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Landscape and the commercial benefits of recreation

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Landscape and the commercial benefits of recreation

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Abstract

In the Netherlands, the objective of the zoning policy the National Ecological Network (NEN) is to protect and enhance nature areas and landscape structures. The NEN is a network of existing nature areas, nature development areas, connecting zones, and agricultural areas with potential for agri-environmental management. The NEN is part of the larger European *Natura 2000* network. In this chapter we will analyse whether entrepreneurial benefits depend on the landscape composition of the NEN zones. Objective of this research is to analyze economic benefits of the NEN for recreational firms. As far as we know, this chapter is the first empirical analysis of the link between nature and landscape values and benefits for recreational firms.

To estimate the relevance of the NEN for recreational firms a landscape index is developed for individual firms that these firms relates to the distance of the firm to and the size of the NEN in the neighborhood of the firm. This index was calculated for about 29000 recreational firms. Analyzing detailed accountancy data for all recreational firms was not possible given the number of firms and their diversity. Therefore, the number of employees of a firm is used as a proxy for the economic benefits. From the number of employees the Net Value Added can be derived. The question analyzed was if the number of employees could be attributed to the NEN in the Netherlands. The study has been carried out applying econometric analysis using location variables and entrepreneurial specific variables.

The results indicate that recreational firms in the neighborhood of the NEN employ relatively more workers than other firms. The effect for the average firm is however small. Most important for employment are forest areas and coastal zones. A larger distance to and/or smaller nature areas show a decreasing effect on the number of people employed by a recreational firm.

A sequential question is whether it is possible to use the Reilly index indicator to determine ex-ante the recreational economic benefits of new developed nature areas. As a case study, we apply this indicator to newly constructed natural area in the Netherlands. Changing agricultural land use into natural areas like forests and commercial wetlands will change the use and character of landscape. The question is whether it will change the recreational benefits of recreational firms in the surroundings.

1. Introduction

Since the 1960s there is growing social demand for nature conservation in the Netherlands. This demand led to a turning point; landscape is not changing from nature areas to agricultural land anymore, but in the opposite direction, from agricultural land to nature areas. Since the 1980s the Dutch government developed gradually a new nature zoning policy, consisting of

purchasing agricultural land and converting it to different types of nature. In 1990 the Dutch government introduced as 'policy concept' the Nature Policy Plan ('Natuurbeleidsplan') of the Dutch Ministry of Agriculture, Nature and Food quality. An important component of this Plan was the ecological main structure (NEN); a network of nature areas including national and international important nature and landscape areas and biodiversity 'hotspots'. The objective of the NEN is to protect and enhance nature areas and landscape structures.

Developing the NEN is based on the island theory of McArthur and Wilson (1963). According to this theory the number of species increases if different populations of the same species that were separated come into contact again. Based on this theory the scattered nature areas or landscapes should be expanded and connected in a network of patches where flora and fauna will have priority. This network of areas, which is planned to be completed by 2018, would cover about 15% of rural area in the Netherlands. It will consist of existing nature areas, nature development areas, connecting zones, and agricultural areas with potential for agri-environmental management. It is also part of the larger European *Natura 2000* network. The nature areas to be developed are integral part of man-made landscapes.

A landscape is defined by the European Landscape Convention (Council of Europe, 2000) as an area, as perceived by people, whose character is the result of the action and interaction of natural and/ or human factors. Landscapes, such as most of the nature areas, are able to provide many different landscape or ecosystem services, which are defined as the capacity of a landscape to provide goods and services to society (Millennium Ecosystem Assessment, 2005). In this chapter we will focus on a specific part of the preamble of the convention, namely that landscape constitutes a resource favorable to economic activity and whose protection, management and planning can contribute to job creation. In ecosystem assessment terms, we focus on one landscape service, namely the attractiveness of the landscape for recreational purposes. Due to the recreational benefits provided by a particular landscape, tourists are attracted to particular landscapes. The attractiveness of natural areas in the Netherlands is for instance reflected by tourists who visit the National Parks (belonging to the NEN) each year.

Developing an ecological main structure implies a large public investment in the Netherlands (see, for example, Jongeneel et al., 2005: 71-87). It is important to know what the social benefits of nature areas are. Within economic theory, it is well-known that location is an important factor for firm-growth (Hoogstra en van Dijk, 2004: 189). It is even one of the foundations of spatial economics (Boschma et al., 2002: 88-91). We may expect that the location – including the distance to the NEN - is important for the net value added (NVA) of recreational firms, but the magnitude of the NVA will depend on the type of firms. It may be different for restaurants, camping and bungalows parks.

In this Chapter we will analyze to what extent different location factors determine firm employment growth based on individual firm data. The location factors consist of landscape factors concerning the type of nature, the location of the firm in relation to the surrounding NEN and economic factors such as the growth of the population and employment in the neighborhood of the firms. In this Chapter we will disregard the non-marketable benefits of the NEN.

This chapter proceeds as follows. In Section 2 we elaborate on the relationship between social recreational benefits and private profit earned by recreational firms. In Section 3 the Landscape Reilly index, a measure that can take into account the density of landscape in the

neighborhood of the recreational firm, is described. Section 4 presents the theoretical background and the employment data for the different type of recreational firms, even as the calculation of NVA based on the employment data. Section 5 discusses the method and empirical model. Section 6 presents estimation results, while section 7 gives insight in the implications of these results. The paper finishes with some conclusions.

2. Landscape and recreational benefits.

One of ecosystem services provided by the NEN landscape is the recreation service. Different stakeholder groups will benefit from this specific ecosystem service. Due to the fact that most often there is no market for ecosystem services like recreation, the benefits have to be measured with non-market valuation studies. There is a lot of monetary valuation literature that estimate the individual value of changes in natural landscape areas. Examples for the Netherlands are Brouwer and Slangen (1998) who analyse the non-market benefits of preserving in Dutch nature landscape areas, Van der Heide et al. (2008) who focus on the value of defragmentation of the Veluwe and Nunes et al (2009) who estimate the value of a less cockle fishery resulting in an ecological improvement of the Waddenzee. These studies focus on non-marketable benefits of landscapes.

Another economic method investigating the influence of the value of landscape elements in market prices is hedonic pricing. Landscape characteristics can be included as a location characteristics which is an explanatory variables for restaurant, hotel room and package deal prices. Landscape characteristics that appear to be important are distance to the city center (Monty and Skidmore, 2003), distance to the beach (Espinete et al., 2003), the landscape characteristics dikes and open coasts (Hamilton, 2007) and on another scale the country (Mangion et al., 2005).

In this chapter, we will focus on another group of beneficiaries, namely recreational firms located in the neighborhood of NEN. Tourists visiting particular landscapes spend money in restaurants located in or close to NEN landscapes. The performance of recreational firms is the result of a complex combination of (1) firms specific factors including entrepreneurial skills of the owner; (2) surrounding man made and natural amenities and (3) access to these amenities. An obvious example of the importance of landscape for recreational firms are firms that directly depend on the landscape where activities can take many forms ranging from active (scenic flights, mountain biking) to passive (painting, environmentally-friendly lodging, firms that are developed as access point to nature areas) and from consumptive (fishing, hunting) non-consumptive (walking, bird-watching and photographic tours) (Bell et al., 2007, Marcouiller et al., 2009 and Marcouiller and Prey, 2005). This study focuses on surrounding man-made and natural amenities indicated as location specific factors. Entrepreneurial skills and access to amenities are not taken into account because of limited data..

Location factors qualifying the spatial environment variables traditionally play a crucial role in the field of regional science in which the economic performance of regions is one the prime objects of study. But also among economists, there is nowadays a widespread belief that “space matters” (Krugman, 1991: 8). However, in these fields of research the units of observation are spatial entities and not individual firms (cf. Hoogstra and Van Dijk, 2004: 181).

Based on the analysis of spatial units, it is according to Hoogstra and Van Dijk (2004: 181) possible to formulate the hypothesis that location factors may contribute to identifying the factors determining regional employment growth. It is reasonable to assume that environmental factors determining regional growth are also important determinants for the employment growth of individual firms because regional growth is the aggregated of individual firms growth. One has to take into consideration that employment growth is often not regarded as the major business target by the establishment itself. When we follow basic neoclassical economic theory where an economic unit focuses on profit maximization, the number of employees is NEN of minor importance. Although in the long run an economic unit needs to be profitable, grows follows a life-cycle pattern that is often characterized by a strategy of increasing turnover and an increasing number of employees. This fits in a strategy of benefiting from economic of scale with survival of the firm as the major objective (Hoogstra and Van Dijk, 2004: 183 184).

3. The Landscape Reilly Index; a landscape density index

One of the surrounding amenities influencing the performance of a recreational firm, is the surrounding landscape. To measure the impact of the nature-landscape, the level of nature-landscape in the environment has to be measured. To measure the density of landscape available in the neighborhood of a recreational firm, the Landscape Reilly Index (or in short Reilly-index) is used. This index serves the purposes (as distinguished by Geohegan et al., 1997) to provide a means to scale up the landscape to the level of the individual recreational firm which is relevant from the human perspective of management and valuation. This index captured in one number, the size of the NEN-area in the neighborhood of the recreational firm and the distance of the firm to the landscape areas (Cotteleer, 2008: 70). Strong points of the Reilly-index are 1) that it combines distance with size and 2) areas located further away or smaller are weighed less. In other words, the Reilly index is a measure for the share of land used for a certain land-use function in the surrounding of a specific location. Other examples of land-use functions that can be captured by a Reilly index are agriculture and glasshouse horticulture.

Equation (1) gives the formula for the calculation of the Reilly-index. The calculation of the Reilly-index starts at the point where the firm is located. After that, the size of the NEN-landscape within a certain radius (5 km) is determined. Based on the sum of all the distances of the firm to the NEN-landscapes located within the chosen radius, and on the size of the EHS-landscapes the Reilly index can be calculated. Distance is measured in meters, size in squared meters.

$$\text{Landscape Reilly index} = \sum_{j=1}^J \frac{\text{Size of the EMS}_j \text{ (within radius)}}{(\text{distance of the firm to EMS})_{ij}^2} \quad (1)$$

We applied the Landscape Reilly -index to the impact of the NEN on recreational firms in the Netherlands. The Netherlands has about 3.5 million ha of land. In 1990, 60% was agricultural landscape and 13 % was nature-landscape. The target of the Nature Policy Plan (LNV, 1990) was to develop the NEN, for which about 275 thousand ha of new nature have to be develop before 2018. This implies an increase of about 60%, partly realised by purchasing agricultural land and converting it into nature. The Netherlands Environmental Assessment Agency (NEAA) defined 18 different types of NEN types of nature-landscape (Koeijer et al., 2008).

Based on personal communication with the NEAA, we have taken into account 12 types of nature, clustered in 4 main groups, forests, marshes, grasslands and coastal areas (see Table 1).

Tabel 1: Types of nature and clusters of nature

A type of nature	Cluster of nature
Cultural historic forests	Forest
Dry heath lands	Forest
Dry natural forests	Forest
Dry poor grasslands	Forest
Salt marshes	Coastal areas
Marshland	Marshes
Open dunes	Coastal areas
Wet natural forests	Forest
Wet poor grasslands	Grasslands
Poor fen pools and moorlands	Forest
Nutrient rich grasslands and fields	Grasslands
Grassland specific for birds	Grasslands

Source: The clustering is based on personal communication with Tanja de Koeijer and Rogier Pouwels (Netherlands Environmental Assessment Agency)

We illustrate the calculation of the Reilly-index in Table 2 and Figure 1 for the location of two restaurants; A en B. The two restaurants (A and B) are situated in the proximity of four different areas of the NEN, numbered from 1 to 4. Table 4 shows the distance between the restaurants and the four NEN-areas. The size of the four NEN-areas is also given. Figure 1 shows the two restaurants and their location in relation to the four NEN-areas. The arrows in Figure 1 give the distance to the four NEN-areas. The size and distance correspond with Table 2.

Table 2: Reilly index for two restaurants given the size of and the distance to the NEN

NEN area	Size of the NEN in ha	Distance to restaurant A (in 1000m)	Size / (Distance)²	Distance to restaurant B (in 1000m)	Size / (Distance)²
1	100	1	1	1.4	0.51
2	50	2.1	0.11	0.4	3.13
3	20	0.6600	0.56	0.7	0.41
4	90	1.2	0.63	0.9	1.11
Reilly index		2.29			5.15

Source: adapted from Cotteleer (2008: 101)

From Table 2 and Figure 1, it is apparent that the Reilly-index for restaurant B much larger is than for restaurant A, because restaurant B is located much closer to one of the NEN-areas. Although location 2 of the NEN is not the largest NEN-area, the shorter distance from restaurant B to this area is largely responsible for the larger Reilly score for this restaurant.

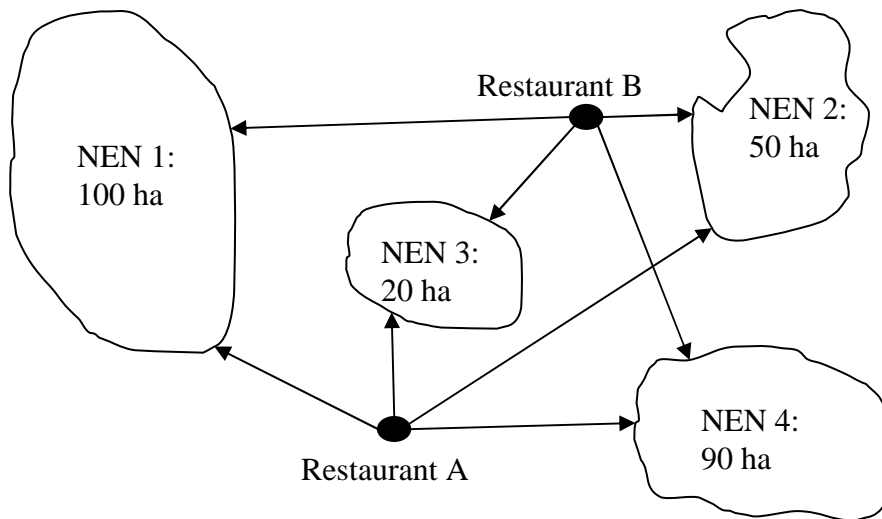


Figure 1: The graphically presentation of the Reilly index.

A NEN landscape located closer to the restaurant, and a larger NEN landscape results in a higher Landscape Reilly index. Table 3 gives an illustration of Reilly indexes for 7 randomly chosen restaurants with 10 workers in 6 cities in the Netherlands. For each restaurant, the Reilly index for the entire NEN, and for the 4 distinguished types of nature-landscape are given (radius 5 km). These restaurants are examples taken from the LISA database which consists of locations of firms in the Netherlands.

Table 3: The Landscape Reilly index for 7 restaurants with 10 workers in 6 cities

City	Reilly index				
	NEN	Forests	Marshes	Grasslands	Coastal areas
Amsterdam	0	0	0	0	0
Amsterdam	0.039	0.022	0.012	0.0050	0
Den Haag	1.12	0.71	0	0.057	0.36
Apeldoorn	1.47	1.44	0.0067	0.018	0
Beekbergen	19.50	19.35	0.011	0.14	0
Winterswijk	8.70	3.78	0.54	4.37	0
Zandvoort	9.64	0.32	0	0.028	9.29

Source: own calculations

In Amsterdam, there are restaurants with a Reilly index of 0, i.e. as low as possible (no NEN-landscape within 5 kilometers of the Restaurant). Notwithstanding, there is another recreational firm in Amsterdam with a low but a positive Reilly index for the whole NEN, for forests, marshes and for grasslands. However, for the coastal areas the Reilly index of this restaurant is 0. The two restaurants in Den Haag and Apeldoorn have a comparable Reilly-index, indicating that the landscape density of nature within a 5 km radius is comparable. Restaurants in Beekbergen and Zandvoort have a relatively large Reilly-index, mostly affected by one type of nature, forests in Beekbergen and coastal areas in Zandvoort. In

Winterswijk the two NEN types grasslands and forests contribute to the relatively large Reilly index.

4. Data and empirical model

As said, in this study we would like to analyze to what extent different location factors determine firm employment growth based on data with individuals firms as the units of observation. The firm employment is taken as proxy for the NVA of recreational firms, because we do not know the NVA of individual recreational firms. From firm employment we can deduct the NVA of the individual recreational firms, as far as this amount is dependent on the EHS.

The LISA data base distinguishes also full-time and part-time workers. Full-timers are all the workers who are working more than 12 hours a week and part-time workers less than 12 hours. The number of workers includes all the people who are working on the firm, including the owner, manager, members of the family household or employees. Table 4 gives an overview of the numbers of workers in de recreational sector, divided in fulltime and part-time.

Table 4: Overview of the recreational sectors and employment

Sectors	Number of working people		In percents	
	Full-time	Parttime	Full-time	Parttime
Cafes, a.o.	37309	29773	19.0	23.6
Cafetarias, a.o.	30910	19957	15.8	15.8
Zoos, botanical garden and children's farms	1531	689	0.8	0.5
Hotel-restaurants	27501	11585	14.0	9.2
Hotels	7656	2551	3.9	2.0
Ice-cream parlour	1305	1156	0.7	0.9
Yacht-basins	857	260	0.4	0.2
Youth hostels	474	427	0.2	0.3
Campings	5942	2669	3.0	2.1
Museums	5844	1247	3.0	1.0
Equestrian sport	2142	513	1.1	0.4
Recreation centra	4314	4411	2.2	3.5
Restaurants	64155	47827	32.7	37.9
Bungalow parks	6293	3071	3.2	2.4
Total	196233	126136	100.0	100.0

Source: LISA-database, 2003 and 2007.

From the employment point of view, the restaurants sector is the most important one. It has almost 1/3 of the full-time jobs and about 38% of the part-time jobs. Due to the fact that landscape characteristics can have a different impact on different types of recreational firms (Shaw and Ozog, 1999; Yeh et al., 2006), we split up the recreational firms in single day and overnight recreation. Single day recreational firms include, for example, cafés, zoos, museums and restaurants. The most important ones are restaurants and cafes because they represent about 50 % of the total number of people employed. Overnight recreational firms include hotels, youth hostels, camping and bungalow parks.

In this Section we will discuss the method for estimating the relationship between the firm employment and asset firm-specific variables. The firm-specific variables refer to the type of the recreational firm and whether the firm has been moved. The location-specific variables can be split up in (i) economic location factors such as the growth of population and growth of employment; (ii) a variable for the location of recreational firms in rural or non-rural areas; (iii) Reilly indices for each recreational firm for different types of nature belonging to the NEN; (iv) a variable for the distance to the museums as an indicator for the culturally and historically attractiveness of the location. For testing the relationship we use of the following econometric model:

$$\ln(WP) = \alpha + \beta_1 BEDR + \beta_2 LOC + \varepsilon \quad (2)$$

Waarbij

$\ln(WP)$	=	Number of working people on a recreational firm
$BEDR$	=	A set van firm-specific factors
LOC	=	A set of location-specific factors
ε	=	Error
$\alpha, \beta_1 \text{ en } \beta_2$	=	Coefficients

Table 5 presents the variables used in the econometric model. The firm- specific variables consists of 29026 observations; originating from firms existing in 2003 and 2007. These variables refer tot the numbers of people working on the firms and a moving of the firm during the last 5 years.

Table 5: Firm-specific and location-specific variables

Variable	Average	Median	Maximum	Minimum
Number of workers	5.17	3.00	662.33	0.33
Moving during the last 5 years	0.0063	0.00	1.00	0.00
Growth of population between 2004 en 2007 in post code area (ln)	0.0038	-0.0020	2.01	-1.39
Growth employment between 2003 en 2007 in post code area (ln)	0.0066	0.0027	1.79	-2.15
Dummy for location in rural area	0.42	0.00	1.00	0.00
Reilly index EHS marshes	0.11	0.02	28.11	0.00
Reilly index EHS forest	1.69	0.62	49.57	0.00
Reilly index EHS coastal areas	0.22	0.00	44.99	0.00
Reilly index EHS grassland	0.71	0.25	44.09	0.00
Distance to musea	17.35	17.27	26.06	4.83
Dummy is 1 if restaurants	0.42	0.00	1.00	0.00
Dummy is 1 if cafés	0.42	0.00	1.00	0.00
Dummy is 1 if hotels	0.05	0.00	1.00	0.00
Dummy is 1 if youth hostel	0.0041	0.00	1.00	0.00
Dummy is 1 if camping	0.069	0.00	1.00	0.00
Dummy is 1 if bungalowpark	0.039	0.00	1.00	0.00

On an average 5 people are working on a recreational firm. Looking to the minimum and the maximum the dispersion is very large. In the regression analysis, this variable is used as the dependent variable. It is a proxy variable for the NVA.

Concerning the variable ‘has a firm moved the last 5 years’, the theoretically viewpoint could be that a firm choose allocation that maximizes profits. Due to the dynamics in the spatial economic environment and/or firm, the optimal allocation may change over time rather often. This does not imply that firms also move frequently, because relocation itself is rather costly especially when large investments in building and equipment are required (cf. Hoogstra and Van Dijk, 2004: 181). We may expect that being involved in a process of moving or recently relocated has a negative effect on the size of the firms. Table 5 shows that less than 1% of the firm has moves the last 5 years.

The variables growth of population and growth of employment in the post code area of the recreational firms belong to economic location variables. We may expect that these variables largely represent the demand side of the goods and services of the recreational firms. Hoogstra and Van Dijk (2004: 180) consider the regional growth of employment as an indicator for the regional economic development. The variables ‘growth of population’ and ‘growth of employment’ are presented as a logarithm. We assume that both variables will have a positive effect on the size (measured in employment) of the recreational firms.

Another variable is the location of the firms in the spectrum from urban to rural area. Areas with less than 1000 addresses per km² are considered to be rural and areas with more than 1000 addresses per km² as urban. Table 5 shows that about 40 % of the firms are located in the rural areas. Given the fact that the NEN is located in rural areas, we could expect a positive effect of the dummy variable on the size of the recreational firms.

The Reilly indices for the 4 types of nature are taken up as explanatory variables. Table 6 shows that the dispersion of these variables is relatively large. If the NEN has a positive effect on the return of recreational firms we will find a positive effect of the variables – Reilly indices NEN - on the size of the recreational firms.

The variable distance to the musea is taken as an indicator for the attractiveness of the location, for example, concerning the culturally and historical values of location. We did not distinguish between different types of musea. The distance is measured in km from the recreational firm. We may expect the larger the distance of the museums to the recreational firms the smaller effect on the size of the recreational firms.

The last group of the firm-specific variables refers to the type of the recreational firms, presented by a dummy variable. However, the term firm-specific is not completely right, because the dummy variable indicates the type of recreational firm (i.e. the sector) and not characteristics of the firm itself. As said, it is common to split up the recreational firms in ‘day and overnight recreation’. Based on Table 2 we know that restaurants and cafés are the most important sectors for ‘day recreation’. They represent about 50 % of the total NVA of all the recreational firms. For the ‘overnight recreational’ firms we take hotels, youth hostels, camping and bungalow parks. Together, these recreational firms produce about 700 million euro NVA or about 11 % of the total NVA. It is difficult to make an assumption about the effects of these dummy variables on the size of the recreational firm in terms of employment.

5 Results

Table 6 gives the results of the estimations. The independent variable is number of people working per recreational firm. The unit of this variable is in the estimation procedure taken as a logarithm. The four columns present the so-called quartiles estimations (for more information see Koenker en Hallock, 2001). A Breusch-Pagan test on heteroskedasticity showed that the assumptions of OLS are rejected. Therefore, we leave the OLS out of consideration.

As said, the explanatory variables growth of population and growth of employment in the post code area of the recreational firms are presented as logarithms. This means that the estimated coefficients of these variables are elasticities. The other explanatory variables are linear. Because of that, the estimated coefficients of these variables are semi-elasticities.

Table 6: The relationship between number of people working per recreational firm and a set explanatory variables

Variabele	Quantile estimate			
	0.25	0.5 (median)	0.75	0.90
Moving during the last 5 years	-0.2435***	-0.1536***	-0.1016	-0.0108
Growth of population postcode area (ln)	0.7585***	0.8229***	1.0854***	1.0057***
Growth of employment postcode area (ln)	-0.0038	0.0163	0.0239	0.0267
Dummy for location in rural area	-0.0083	-0.0055	-0.0222	0.003
Reilly index NEN marshes	0.0044	0.001	-0.0013	0.0124
Reilly index NEN forests	0.0150***	0.0181***	0.0329***	0.0348***
Reilly index NEN coastal areas	0.0213***	0.0169***	0.0164***	0.0043
Reilly index NEN grasslands	-0.0012	-0.0034	-0.0028	-0.0073
Distance tot musea	-0.0004	-0.0030***	-0.0098***	-0.0142***
Dummy is 1 if restaurants	0.8329***	0.7634***	0.9045***	0.7889***
Dummy is 1 if cafés	0.2645***	0.1839***	0.3702***	0.3311***
Dummy is 1 if hotels	-0.0086	0.0176	0.3323***	0.5976***
Dummy is 1 if bungalowpark	-0.0825***	-0.4022***	-0.2764***	-0.0448
Dummy is 1 if youth hostel	-0.0275	-0.0059	0.3265***	0.5473***
Constante	0.0048	0.6902***	1.2245***	1.9538***

Table 6 shows that being involved in a process of moving or recently be moved has a positive effect on the size of the firms for 2 out of the 4 estimations. Apparently, the investments in building and equipment as result of a moving are not an impediment for growth (cf. Hoogstra and Van Dijk, 2004: 181).

The coefficients for the variable ‘Growth of population in postcode area’ are statistically significant positive for all the estimations. Given the size of the coefficient it is an important variable for the explanation of the amount of the employment per recreational firm. As said, the variable growth of population is presented as a logarithm. This means that the estimated coefficients are also elasticities. The estimated coefficients are positive and about 1. This means that an increase of the population with 1% leads to an increase of the employment per recreational firm with 1 % also.

The coefficients for the variable ‘growth of employment in the post code area of the recreational firms’ are not statistic significant for the four estimations. This means that this variable does not influence the size of the firms. As said, Hoogstra and Van Dijk (2004: 180) consider the growth of employment as an indicator for the regional economic development. This suggests that the regional economic development has no influence on the size of recreational firms.

For the so-called quartiles estimations, the coefficients for the dummy variable ‘location in the rural areas’ are not statistically significant. These results of the quartiles estimations indicate no influence of this variable. We can say that a location in the rural area has a **not** a positive effect on the size recreational firms.

Concerning coefficients for the Reilly indices for the NEN, the coefficients for the Reilly index for marshes are for the four estimations small and not statistic significant. This means that marshes have no effects on the size of recreational firms. The coefficients for the Reilly indices for forest are for the four estimations statistically significant and positive. As said, these coefficients are semi-elasticities. Given the size of the coefficients, it means that if the Reilly index increases with one unit, the increase of the employment per recreational firm in the neighborhood of the forest in terms of percentage will be:

- 1.5 % for 0.25 quartiles estimation;
- 1.8 % for the 0.5 quartiles estimation (median);
- 3.3 % for the 0.75 quartiles estimation;
- 3.5 % for the 0.90 quartiles estimation;

The consequence is that if the Reilly index increases with one unit, the increase of the employment per recreational firm in the neighborhood of the forest in terms of percentage will for example be 1.8 % for the 0.5 quartiles estimation.

The coefficients for the Reilly index for coastal areas are for 3 quartiles estimations statistically significant and positive. For the 90 % quartiles the estimation is not statistic significant. The size of the statistically significant coefficients is, in general, smaller than those for forest. Therefore, an increase of the Reilly index with one unit has a smaller effect on the increase of the employment per recreational firm in the neighborhood of the coastal areas.

The coefficients for the Reilly indices for NEN grassland are for quartiles estimations negative, but not statistically significant. This means that NEN grassland has no positive effect on the size of recreational firms.

As said, the variable distance to the museums is taken as an indicator for the attractiveness of the location, for example, concerning the culturally and historical values of location. The coefficients for the variable ‘distance to museums’ are for three quartiles estimations negative statistically significant. This means that the distance has a negative effect on the size of the

recreational firm; the larger the distance of recreational firm to the museums the smaller the size of the recreational firm.

The type of the recreational firms is presented by a dummy variable. The coefficients for the dummy variables restaurants and cafes are statistically significant positive for all estimations. This means that they are larger (in employment) than the other types of recreational firms in Table 6. Based on Table 2 we know that restaurants and cafés are the most important sectors for recreation. They represent about 50 % of the total NVA. The coefficients for the dummy variable hotels are statistically significant positive for two quartiles estimations. However, for two quartiles estimations the results are not statistically significant. This means hotels as a type of business do not always have a positive effect on the size of the firm.

The coefficients for the dummy variable ‘bungalow parks’ are statistic significant negative for three quartiles estimations. Only the 90% quartile estimation is not statistic significant. This means that they are smaller (in employment) than the other types of recreational firms in Table 6.

The coefficients for the dummy variable ‘youth hostel’ are statistic significant positive for two quartiles estimations. This means that we can only say that they are larger (in employment) than the other types of recreational firms in Table 6 for two (out of four) estimations. A general statement concerning the size is not possible.

Summarizing, we can say, concerning the Reilly indices for the NEN, that only the variables for the Reilly indices for forest and coastal areas lead to positive statistic significant effects on the size of recreational firms. The effect of the variable ‘Reilly index NEN forest’ is for all five estimations positive statistic significant and the variable ‘Reilly index coastal areas’ for four estimations. However, the size of the effects of the Reilly indices varies between the different estimations. This implies that the influence of the NEN on the size of recreational firms is heterogeneous. It can be a result of the size of the areas of the NEN or distance to the recreational firms.

6. Landscape benefits; an application to developing natural areas

In the Netherlands, some private parties have an interest in developing natural areas to generate a profit by getting paid for ecosystem service provision. Developing natural areas implies changing landscape. For this chapter we will focus on the recreational services provided by these natural areas. In this Section, the estimation results of Section 5 will be discussed from two perspectives: the effect of a landscape change from a recreational firm, and from a natural area entrepreneur perspective. Finally, both perspectives will be integrated and discussed from an economic perspective.

For entrepreneurs in natural areas, it is interesting to get hold of benefits which accrue to them due to the provision of the ecosystem services as showed in the previous paragraph This makes it interesting to interpret the results from a landscape change perspective. Extending natural areas in the neighborhood of recreational firms or developing nature areas more close to the firms will increase the Landscape Reilly Index, due to a change in size of an area or more close located to the firm.. As the regression analysis shows the results are not equal across the different types of nature. The Reilly index coefficients for the different type of nature are different. On average, increasing nature has a very small effect on the employment

and NVA of recreational firms. As can be expected, investments in nature areas close to the spot have a larger effect on the NVA of a firm.

From the natural areas entrepreneur point of view, developing new areas implies producing ecosystem services. It can be shown that these services provide values to different stakeholders. However, these stakeholders do often not pay for the services. One of the reasons is that many services have public good characteristics. This research suggests that recreational firms can have benefits from newly developed natural areas. However, the effects on employment are small when analyzing individual cases.

For specific cases, it can be expected that certain firms benefit from other location factors such as nearby urban areas, good infrastructure or the neighborhood of other firms. Renski (2009) concludes that for the United States those firms in rural areas have lower growth numbers compared to firms in urban areas. However, it is normally not negotiated beforehand that such firms want to pay for these services and whether these natural areas fit within the entrepreneurial objectives of the owner of recreational firms.

To show the impact of the result of regression analysis in Section 5, we take coefficients of Reilly index for forest. Given the size of these coefficients, it means that if the Reilly index increases with one unit, the increase of the employment per recreational firm in the neighborhood of the forest will be in percentage 2.5 %. According to our calculations the median of the Reilly indices for forest is 0.62. An increase of the Reilly index with one unit means a rise of the Reilly index from 0.62 to 1.62 or a rise of about 160 %. This means that relatively change in the size of the Reilly index has to be many times larger than the change the employment in the recreational firm.

This can be made clear with following example. Suppose restaurant A is located at a distance of 500 m from a forest with a size of 25 ha. The Reilly index in this case is 1. For increasing the Reilly index from 1 to 1.60 and keeping the same distance (500 m) the size of the forest should increase from 25 to 40 ha. Given the results of our regression analysis, this will lead to an increase of the employment for restaurant A of 1.8 % for the median firm.

More employment also means more NVA. The average NVA per worker in our data set is can be estimated about 28 000 euro. The median of the number of workers per recreational firm is about 3. This means that the NVA for the median recreational firm is about 84 000 euro. An increase of the Reilly index with one point means an increase of NVA per recreational firm of about 1500 euro.

In our example we use as type of nature 'EMS forest'. As the regression analysis shows the results are not each type of nature the same. The coefficients of Reilly indices for the different type of nature are different and the Reilly index is the result from the size and distance of the nature area. However, taking all this arguments into account our main conclusion is that increasing nature area has a very small effect on the employment and NVA of the recreational firms

From our analysis follows that focusing more on the link between developing landscapes and benefits for recreational firms is useful. Calculating an Landscape Reilly index could contribute to this analysis as a means of quantifying benefits. Further research is needed to analyze the effects for instance of new types of nature areas like multifunctional commercial wetlands in the neighborhood of recreational firms.

7. Conclusions

The objective of this chapter is to analyze the economic benefits of the NEN. Because of lacking data for the net value added (NVA) per recreational firm, the employment per firm is used as a proxy for NVA. For explaining the employment for recreational firms we made use of firm-specific and location specific variables. The firm-specific variables include factors such as the number of workers per recreational firm and being moved the last 5 years. However, the number of workers per recreational firm is the dependent and being moved an explanatory variable. The location-specific variables consist of (i) economic location factors such as the growth of population and growth of employment in the post code area of the recreational firms; (ii) a dummy variable for location of recreational firms in a rural or non-rural area; (iii) the Reilly indices for 4 types of nature belonging to the NEN; (iv) a variable for the distance to the museums as an indicator for the culturally and historically attractiveness of the location; (v) dummy variables for 5 types of recreational firms.

The empirical analysis shows that recreational firms located in the neighborhood of certain types of nature of the NEN have more workers than those that do not have such types of nature in their neighborhood. However, the effect is small. The size of the effect depends on the size of the NEN and the distance to the recreational firm, and on the type of nature. A smaller size and/or a larger distance have a decreasing the effect on the employment of recreational firms.

Concerning the type of nature, only forest and coastal areas contribute in a statistically significant and positive way to the employment of recreational firms. However, for increasing the employment for recreational firms in the neighborhood of the forest and coastal areas with a small percentage, for example with 2.5 %, a very strong increase of the area of such type of nature would be necessary.

It is worthwhile to consider that we did not pay attention to: (i) the quality of the entrepreneur as explanatory variable for the size of recreational firms; (ii) characteristics and quality of the building of the recreational firms; (iii) the quality of the service and provisions recreational firms. However on the long run these factors will have effects on the size of the firm.

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