FREEZING WEEK 2016 BREAK THE ICE

Soccer Clubs and Regional Economic Development

Freezing Week 2016, 10. February 2016
HAMK – Häme University of Applied Sciences
Hämeenlinna

Rüdiger Hamm
NIERS – Niederrhein Institute for Regional and Structural Research
Hochschule Niederrhein University of Applied Sciences

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Outline of Presentation

1. Introduction
2. Regional Effects of Soccer Clubs – Theoretical Considerations
3. Regional Effects of Soccer Clubs – Empirical Findings
4. Summary and Conclusions

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Who?

NIERS: One of ten research institutes of Hochschule Niederrhein

„Soccer Research Team“:

- **Christina Fischer, MA**
- **Angelika Jäger, MA**
- **Prof. Dr. Rüdiger Hamm**

And of course Borussia Mönchengladbach …

… as without the club‘s support this type of research would not be possible!

Hochschule Niederrhein
University of Applied Sciences
NIERS
Niederrhein Institut für Regional- und Strukturforschung
Niederrhein Institute for Regional and Structural Research

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research


WIR
SIND
BORUSSIA
B
D

Introduction

One of our research interests:

Analyzing the relationships between sports and events and regional economic development

Especially – regional effects of soccer clubs

Let's talk about this!

- **Can a soccer club influence regional economic development?**
- **How can a soccer club do this?**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Regional effects of a Major league soccer club

Supply side

- City becomes well-known
- Improves city-image
- Relevant factor for firms' location decision
- psychic income

Other Effects

- Improves international understanding
- Health of people
- Use of Infrastructure
- Vandalism of Fans

Demand side

- Salaries
- Intermediates
- Expenses of Fans
- Invest-ment

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Theoretical Considerations

Literature distinguishes demand and supply side effects:

- **Demand side effects:**
  - **Direct effect – regional employment, income and gross value added**
  - **Indirect effects – Investment, demand for intermediate goods and expenses of supporters – regional employment, income and value added**
  - **Induced effects via regional income cycle – regional employment, income and value added**

Theoretical Considerations

- **Supply side effects:**
  - **Increase of awareness level**
  - **Image transfer (improvement of image?)**
  - **Regional location effects**
  - **Regional „psychic income“**
  - **Nucleus of a regional communication and cooperation network**

Empirical Findings – Aims, Research Design and Methods

- Empirical Studies on regional effects of soccer clubs normally focus on demand-side effects, i.e. regional multiplier analysis
- But there seems to be “something more” – beyond regional multipliers (CROMPTON)
- Our research and this presentation does not only deal with “traditional demand side analysis” …
- … but also tries to find out if there is something beyond
- Aim: To empirically analyse all kind of effects as complete as possible
- Research Design: Case study for Borussia Mönchengladbach

Empirical Findings – Aims, Research Design and Methods

Methods for demand side effects:

- **Regional multiplier analysis**
- **Iterative procedure using some information stemming from national input-output-tables**
- **Calculation of regional multipliers = overall effect / direct effect**
- **Overall effect = direct + indirect + induced effect**

Data:

- **Information from the club is needed (salaries, expenditure, investment)**
- **Primary statistics for fans' expenses – surveys in the stadion**
- **Secundary statstics from the German Federal Statistical Office**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Findings – Aims, Research Design and Methods

Methods for supply side effects:

- **Mainly survey-based descriptive and partially multivariate analysis**
- **„Equivalent-value-analysis“ based on „Media coverage analysis“**
- **Basic network analysis**

Data:

- **Media coverage analysis (done by “Repucom”) and**
- **a list of partners have been provided by Borussia**

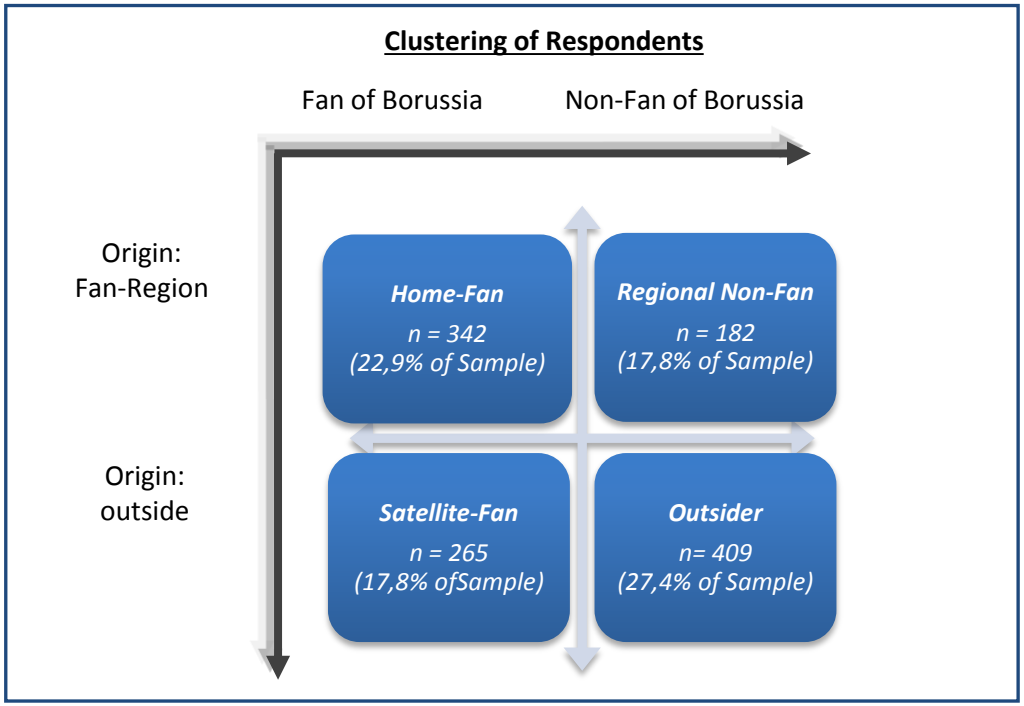
Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Findings – Aims, Research Design and Methods

- **But most of the data stems from three surveys conducted in autumn 2013.**
  - **Audience of soccer matches (913)**
  - **Face-to-face passerby-surveys (579)**
  - **Family-and-friends online-surveys (265)**
- **This last mentioned data set has been used in different ways:**
  - **Total data set (only seldom)**
  - **Reduced data set without audience of matches (in some cases)**
  - **Reduced data set only with fans and “non-fans”, but without sympathizers - clustered data set (in most cases)**

Empirical Findings – Aims, Research Design and Methods

- **Respondents have been clustered the following way**



Empirical Results – Demand Side Effects in the City

Results: Direct, Indirect and Induced Economic Impacts (City)

Borussia VfL 1900 Mönchengladbach

Multiplier

Income:	**1.39 – 1.55**
Value Added:	**1.46 – 1.66**
Employment:	**3.13 – 4.01**
Gross Production:	**1.60 – 1.87**

Direct Impacts

- Income: 44.3 Mio. €
- Value Added: 64.5 Mio. €
- Employment: 326
- Gross Production: 95.8 Mio €

Indirect Effects

- Income: 13.8 – 17.9 Mio. €
- Value Added: 23 – 29.5 Mio. €
- Employment:
- Gross Production: 44.1 - 56.7 Mio €

Induced Effects

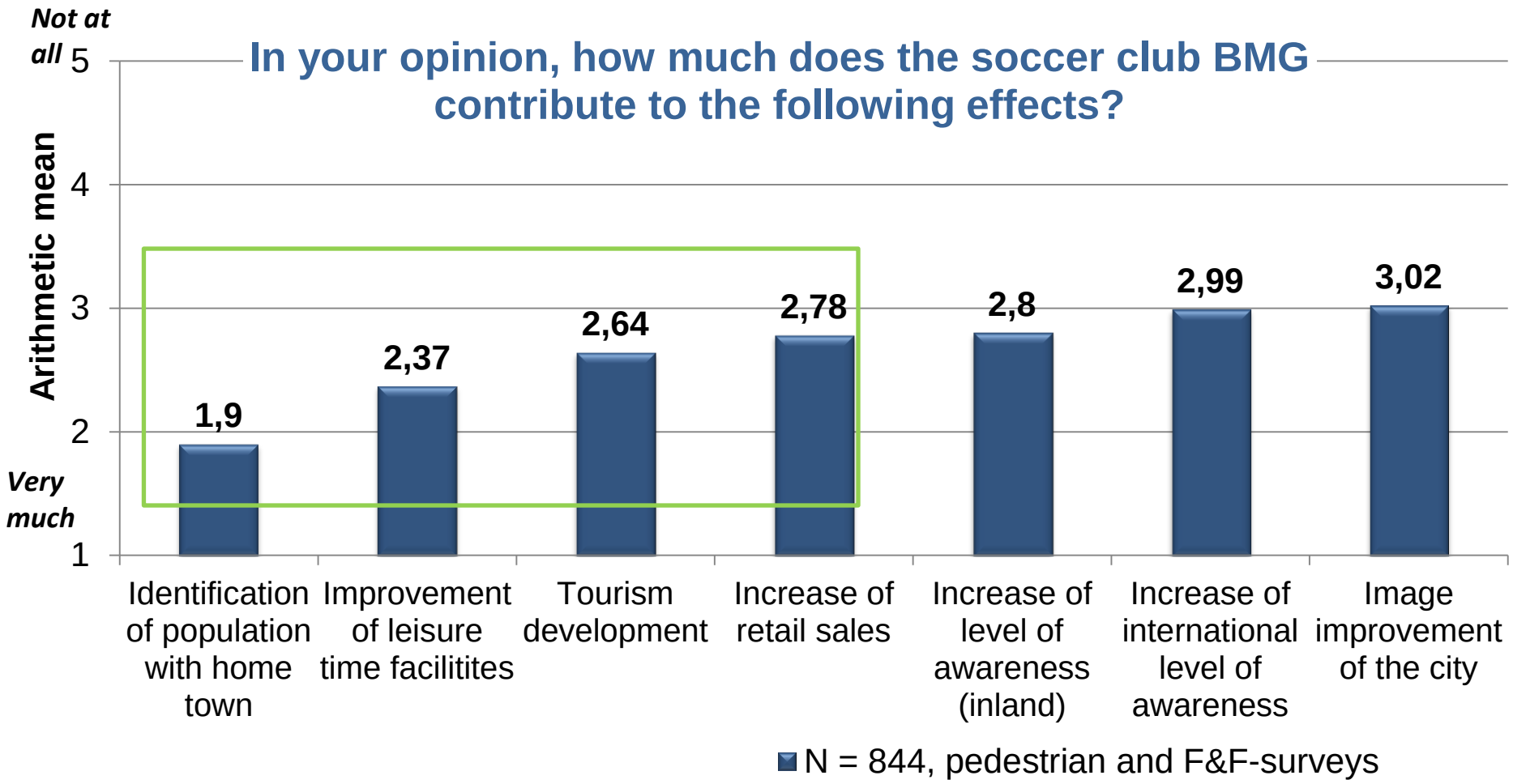
- Income: 3.4 – 6.7 Mio €
- Value Added: 6.6 – 13.2 Mio €
- Employment: 695 - 982
- Gross Production: 13.5 - 26.9 Mio €

Total Income, Employment and Value Added Effects

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Results – Supply Side Effects

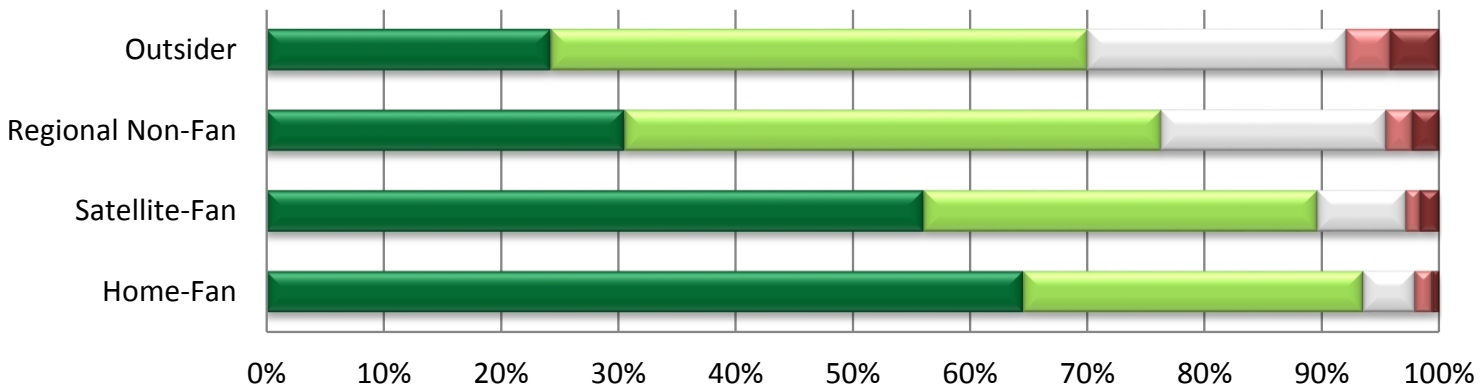
Some supply-side at first glance



Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Findings – Supply side effects
Awareness

1. Increasing the city's national awareness?



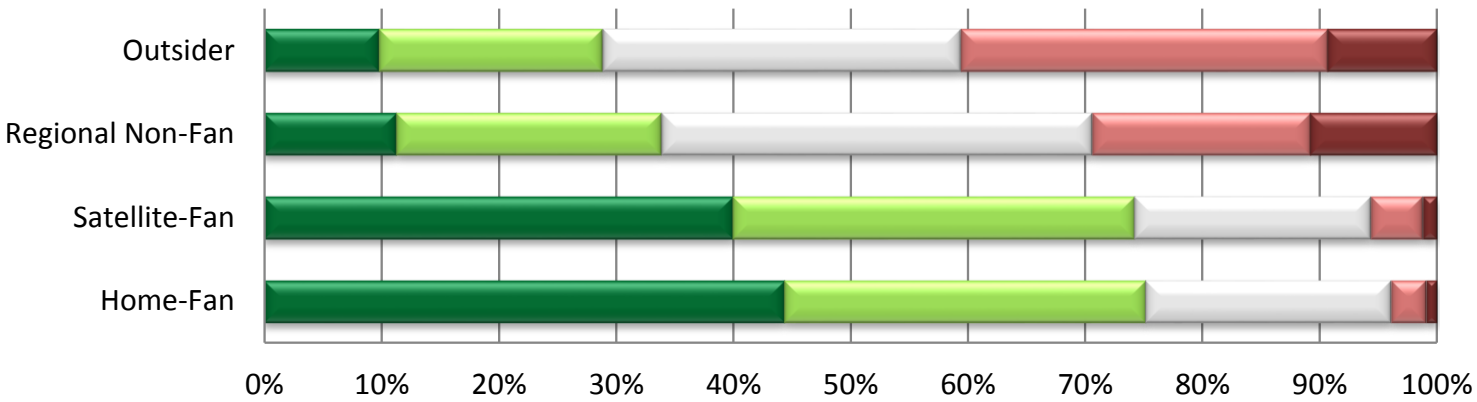
	Home-Fan	Satellite-Fan	Regional Non-Fan	Outsider
Very strong	64,5%	56,0%	30,5%	24,3%
Strong	29,0%	33,6%	45,8%	45,8%
Middle	4,4%	7,6%	19,2%	22,1%
low	1,5%	1,2%	2,3%	3,8%
not at all	,6%	1,6%	2,3%	4,1%

- **93.5% of the home-fans think that the club increases the national awareness of the city**
- **Even 70,1% of the outsiders believe so**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Findings – Supply side effects
Awareness

2. Increasing the city's international awareness?



	Home-Fan	Satellite-Fan	Regional Non-Fan	Outsider
Very strong	44,3%	39,9%	11,3%	9,8%
Strong	30,8%	34,3%	22,6%	19,1%
Middle	21,0%	20,2%	36,7%	30,5%
low	3,0%	4,4%	18,6%	31,3%
not at all	,9%	1,2%	10,7%	9,3%

- **About 75% of the two fan groups believe that Borussia increases the city's international awareness**
- **Nearly 30% of the outsiders believe in these effects, too**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

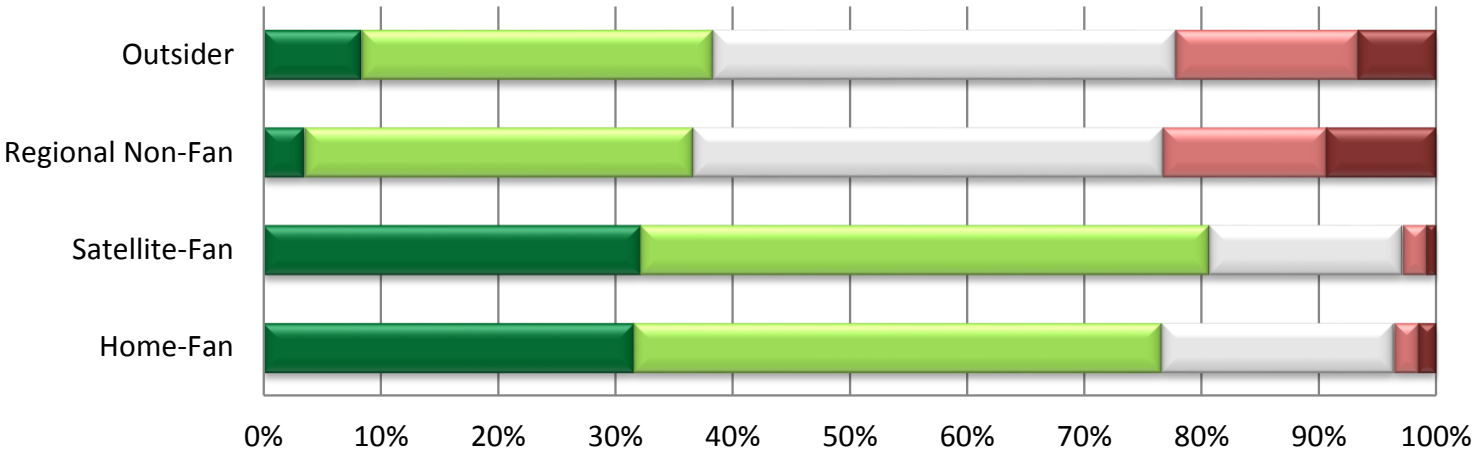
Empirical Findings – Supply side effects
Awareness

Value of Borussia's media coverage for the city

- Time and number of people reached by different TV-programs
- Valued by average TCP firms have to pay for advertising on TV
- 10 % of that as an estimation: Between 10,3 Mio. € und 20,8 Mio. €.
- That's what the city of MG would have to pay to have a similar effect of advertising

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Findings – Supply side effects
Improvement of Image



	Home-Fan	Satellite-Fan	Regional Non-Fan	Outsider
Very strong	31,5%	32,1%	3,5%	8,4%
Strong	45,0%	48,6%	33,1%	30,0%
Middle	19,8%	16,5%	40,1%	39,5%
low	2,1%	2,1%	14,0%	15,6%
not at all	1,5%	,8%	9,3%	6,6%

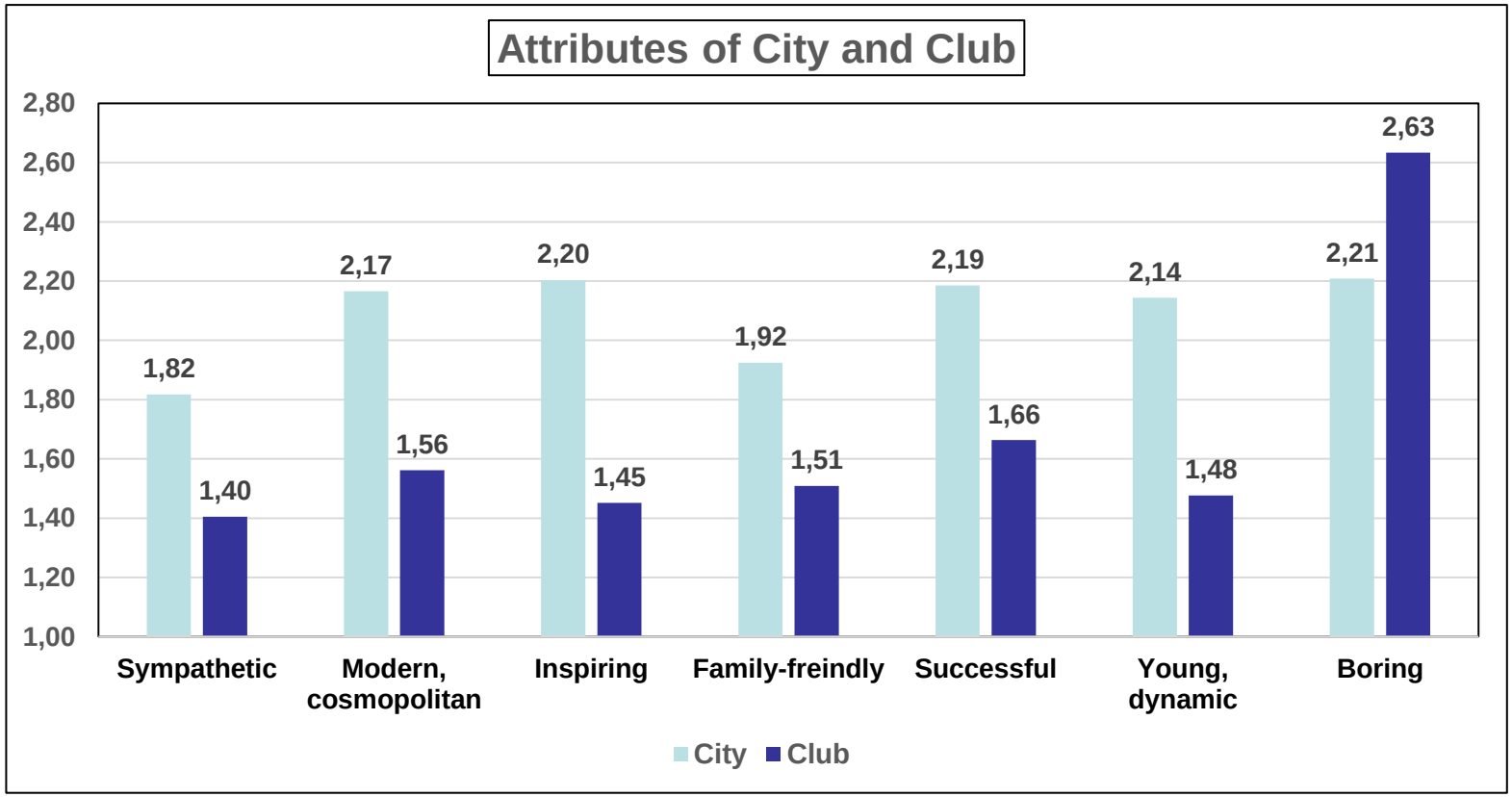
- **76,5% of the home-fans and nearly 40% of the outsiders believe in these effects.**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Findings – Supply side effects

Improvement of Image

Respondents had to rate a number of image-forming attributes for the city and the club



- **In all respects the club is noticeably rated more positive than the city**
- **Results suggest that an image transfer takes place**
- **More probable from the club to the city than vice versa**

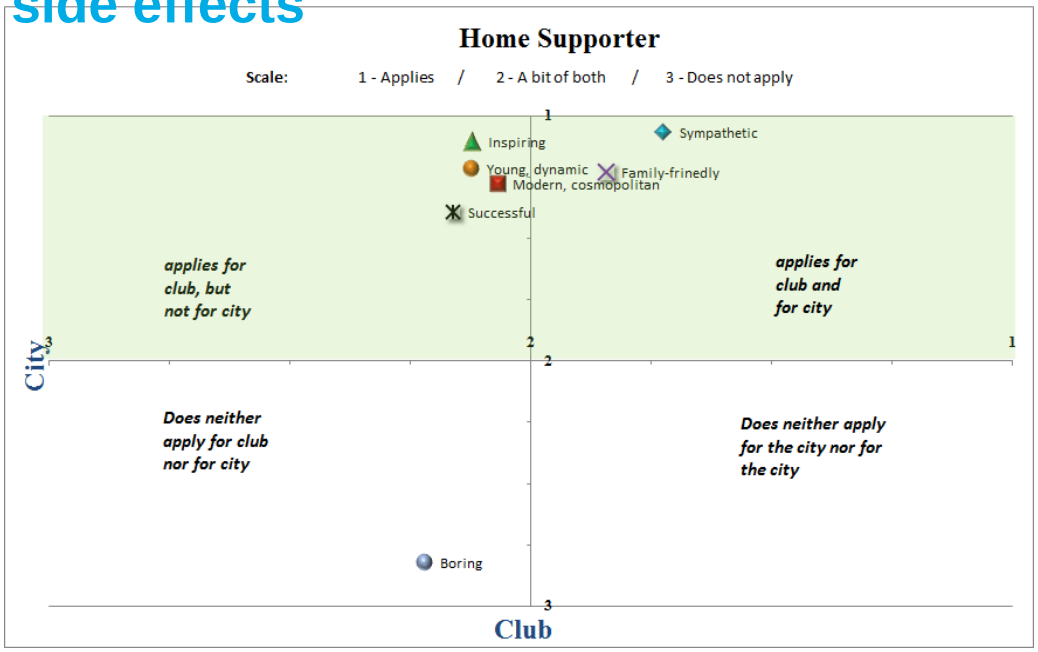
Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

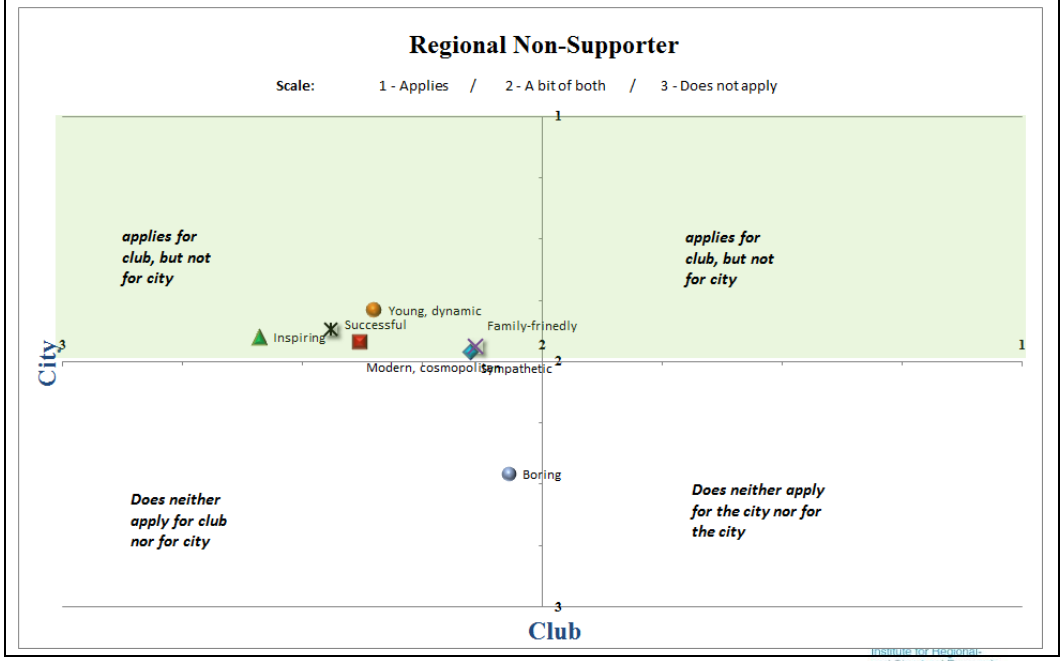
Empirical Findings – Supply side effects

Improvement of Image

Ratings by fan groups

- Expectation in case of a transfer: fans of Borussia do not only judge the club more positive than non-fans but also the city.
- Exactly this can be observed in diagram.
- The points tend to move to the upper right part of the coordinate system meaning that home-fans give better ratings to both – club and city.



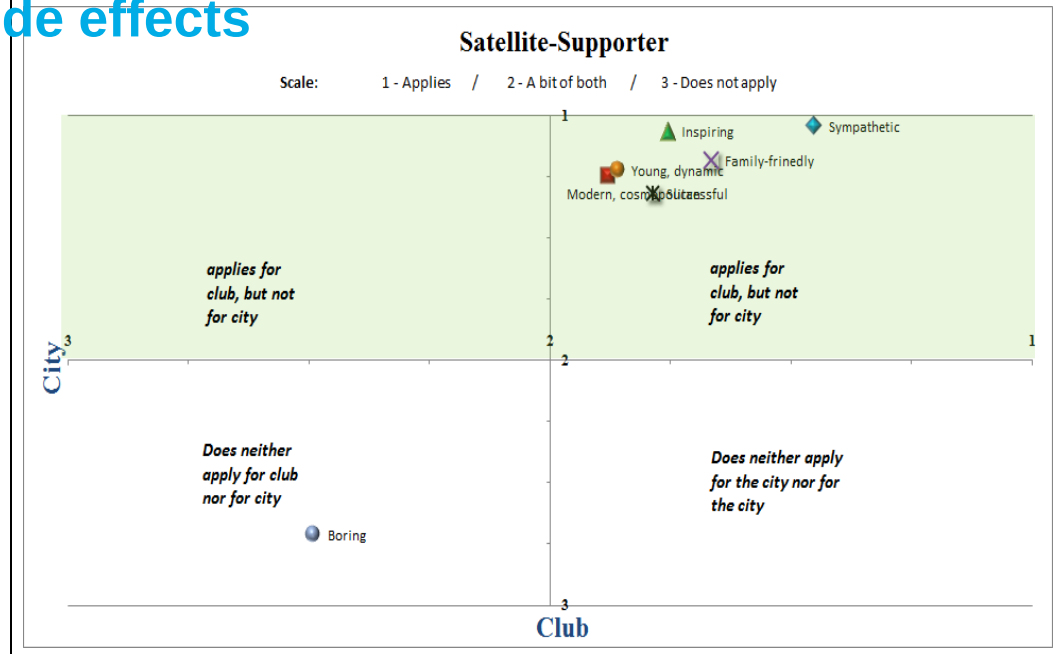


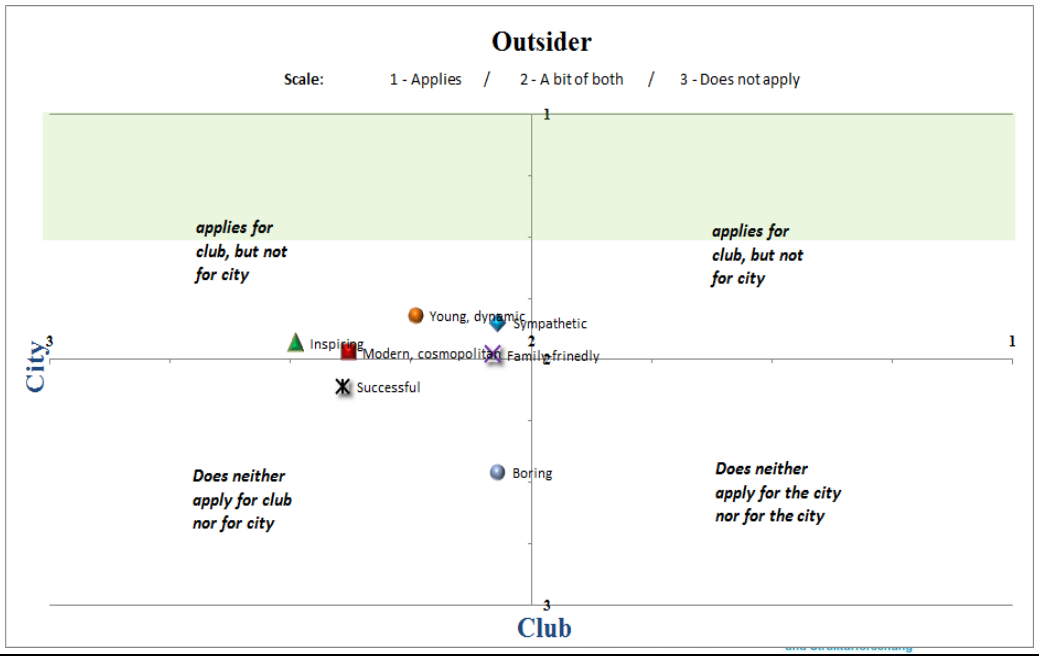
Empirical Findings – Supply side effects

Improvement of Image

Ratings by fan groups

- The same can be observed comparing satellite fans and outsiders.
- The points tend to move to the upper right part of the coordinate system meaning that satellite-fans give better ratings to both – club and city.





Empirical Findings – Supply side effects

Improvement of Image

- Results suggest that a transfer of (positive) image takes place.
- Combination of factor analysis and regression to check the results.
- In the surveys the respondents had to evaluate seven attributes for the city and the club. Factor analysis is used
  - to discover whether variables are overlapping,
  - to structure the relationships between these variables and
  - to identify groups of variables highly correlated to each other and to separate them from those with low correlation.
- Results of Factor analysis are used to calculate values for the structured factors.
- Finally new variables are used for analysing the relationship between the city's and the club's image by means of a regression.

Empirical Findings – Supply side effects

Improvement of Image

1. Testing appropriateness of data (city-image and club-image). Result: Data is appropriate!
2. Deciding how many factors should be extracted. Scree-test and Kaiser-Criterion suggest to extract one factor in both cases (city-image and club-image).
3. Principal component analysis for extraction of factors. Calculation of two new variables: “Image of the club” and “Image of the city”.
4. Last step: OLS.

$$I_{city} = f(I_{club})$$

Expectations:

- The better the club‘s image, the better the city‘s image,
- i.e. first derivation is expected to be positive:
  - $dI_{city}/dI_{club} > 0$

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Findings – Supply side effects

Improvement of Image

Results of Regression Analysis - Dependent Variable: Image of the City				
	Coefficient	T-Value	Significance	R^2 corr.
Regression 1				
Const.	0,024	0,75	0,452	0,185
Image of the club	0,417	13,45	0,000	
Own calculations				

Results of OLS:

- **„Image of the city“ is the better the better the „Image of the club“ - so there seems to be a transfer of image.**
- **The transfer-effect of the negative attribute “boring” (0,025) is less intensive than that of positive attributes (like e.g. „successful “: 0,079)**

Empirical Findings – Supply side effects

Improvement of Image

Extension

Are there differences due to sex, age, origin or fan-status? Using dummies.

Results of Regression Analysis - Dependent Variable: Image of the City				
	Coefficient	T-Value	Significance	R^2 corr.
Regression 2				
Const.	-0,093	-1,48	0,141	0,207
Image of the club	0,393	10,11	0,000	
Dummy 1: Fan of Borussia	-0,172	-2,25	0,025	
Dummy 2: Origin "Fan-Region"	0,391	5,75	0,000	
Own calculations				

Results:

- **There are no significant effects of sex and age.**
- **Transfer effects are significantly higher for people living in and around Mönchengladbach.**
- **Surprisingly the effects are lower for fans of Borussia.**

Differences by origin and fan-status		
	Fan of Borussia	No fan of Borussia
From Mönchengladbach an around	+	++
From elsewhere	-	normal

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Results – Supply Side Effects

Regional „psychic income“

→ **Psychological benefit of population due to existence of soccer club**

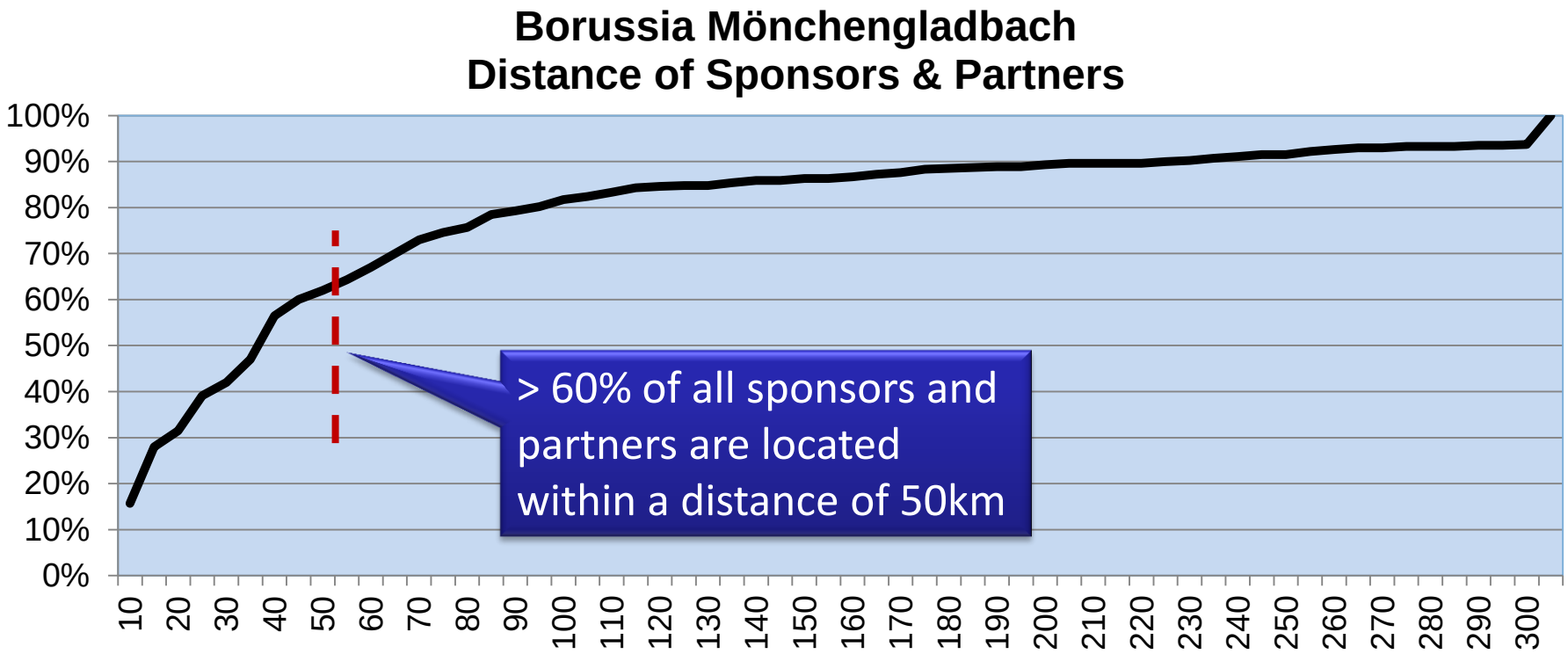
→ **Self-assurance, self-esteem, pride, patriotism, identification**

Survey: „Imagine, BMG would face bankrupcy. How much would you be willing to donate for the soccer club in this year, to continually avoid this situation?“	
Fan-Cluster	**Willingness to donate, Ø**
Home-Fan	110.58€
Satellite-Fan	97.51€
Regional Non-Fan	7.04€
Outsider	5.22€
Total Sample, Ø	**53.60€**
Pedestrian and F&F-surveys, participants that live in Mönchengladbach	**42.95€**
Calculation of total willingness to donate in Mönchengladbach per year (Population in Mönchengladbach older than 15 years: 222,518)[1]	**9,557,148 €**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Results

Nucleus of regional communication and cooperation network



	0 - 5 km	5.1 – 10 km	10.1 – 20 km	20.1 – 50 km	50.1 - 100 km	100.1 - 250 km	> 250 km
Cumulated share of all sponsors and partners (N = 460)	2.6 %	15.65 %	31.5 %	62 %	81.7 %	91.5 %	100 %

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Summary

Main results:

1. **There are considerable demand side effects**
2. **Borussia Mönchengladbach is increasing the city‘s national and international awareness**
3. **Estimations suggest the existence of a “psychic income”**
4. **Borussia has a great number of regional partners – whether this means that the club is a nucleus of a regional communication- and cooperation-network is an interesting topic for further research**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Summary

Main results as to image and transfer of image:

- **Descriptive analysis and the combination of factor analysis and regressions suggest a transfer of image from the club to the city.**
- **Furthermore, regression analysis gives a hint that positive image attributes are transferred more probably than negative ones.**
- **The transfer-effect seems to be highest for people stemming from Mönchengladbach and around without being fan of the club.**

Conclusion: In the case of Borussia Mönchengladbach …

- **… the soccer club influences regional image …**
- **... and as regional image is a relevant factor of location …**
- **… the soccer club also influences regional development behind regional multipliers.**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Literature and Data References

Crompton, J.L.: Beyond Economic Impact: An alternative Rationale for the Public Subsidy of Major League Sports Facilities. In: Journal Sports Management, Vol. 18, 2004.

Arbeitsgemeinschaft Fernsehforschung AGF: AGF / GfK Fernsehforschung, TV Scope, Fernsehpanel D+EU von 2000 bis 2011. 2012.

Borussia VfL 1900 Mönchengladbach GmbH: Medienpräsenzanalyse Saison 11/12 und 12/13. Vom Verein zur Verfügung gestellte Sonderauswertung, Mönchengladbach, 2013a.

Borussia VfL 1900 Mönchengladbach GmbH: Übersicht über die Vereinssponsoren des VfL Borussia Mönchengladbach, Saison 2012/2013. Vom Verein zur Verfügung gestellte Sonderauswertung, Mönchengladbach, 2013b.

Borussia VfL 1900 Mönchengladbach GmbH: Interne Betriebswirtschaftliche Informationen – vom Verein zur Verfügung gestellte Sonderauswertung. Mönchengladbach, 2013g.

IT NRW (Information und Technik Nordrhein-Westfalen): Statistische Berichte: Gäste und Übernachtungen im Reiseverkehr Nordrhein-Westfalens. Online-Dokument, https://webshop.it.nrw.de/ssearch.php?kategorie=2400&prefix=G41, Zugriff 06.02.14.

Statistisches Bundesamt (Hrsg.): Volkswirtschaftliche Gesamtrechnungen, Input-Output-Rechnungen nach 12 Gütergruppen/Produktionsbereichen 2007. Wiesbaden 2010, Tabelle 2.1.

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Thank You for Your Attention!

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Factor Analysis

First step: Testing appropriateness of data (city-image and club-image):

- **Correlation: All variables used to describe the image are correlated to each other. Correlation is below I0,7I in all cases, i.e. no clear conclusion.**
- **Significance of correlation: All correlations are highly significant (1%-level).**
- **The Bartlett-Test tests whether a sample stems from a population of uncorrelated variables. Result: With a probability < 1% the variables are uncorrelated.**
- **The Kaiser-Meyer-Ohlkin-Criterion ("measure of sampling adequacy"=MSA) tests whether a factor analysis is meaningful or not. It allows an evaluation of the overall correlation matrix as well as of single variables. Literature suggests the MSA to be above 0,8; in our case the MSA-values for the correlation matrices are above 0,9, the MSA-values for the single variables lie between 0,779 (middling) and 0,940 (marvellous).**
- **Data is appropriate!**

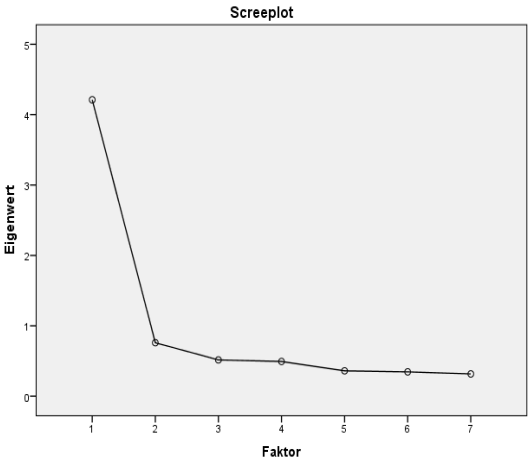
Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

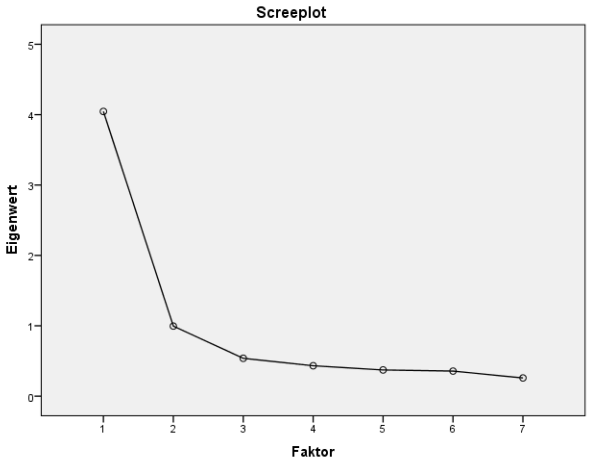
Factor Analysis

Second step: Deciding how many factors should be extracted

Literature suggests two different ways for solving this problem.

1. **Scree-test, i.e.**
   - **Plotting the eigenvalues in diminishing order,**
   - **Look where the difference of the eigenvalues between two factors takes a maximum (the curve must have a sharp bend),**
   - **Choose the first point left to this sharp bend – it determines the number of factors to be extracted.**
   - **Method suggests to extract one factor in both cases (left hand – city; right hand – club!)**





Factor Analysis

Alternatively:

2. **Kaiser-Criterion: Number of extracted factors should equal the number of factors with an eigenvalue above one.**
   - **The table shows that only the eigenvalue of the first factor is above one. So this method, too, would propose to extract one factor in both cases.**
   - **Decision: Extraction of one factor for the city and the club.**

Table…: Explained Total Variance

Component	City Original Eigenvalues			Club Original Eigenvalues		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,212	60,16	60,16	4,046	57,80	57,80
2	0,759	10,85	71,01	0,995	14,22	72,02
3	0,515	7,36	78,37	0,538	7,69	79,70
4	0,493	7,04	85,41	0,433	6,18	85,88
5	0,360	5,15	90,55	0,373	5,32	91,21
6	0,345	4,93	95,48	0,357	5,10	96,30
7	0,316	4,52	100,00	0,259	3,70	100,00

Extraktionsmethode: Hauptkomponentenanalyse.

Factor Analysis

	City		Club	
	First Component	Coefficient	First Component	Coefficient
Sympathetic	0,793	0,188	0,847	0,209
Modern, cosmopolitan	0,821	0,195	0,826	0,204
Inspiring	0,840	0,199	0,862	0,213
Family-frinedly	0,749	0,178	0,786	0,194
Successful	0,818	0,194	0,764	0,189
Young, dynamic	0,805	0,191	0,803	0,198
Boring	-0,571	-0,136	-0,240	-0,059
Own calculations by principal component method				

Image of the city:

- **All variables have high factor loadings.**
- **Coefficients of the components of factor 1 estimated by multiple regression.**
- **They are the weights for calculating the values of the new factor by multiplication with the original data for the seven attributes.**
- **Six positive attributes with similar positive weights.**
- **Negative attribute “boring” has a lower, but negative weight.**
- **New variable is defined as ”Image of the city”.**

Factor Analysis

	City		Club	
	First Component	Coefficient	First Component	Coefficient
Sympathetic	0,793	0,188	0,847	0,209
Modern, cosmopolitan	0,821	0,195	0,826	0,204
Inspiring	0,840	0,199	0,862	0,213
Family-frinedly	0,749	0,178	0,786	0,194
Successful	0,818	0,194	0,764	0,189
Young, dynamic	0,805	0,191	0,803	0,198
Boring	-0,571	-0,136	-0,240	-0,059
Own calculations by principal component method				

Image of the club:

- **Similar results as in the case of the city.**
- **New variable is defined as ”Image of the club”.**

Regression Analysis

Last step: OLS.

$I_{city} = f(I_{club})$

Expectations:

- **The better the club‘s image, the better the city‘s image,**
- **i.e. first derivation is expected to be positive:**
  - **$dI_{city}/dI_{club} > 0$**

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Region

Results: Direct, Indirect and Induced Economic Impacts (Region)

Borussia VfL 1900 Mönchengladbach

Multiplier

Income:	**1,42 – 1,66**
Value Added:	**1,52 – 1,81**
Employment:	**4,55 – 6,51**
Gross Production:	**1,68 – 2,08**

Direct Impacts

- Income: 44.3 Mio. €
- Value Added: 64.5 Mio. €
- Employment: 211
- Gross Production: 95.8 Mio €

Indirect Impacts

- Income: 14.2 – 19.9 Mio. €
- Value Added: 24.3 – 33.4 Mio. €
- Employment:
- Gross Production: 46.6 - 64.2 Mio €

Induced Impacts

- Income: 4.6 – 9.4 Mio €
- Value Added: 9.0 – 18.7 Mio €
- Employment: 749 – 1.162
- Gross Production: 18.8 - 39.2 Mio €

Total Income, Employment and Value Added Effects

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research

Empirical Results – Demand Side Effects in the City

Effects on Income, Value Added, Employment and Gross Production within the city MG				
(1) *High Estimation*				
Total Effects	**Income**	**Value Added**	**Employment**	**Gross Production**
Direct Effect	44,314,000€	64,467,057€	211	95,759,657€
Indirect Effect (Investment, expenditure)	1,883,002€	3,863,140€		7,087,000€
Indirect Effect (Expenses of fans and visitors)	15,980,518€	25,622,348€		49,588,342€
Induced Effects	6,720,651€	13,246,288€	982	26,933,734€
Total Effect	68,898,171€	107,198,833€	1.193	179,368,733€
Multiplicator	***1.55***	***1.66***	***4.01***	***1.87***
(2) *Low Estimation*				
Total Effects	**Income**	**Value Added**	**Employment**	**Gross Production**
Direct Effect	44,314,000€	64,467,057€	211	95,759,657€
Indirect Effect (Investment, expenditure)	1,883,002€	3,863,140€		7,087,000€
Indirect Effect (Expenses of fans and visitors)	11,929,163€	19,126,612€		37,016,786€
Induced Effects	3,386,072€	6,644,527€	695	13,462,157€
Total Effect	61,512,237€	94,101,336€	906	153,325,600€
Multiplicator	***1.39***	***1.46***	***3.13***	***1.60***

Empirical Results – Supply Side Effects

Value of Borussia‘s Media Coverage for the City

What would the city Mönchengladbach have to pay for the TV media coverage it received for free by the TV presence of the soccer club BMG?

Advertising Value Equivalency (AVE)

→ **Calculation: Media exposure** (broadcast time * number of viewers) **divided by 1.000 * TCP** (thounsandcontactprice, price per 1.000 page impressions)

→ As the city cannot influence the broadcasting content, we calculate a low estimation of TCP (5% of average TCP in last three years) and a high estimation (10% of average TCP in last three years)

Season 2011/12: 18.062 Mio media exposure / 1,000 * 0.69TCP (l.e.) accordingly **1.39 (h.e.)**

AVE = 12.46 Mio. € (low estimation) and accordingly 25,05 Mio. € (high estimation)

Season 2012/13: 14,087 Mio media exposure / 1,000 * 0.69TCP (l.e.) accordingly **1.39 (h.e.)**

AVE = 10,34 Mio. € (low estimation) and accordingly 20,79 Mio. € (high estimation)

Hochschule Niederrhein
University of Applied Sciences
NIERS
Institut für Regional- und Strukturforschung
Institute for Regional- and Structural Research