

Hochschule Niederrhein
University of Applied Sciences



NIERS

Institut für Regional-
und Strukturforschung
Institute for Regional-
and Structural Research

Location Conditions of Energy-intensive Enterprises

53rd ERSA Congress

“Regional Integration: Europe, the Mediterranean and the World Economy”

27-31 August 2013

Palermo, Italy

Rüdiger Hamm

NIERS - Niederrhein Institute for Regional and Structural Research

Niederrhein University of Applied Sciences

Outline of Presentation

- 1. Introduction – research question.**
- 2. Theoretical considerations.**
- 3. Research Method.**
- 4. Results.**
 - a. Ranking locational factors by importance (all firms).**
 - b. Comparing general results with those from energy-intensive firms.**
- 5. Summary.**

Introduction – Research Question

On the one hand: Conditions of a location influence the firms' economic situation.

On the other hand: The firms' economic situation determines the regional economic performance, the regional tax receipts and by this the regions' possibilities for influencing the location conditions.

Interdependency explains the interest of firms and politicians in analyzing the regional location conditions.

Introduction – Research Question

Entrepreneurial location decisions are determined by a broad variety of aspects – location factors.

- 1. The relevance of these location factors will be different. First aim of the present paper is to work out these differences by use of empirical methods.**
- 2. The relevance of these factors will differ by industry. Second aim of the paper is to analyze the special requirements of energy-intensive industries.**

Theoretical considerations

Economic, social, political and natural framework conditions determine entrepreneurial success.

Many of these conditions depend on the location.

Following MAIER/TÖDTLING (2006) location conditions are factors which meet the following two requirements:

- 1. Factor is relevant for the firm's costs or revenues, including nonmonetary costs (e.g. expenditure of time) and long run effects (e.g. on innovativeness).**
- 2. Factor must show spatial differences concerning availability, quality and/or price.**

Theoretical considerations

Starting from this definition location factors can be systemized e.g. following BERLEMANN/TILGNER (2006).

They differentiate between ...

- **... determinants of production conditions (input),**
- **... determinants of market conditions (output) and**
- **... political and legal framework conditions.**

Theoretical considerations

Determinants of production conditions

Regional factor endowments – i.e. workforce, real estate, private and public capital.

In each case quantitative, qualitative and price aspects must be taken into consideration.

Using workforce as an example:

- Availability of labor
- Qualification of labor force
- Wage rates

Similar considerations apply to real estate.

Theoretical considerations

Real capital:

- **Availability and prices depend on the availability of financial capital.**
- **Financial capital is mobile; regional differences can hardly be expected.**
- **Factor does not fulfill the requirements for a regional location condition.**

Public capital:

- **All kind of infrastructure.**
- **Production oriented infrastructure is directly used by private firms (e.g. traffic connections, information and communication infrastructure, energy infrastructure, facilities for education, research institutions).**
- **Household oriented infrastructure only has indirect influences via living standards, thus making a location more attractive to qualified workforce (e.g. hospitals, homes for elder people, Kindergartens, cultural, recreational and leisure facilities).**

Theoretical considerations

Determinants of market conditions

- **Magnitude, distance and accessibility of markets internal and external to the region.**
- **Distances to providers and clients.**
- **Success in attracting external demand depends on the region's structures by industry and on the entrepreneurial competitiveness.**

Political, legal and social framework conditions

- **Framework conditions differing from region to region are e.g. the business climate, the duration of permit procedures and the special local fees and taxes.**

Research Method

Simple methodological approach: Firm surveys.

NIERS has analyzed the regional location conditions of Middle Lower Rhine Area (MLRA) for several times.

MLRA is a German region located in the western part of Northrhine-Westphalia between the river Rhine and the Dutch-German Border (Mönchengladbach, Krefeld, Viersen and Neuss).

Empirical results presented here are based on a firm survey from 2008.

More than 1500 firms (6000 asked) participated in the survey.

Research Method

Firms in Middle Lower Rhine Area have been asked to judge

- **the specific quality in MLRA and**
- **the importance (relevant for research question of the paper)**

for 59 different location factors.

The firms had to judge each single location factor on a scale reaching from 1 to 4 – with 1 = very important, 2 = important, 3 = less important, 4 = unimportant. The average possible mark therefore was 2,5.

Firms' participation in the survey has been high enough to differentiate the analysis by industry – here energy-intensive industries.

First step: General Results.

Ranking by average marks.

Ten most important factors:

- **Cost aspects (energy costs, costs of waste removal, water and waste water fees).**
- **Local fiscal burden (public fees, local taxes on entrepreneurial capital and on land).**
- **Some „traditional“ factors (highways, availability and qualification of workforce).**
- **Business-friendly climate of local authorities as a soft factor.**

Factors of minor importance:

- **Railway connections have the lowest relevance.**
- **Availability of real estate and the supply of commercial.**
- **Airport connections.**
- **Availability of technological consulting and the regional university as partner for research and development.**

Results

Second step: Same analysis for energy-intensive firms.

No generally accepted definition of “energy-intensiveness”; pragmatic solution based on WZ-classification:

- **Indicator: Energy consumption as share of gross value added.**
- **Threshold value: Energy-intensive if this share exceeds 15 %.**

Most of identified industries belong to manufacture of food products, of pulp, paper and paper products, of chemicals, of non metallic mineral products and of basic metals and metal products.

37 energy-intensive firms participated in the survey.

Comparing the results.

Some factors noticeably changed their positions.

Higher importance:

- **Proximity to important providers,**
- **proximity to important customers,**
- **land prices and**
- **privatization of municipal responsibilities.**

Lower importance:

- **Parking fees,**
- **sufficient parking,**
- **cityscape (cleanliness as well as architecture)**
- **safety in the inner cities.**

In general: Soft factors are of minor relevance for energy-intensive industries, while spatial contiguity is still a crucial factor for them.

Evaluation gaps allow better insights.

Three groups of location factors more relevant to energy-intensive industries:

- **Proximity**
- **Cost aspects (energy costs, water and wastewater taxes, local property and business taxes, land prices, public charges, costs of waste disposal)**
- **Governmental behavior (portfolio management of local enterprises, duration of permit procedures, quality of cooperation with local authorities and administration, the level of administrative regulations and a pro-business municipal administration)**

Groups with less relevance:

- **Inner city conditions**
- **Other soft location factors**
- **Consulting services.**
- **Education**

Summary

Aim of paper: Analyze of location factors for energy-intensive firms.

Method: Broadly based firm survey in Middle Lower Rhine Area from 2008.

Results:

- **Cost aspects and local fiscal burdens are the most important location factors to all firms besides some „traditional“ factors like highways and workforce.**
- **Results for energy-intensive industries remarkably differ from that, though differences are hardly surprising.**
- **Summarized:**
 - **Spatial proximity to customers and suppliers, cost aspects and the degree of governmental regulation and institutional constraints are of special relevance for energy-intensive firms.**
 - **Soft factors of location, consulting services and some aspects of schooling and education are of lesser importance to energy-intensive firms.**

Thank You for Your Interest!

Hochschule Niederrhein
University of Applied Sciences



NIERS

Institut für Regional-
und Strukturforschung
Institute for Regional-
and Structural Research

Appendix

| Table 1: Energy-intensive Branches (2007) | | | | | | | |
|--------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------|--------------------|--------------------------------------|--------------------------------------|
| WZ | No. of firms in sample | | Gross Value of Production (GVP) | Gross Value Added (GVA) | Energy Consumption | Energy Consumption Share in GVA in % | Energy Consumption Share in GVP in % |
| DA1597 | | Manufacture of malt | 322.635 | 36.158 | 30.960 | 85,63 | 9,60 |
| DI2653 | | Manufacture of plaster | 176.205 | 54.445 | 34.311 | 63,02 | 19,47 |
| DI2652 | | Manufacture of lime | 649.674 | 245.762 | 153.126 | 62,31 | 23,57 |
| CA10 | | Mining of coal and lignite; extraction of peat | 4.279.279 | 419.160 | 253.984 | 60,59 | 5,94 |
| DI2651 | 1 | Manufacture of cement | 2.520.286 | 868.877 | 431.267 | 49,63 | 17,11 |
| DE2112 | 3 | Manufacture of paper and paperboard | 16.252.688 | 3.718.550 | 1.761.694 | 47,38 | 10,84 |
| DG2413 | | Manufacture of other inorganic basis chemicals | 5.124.057 | 1.141.518 | 533.379 | 46,73 | 10,41 |
| DI2640 | 1 | Manufacture of bricks, tiles and construction products in baked clay | 1.474.913 | 548.071 | 243.286 | 44,39 | 16,49 |
| DJ2742 | 1 | Aluminium production | 14.237.921 | 2.063.684 | 736.403 | 35,68 | 5,17 |
| DJ2710 | | Manufacture of basic iron and steel and of ferro-alloys | 41.523.840 | 10.577.925 | 3.663.448 | 34,63 | 8,82 |
| CB141 | | Quarrying of stone | 1.061.682 | 380.181 | 128.473 | 33,79 | 12,10 |
| DG2470 | | Manufacture of man-made fibres | 4.242.699 | 917.318 | 307.666 | 33,54 | 7,25 |
| DA1562 | 1 | Manufacture of starches and starch products | 1.669.497 | 342.942 | 111.943 | 32,64 | 6,71 |
| DI2630 | | Manufacture of ceramic tiles and flags | 789.492 | 261.675 | 84.509 | 32,30 | 10,70 |
| DI2611 | | Manufacture of flat glass | 1.363.565 | 463.844 | 143.376 | 30,91 | 10,51 |
| DI2613 | | Manufacture of hollow glass | 2.570.075 | 1.013.622 | 307.145 | 30,30 | 11,95 |
| DI2662 | | Manufacture of plaster products for construction purposes | 1.398.966 | 370.693 | 109.218 | 29,46 | 7,81 |
| CB1422 | 1 | Mining of clays and kaolin | 349.530 | 146.467 | 40.791 | 27,85 | 11,67 |
| DD2020 | | Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards | 6.381.552 | 1.289.752 | 336.975 | 26,13 | 5,28 |
| DG2414 | 1 | Manufacture of other organic basic chemicals | 24.365.531 | 5.334.872 | 1.333.165 | 24,99 | 5,47 |
| DA1541 | | Manufacture of crude oil and fats | 2.380.218 | 212.808 | 52.526 | 24,68 | 2,21 |
| CB1421 | 5 | Operation of gravel and sand pits | 2.265.621 | 854.770 | 209.950 | 24,56 | 9,27 |
| DG2415 | | Manufacture of fertilizers and nitrogen compounds | 3.385.200 | 947.562 | 224.256 | 23,67 | 6,62 |
| DB1723 | | Worsted-type weaving | 176.174 | 45.958 | 10.719 | 23,32 | 6,08 |
| DB1711 | | Preparation and spinning of cotton-type fibres | 485.467 | 132.283 | 30.470 | 23,03 | 6,28 |
| DI2614 | | Manufacture of glass fibres | 1.029.432 | 363.896 | 83.280 | 22,89 | 8,09 |
| DJ2745 | 1 | Other non-ferrous metal production | 2.174.413 | 154.085 | 33.582 | 21,79 | 1,54 |
| DA1531 | | Processing and preserving of potatoes | 1.487.343 | 356.006 | 74.991 | 21,06 | 5,04 |
| DB1730 | 4 | Finishing of textiles | 976.591 | 372.896 | 78.271 | 20,99 | 8,01 |
| DJ2751 | 3 | Casting of iron | 6.162.893 | 2.049.878 | 426.762 | 20,82 | 6,92 |
| DG2412 | | Manufacture of dyes and pigments | 3.100.923 | 958.044 | 198.026 | 20,67 | 6,39 |
| DA1512 | | Production and preserving of poultrymeat | 3.492.724 | 425.153 | 86.489 | 20,34 | 2,48 |
| DA1583 | | Manufacture of sugar | 2.871.076 | 829.579 | 165.181 | 19,91 | 5,75 |
| DJ2743 | 1 | Lead, zinc and tin production | 2.716.015 | 507.316 | 100.906 | 19,89 | 3,72 |
| DI2615 | 1 | Manufacture and processing of other glass, including technical glassware | 2.133.575 | 849.389 | 162.411 | 19,12 | 7,61 |
| DN3720 | 4 | Recycling of non-metal waste and scrap | 1.715.704 | 472.377 | 90.165 | 19,09 | 5,26 |
| DA1551 | | Operation of dairies and cheese making | 26.101.322 | 2.417.618 | 454.504 | 18,80 | 1,74 |
| CB1450 | | Other mining and quarrying n.e.c. | 126.765 | 30.565 | 5.529 | 18,09 | 4,36 |
| DJ2734 | 6 | Wire drawing | 1.822.391 | 336.298 | 60.153 | 17,89 | 3,30 |
| DG2416 | 1 | Manufacture of plastic in primary forms | 44.742.060 | 10.670.274 | 1.885.798 | 17,67 | 4,21 |
| DA1585 | | Manufacture of macaroni, noodles, couscous and similar farinaceous products | 581.715 | 118.636 | 20.943 | 17,65 | 3,60 |
| DA1532 | | Manufacture of fruit and vegetable juice | 2.965.693 | 345.499 | 59.495 | 17,22 | 2,01 |
| DI2682 | | Manufacture of other non-metallic mineral products n.e.c. | 4.315.568 | 1.133.190 | 192.103 | 16,95 | 4,45 |
| DE2122 | | Manufacture of household and sanitary goods and of toilet requisites | 4.716.415 | 1.281.247 | 216.625 | 16,91 | 4,59 |
| DA1571 | 1 | Manufacture of prepared feeds for farm animals | 4.576.934 | 548.930 | 90.602 | 16,51 | 1,98 |
| DJ2721 | | Manufacture of cast iron tubes | 458.381 | 126.606 | 20.416 | 16,13 | 4,45 |
| DE2111 | | Manufacture of pulp | 746.659 | 225.453 | 35.174 | 15,60 | 4,71 |
| DI2626 | 1 | Manufacture of refractory ceramic products | 1.669.310 | 522.650 | 78.554 | 15,03 | 4,71 |

Calculated on basis of German Federal Statistical Office