Ernst & Young (1995), p. 55.

Nyiregyhaza. Since Nyiregyhaza - a city with a strong emphasis on bringing investment into the region - invested large amount of money into industrial park infrastructure which reflects also the data listed in the matrix above.[90]

Road transport access to the Flextronics factory played a significant role. Already established major roads are passing by both of the prospective parks. Since the M3 highway – as part of the major European Union road network - was in process of being built and was located nearby the future industrial parks, both of the cities Debrecen and Nyiregyhaza scored similarly and this fact was evaluated as a key location factor by both of my interview partners.

Considering the result of the location/decision matrix in all, it can be seen that in this particular decision the 'human factor' has played also a major role. In many of the interviews my Flextronics contacts assured me that in the operative flow of the decision, the communication with the city authorities was always an influential factor which strongly supported the management to make its choice among the cities. The attitude of the local authorities toward foreign direct investment was very positive in Nyiregyhaza where city officials ensured not only 'standard' support but moreover a functioning fully equipped industrial park.

By summarizing the data from the matrix, it can be seen that Debrecen and Nyiregyhaza would have had similar characteristics in many of the factors, in some cases Debrecen even with higher scores, like road transport or location of investors in the area. However in overall, the rational numbers were significantly influenced by the human factor which turned out the numbers favouring Nyiregyhaza as future location for Flextronics International.

[90] Antaloczy Katalin (2000), p. 482.

3.2 Flextronics' location choice by the Steiner Weber Model

In subchapter 1.9 I described the theory of the Steiner Weber Model and now I introduce the main part of the calculation in full depth for the data set that consists of the three cities, namely Miskolc, Debrecen and Nyiregyhaza.

Transportation costs have been indicated as major key quantitative factors by Flextronics International for the decision and so I have included them as measurement to filter out the cities: transportation costs for produced goods from/to pre-selected cities to airport (cargo base), transportation costs for reaching industrial park from/to the pre-selected cities, transportation costs reaching one of Flextronics main suppliers of in Ukraine from/to pre-selected cities and as last variable transportation costs reaching one of Flextronics' main supplier in Romania from/to pre-selected cities.

Here the calculation starts with the predefinition of some basic variables for the calculation as constants:

k_t…….Cost of transportation of 1 tonne of goods for 1km = 0,77 €/1km/1 ton[91]
t_p …….Amount of goods to be transported in tonnes = 1,008 ton/day
a_p…….distance between plant and the selected destination in km.

For a_p I have the following calculation formula $\sqrt{(x_1 - x_2)^2 + (y_1 - y_0)^2}$ in the Steiner-Weber model and the following table for the transportation costs for producing goods – almost available for selling in the market. The variables x and y are respected geographical coordinates of two points.

a_p	Ferihegy (Airport)
Miskolc	182km ($_{HW1=70\%}$)
Nyiregyhaza	228km ($_{HW2=80\%}$)
Debrecen	228km ($_{HW3=94\%}$)

For the mitigation of the highway costs I use a new factor namely HW. This is a cost coefficient for the distance of 1km on the Hungarian highway multiplied by

[91] In case of transportation from 170km up to 270km; Price Source: SzabolcsTrans Hungary Ltd.

the part of the destination on highway in percentage. Further I defined other variables for this calculation:

K_{HW} =Cost of 1 km on HW / cost of 1 km on non-HW

P_{HW} =percentage of HW on the route.

Therefore the calculation of the highways coefficient is done by the following formula $HW=K_{HW} \cdot P_{HW}$.

For this case we get the following values as summarized in this matrix:

	P_{HW1}	P_{HW2}	P_{HW3}
a_{p1}	182 km / 70%	182 km / 84%	182 km / 94%
a_{p2}	228 km / 70%	228 km / 84%	228 km / 94%
a_{p3}	228 km / 70%	228 km / 84%	228 km / 94%
K_{HW}	1,2	1,2	1,2

After this calculation finally we calculate the transportation costs for produced goods with the following formula: $K_{ti} = K_t \cdot t_p \cdot a_{pi}(P_{nonHW} + K_{HW} \cdot P_{HW})$ and the variables are defined as:

P_{nonHW} …….percentage of regular road (no highway)

P_{HW}……...percentage of highway

K_{HW}……cost coefficient of highway.

For each of the valued cities we get the following calculated magnitude:

City	Transportation cost for produced goods
Miskolc	$K_{t1}=7,7 \cdot 1,008 \cdot 182 \cdot (30\%+1,2 \cdot 70\%) =$ 1,610.3
Nyiregyhaza	$K_{t2}=7,7 \cdot 1,008 \cdot 228 \cdot (16\% + 1,2 \cdot 84\%) =$ 2,066.9
Debrecen	$K_{t3}=7,7 \cdot 1,008 \cdot 228 \cdot (6\%+1,2 \cdot 94\%)=$ 2,102.3.

Further I predefined some basic variables for the second calculation as constants:

k_t…….Cost of transportation of 1 tonne of goods for 1km = 13 €/1km/1 ton[92]
t_p …….Amount of goods to be transported in tonnes = 12 ton/day
a_p…….distance between plant and the selected destination in km.

For a_p I have the following calculation formula $\sqrt{(x_1 - x_2)^2 + (y_1 - y_0)^2}$ in the Steiner-Weber model and the following table for the transportation costs for reaching the industrial park. The variables x and y are respected geographical coordinates of two points.

a_p	Industrial Park
Miskolc	22km ($_{HW1=60\%}$)
Nyiregyhaza	7km ($_{HW2=0\%}$)
Debrecen	8km ($_{HW2=50\%}$)

For the mitigation of the highway costs I use a new factor namely HW. This is a cost coefficient for the distance of 1km on the Hungarian highway multiplied by the part of the destination on highway in percentage. Further I defined other variables for this calculation:

K_{HW} =Cost of 1 km on HW / cost of 1 km on non-HW
P_{HW} =percentage of HW on the route.

Therefore the calculation of the highways coefficient is done by the following formula $HW_i = (P_{nonHW} + K_{HW} \cdot P_{HW})$.

For this case we get the following values as summarized in this matrix:

	P_{HW1}	P_{HW2}	P_{HW3}
a_{p1}	22 km / 60%	22 km / 0%	22 km / 50%
a_{p2}	7 km / 60%	7 km / 0%	7 km / 50%
a_{p3}	8 km / 60%	8 km / 0%	8 km / 50%
K_{HW}	1,2	1,2	1,2

[92] In case of transportation from 1km up to 50km; Price Source: SzabolcsTrans Hungary Ltd.

After this calculation finally I calculate the transportation costs for arriving in the industrial park with the following formula: $K_{ti}=k_t \cdot t_p \cdot a_{pi} \cdot HW_i$ and the variables are defined as:

P_{nonHW} …….percentage of regular road (no highway)

P_{HW}……...percentage of highway

K_{HW}……cost coefficient of highway.

For each of the valued cities we get the following calculated magnitude:

City	Transportation cost for reaching the industrial park
Miskolc	$K_{t1}=13 \cdot 12 \cdot 22 \cdot (40\% + 1,2 \cdot 60\%) =$ 3,843.8
Nyiregyhaza	$K_{t2}=13 \cdot 12 \cdot 7 \cdot (100\% + 1,2 \cdot 0\%) =$1,092
Debrecen	$K_{t3}=13 \cdot 12 \cdot 8 \cdot (50\%+1,2 \cdot 50\%) =$1,372.8

At last I predefined some basic variables for the last calculation as constants:

k_t…….Cost of transportation of 1 tonne of goods for 1km = 17 €/1km/1 ton[93]

t_p …….Amount of goods to be transported in tonnes = 15 ton/day

a_p…….distance between plant and the selected destination in km.

For a_p I have the following calculation formula $\sqrt{(x_1 - x_2)^2 + (y_1 - y_0)^2}$ in the Steiner-Weber model and the following table for the transportation costs for reaching the supplier abroad. The variables x and y are respected geographical coordinates of two points.

a_p	Resource1/Ukraine	Resource2/Rumania
Miskolc	105km	130km
Nyiregyhaza	100km	120km
Debrecen	107km	119km

For the mitigation of the highway costs I use a new factor namely HW. This is a cost coefficient for the distance of 1km on the Hungarian highway multiplied by the part of the destination on highway in percentage. Further I defined other variables for this calculation:

K_{HW} =Cost of 1 km on HW / cost of 1 km on non-HW

P_{HW} =percentage of HW on the route.

[93] In case of transportation from 1km up to 50km; Price Source: SzabolcsTrans Hungary Ltd.

Based on the information from Flextronics moreover from logistic companies in the year of 1999/2000 there wasn't highway directly to the suppliers in Ukraine or in Romania, therefore the HW_i coefficient in this scenario is always 1.

For this case we get the following values as summarized in this matrices:

Ukraine	P_{HW1}	P_{HW2}	P_{HW3}
a_{p1}	105km / 0%	105km / 0%	105km / 0%
a_{p2}	100 km / 0%	100 km / 0%	100 km / 0%
a_{p3}	107 km / 0%	107 km / 0%	107 km / 0%
K_{HW}	1,2	1,2	1,2

Romania	P_{HW1}	P_{HW2}	P_{HW3}
a_{p1}	130km / 0%	130km / 0%	130km / 0%
a_{p2}	120 km / 0%	120 km / 0%	120 km / 0%
a_{p3}	119 km / 0%	119 km / 0%	119 km / 0%
K_{HW}	1,2	1,2	1,2

After this calculation finally I calculate the transportation costs for reaching the supplier abroad with the following formula: $K_{ti}=k_t \cdot t_p \cdot a_{pi} \cdot HW_i$ and the variables are defined as:

P_{nonHW} …….percentage of regular road (no highway)

P_{HW}……...percentage of highway

K_{HW}……cost coefficient of highway.

For each of the valued cities we get the following calculated magnitude:

Ukraine / City	Transportation cost for reaching the supplier abroad
Miskolc	$K_{t1(R1)}=17 \cdot 15 \cdot 105$ (100% + 0%)=26,775
Nyiregyhaza	$K_{t2(R1)}=17 \cdot 15 \cdot 100$ (100% + 0%)= 25,500
Debrecen	$K_{t3(R1)}=17 \cdot 15 \cdot 107$ (100%+0%)= 27,285

Rumania / City	Transportation cost for reaching the supplier abroad
Miskolc	$K_{t1(R2)}$=18 · 21 · 105 · (100% + 0%)= 39,690
Nyiregyhaza	$K_{t2(R2)}$= 18 · 21 · 100 · (100% + 0%)= 37,800
Debrecen	$K_{t3(R2)}$=17 · 25 ·107· (100% + 0%) = 38,199

In the last table the results are summarized as following:

City	Transportation costs for produced goods	Transportation costs for reaching the Industrial Park	(R1)Transportation costs for reaching supplier in Ukraine	(R2)Transportation costs for reaching supplier in Romania	TOTAL COSTS
Miskolc	1,610.3	3,843.8	26,775	39,690	71,919.1
Nyiregyhaza	**2,066.9**	**1,092.0**	**25,550**	**37,800**	**66,508.9**
Debrecen	2,102.3	1,372.8	27,285	38,199	68,959.1

As main result it is proved by the Steiner Weber model that from a transportation cost view point Nyiregyhaza is the ideal city with lowest estimated costs.

3.3 Conclusion

For the rising internationalization of corporations there are many factors to consider. One of the phenomenons of that is globalisation, which increasingly affects not only economically but politically nations of the western hemisphere. Corporations strive for advantages such as growth in sales or cost saving from this situation. The strongest input of this thesis is the case of Flextronics's foreign direct investment in Hungary. For the establishment of a new Greenfield investment, Flextronics was looking for a city in Eastern Hungary where the company could start its low-cost production line.

For the locations, three north-eastern county capitals were competing with each other to fulfil Flextronics' requirements – the capitol of Borsod-Abauj-Zemplen county, Miskolc; the capitol of Hajdu-Bihar county, Debrecen; and last but not least the capitol of Szabolcs-Szatmar-Bereg county, Nyiregyhaza. These county capitals were evaluated based on their labour structure, educational and training background. Further factors influencing the evaluation included industrial park infrastructure, location of suppliers and the living environment.

As a result of the decision matrix, Nyiregyhaza had the best promise; though Debrecen in some areas scored better, overall acceptance towards Nyiregyhaza was higher. This result is reflected also by the decision of Flextronics which actually choose the previously mentioned capitol of Szabolcs Szatmar Bereg County.

Taking into account another empirical methodology like the model of Steiner Weber, we can see the outcome for a key factor like transportations costs in objective numbers. The outcome of the Steiner Weber Model reflects the theoretical outcome with quantifiable facts. As we can see the comparison of transportation costs among the cities, the result of the analytical method reflects as well that Nyiregyhaza is the best from those pre-selected cities .

With investment continuing to flow inward, established corporations consolidating their operations and the number of sponsoring agencies inevitably increasing, location decision are crucially important to business success. Establishment of a plant is a binding and usually permanent decision, locking the firm into long-term constraints. As a result of the thesis it turned out that Debrecen and Nyiregyhaza scored almost the same; on the other hand soft factors, such as governmental attitude toward FDI, and personal experience with local authorities influenced significantly the decision makers of Flextronics.

Further result of my thesis helped me to understand how the theory and the practice can combine an optimal tool for right location decision making. In the course of my analysis for this thesis, it has been clear to me that besides the strategies and a theoretical model, how influential the ‘human factor’ is. The motive for the new location was based mainly on cost factors which should contribute to profit. Along with factors which were pointed out in the individual city introductions, the investment climate of the city of Nyiregyhaza was certainly a weighted reason to select as the site for Flextronics.

As a further outcome of the study, I have learned that various locations in Eastern Hungary are very attractive locations from many cost aspects. City authorities have also set up local agents to draw the attention of corporations and

there is certainly significant positive result from such city promotions. For cities in the east part of Hungary, the presence of multinational manufacturing companies is an increasing trend, if we compare that with the western part of Hungary. As a matter of fact, city officials started to develop industrial parks around the cities. However, when it comes to realization, my research about these cities showed that in many cases industrial parks were still only in the planning stage by the time the company wanted to take action toward plant construction affecting in that way the re-location attitude.

In the location decision of Flextronics, the general locations factors played a significant role, such as inexpensive but educated labour, infrastructure, logistics, economical and political stability. In 1999 Hungary, and so Nyiregyhaza, was the optimal location for Flextronics. But as we look back and at the same time look ahead we can see that the low-cost strategy cannot go on without an end. In the globalized world, there will be always locations that may offer lower costs. On the other hand, competence centres and locations with highly educated population may offer an alternative for manufacturing industries to invest more on the long-term basis. Hungary and other less-developed counties in the Eastern region should invest more in infrastructure and promote their strength in a way that is also measurable for corporations.

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Appendix 1 – Curriculum Vitae

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Education

2002 – 2008	University of Vienna International Business Administration - Master's degree Specializations: Financial Services, Industrial Mangmnt.	Vienna / Austria
Summer Semester 2005	BI Norwegian School of Management ERASMUS Exchange semester Specializations: Petroleum Industry, Entrepreneurships	Oslo / Norway
Winter Semester 2001	College of Szolnok International Business Administration	Szolnok / Hungary
1996 – 2001	Zrinyi Ilona High School Hungarian HS diploma	Nyiregyhaza / Hungary
1999 – 2000	John F. Kennedy High School Student exchange program US High School diploma	Sacramento / USA

Work experience/internship

October 2006 – July 2007	University of Vienna Faculty of IT Support; Student Tutor	Vienna / Austria
July – October 2006	Siemens Department of Corporate Information Office; Intern	Beijing / China
February – March 2006	Lufthansa Cargo Department of Sales; Inern	Budapest / Hungary
January –June 2005	Flextronics International Department of Strategic Purchasing; Inern	Billingstad / Norway
August – December 2004	Siemens Department of Strategic Purchasing; Intern	Malvern, PA / USA
August – October 2003	Voestalpine Department of Strategic Human Resources; Intern	Linz / Austria

Language skills

English	fluent
German	fluent
Hungarian	fluent

Computer skills

Word, Excel, Power Point, Front Page, Access, SAP (FI/CO/SD/MM), Click2Procure

Appendix 2 – Abstract in German

Meine Diplomarbeit soll den Prozess der Auswahl eines geeigneten Standortes für ein Produktionsunternehmen in Ungarn beleuchten. Es hätte den Umfang der Diplomarbeit gesprengt, wäre jeder einzelne Standortfaktor gesondert betrachtet worden. Ich habe mich daher auf die Darstellung der aktuellsten und mir als am relevantesten erscheinenden Forschungsergebnisse beschränkt. Es wurden vor allem jene Standortfaktoren, die häufig in der Praxis erwähnt werden schwerpunktmäßig betrachtet. Weiters möchte ich aufzeigen, warum gerade manche Standortfaktoren besonders wichtig sind, wie sie sich entwickeln und welchen Einfluss das ökonomische und politische Umfeld auf diese hat.

Das erste Kapitel befasst sich mit der Theorie der Standorte und beschreibt Trends und unterschiedliche Ansichten über Standortfaktoren.

Im zweiten Kapitel stelle ich das Produktionsunternehmen Flextronics vor, wobei ich ein besonderes Augenmerk hinsichtlich potentieller Unternehmensstandorte auf Ungarn lege. Als nächste beschreibe ich den Entscheidungsfindungsprozess von Flextronics und vergleiche ausgewählte ungarische Städte, in welchen das Unternehmen den Bau einer Produktionsanlage plante.

Im dritten Kapitel bewerte ich die vom Unternehmen getroffene Entscheidung mittels empirischer Methoden und leitete daraus eine theoretische Schlussfolgerung ab.

Der Zweck der Diplomarbeit war es, das Thema aus Sicht eines Unternehmens, das die Gründung einer Tochtergesellschaft in Ungarn prüft, zu beleuchten. Dabei habe ich versucht, die Vor- und Nachteile der unterschiedlichen Standorte betreffend der Ziele und Motivationen die ein derartiges Unternehmen hat, zu beschreiben. Die tatsächliche Entscheidung der Flextronics Inc., welche sich für die Errichtung eines Standortes in Ungarn entschieden hat, bestätigt damit die Aussage der Diplomarbeit.