

Lifestyles, New Uses, and the Redevelopment of Industrial Heritage Sites: A Case Study of Strijp-S, Eindhoven

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1 ABSTRACT

As de-industrialisation has left factories vacant and urban living is gaining popularity, redeveloping a former industrial area offers cities a unique residential environment. In order to get insights in the motives of people moving to these areas, this research has studied residents of case study area Strijp-S, their motives of moving there and their lifestyles. Former Philips territory Strijp-S has already been partly redeveloped into a mixed-use creative and culture district and this has been successful as it has been awarded a prestigious prize (NRP Gulden Feniks, 2013) and has become a popular place to live. This study collected data from the residents of Strijp-S. The results of the data collection showed that the main group of Strijp-S residents are young, highly educated singles and couples. Furthermore, a large group moved to this neighborhood from their parental or student homes and thus can be considered as 'starters'. Based upon the activity pattern items from Frenkel, Bendit and Kaplan (2012), four types of lifestyles were discovered: Mellow Morgan, Enthusiastic Elliott, Racing Riley and Sporty Sam. While culture was one of the factors, the lifestyles found in this research mainly distinguished themselves by their attitude towards sport and work. Finally, when examining the motivation of people to move to Strijp-S, it is remarkable how many of the respondents (around 70%) looked for dwellings only in this neighbourhood. In particular, the distance to the city centre and the image of Strijp-S as a creative neighborhood were mentioned to be of importance. Furthermore, residents with a Racing Riley lifestyle and part-time workers tend to choose this neighbourhood for its characteristics and focus less on the dwelling characteristics. So where some studies tend to focus on dwelling characteristics, this research shows that environmental characteristics including the activity types should be taken into account when redeveloping an industrial heritage area. Furthermore, the marketing of the area is important, as the image of Strijp-S as a neighbourhood was often mentioned to be of importance when choosing to move there.

Keywords: lifestyles, redevelopment, industrial heritage site, mixed use neighbourhood, new use

2 INTRODUCTION

European cities offer unique built landscapes that represent the identity and shared history of its cities, regions and inhabitants. These shared memory spaces are continually evolving, often facing challenges that derive from processes such as industrialisation, lack of investment or economic decline that result in unemployment, depopulation, disengagement and marginalisation. Cities dealing with the aftermath of these challenges have been experimenting with approaches and tools to promote the revitalisation of their built environment, including areas protected as heritage, often using this same area as an asset upon which to build this revitalisation process. Due to the changes in modern society and cities, many industrial areas lost their industrial functions and became obsolete on the one hand and urbanisation is emerging on the other hand. Reducing the amount of obsolete industrial sites by means of revitalisation is important for regional sustainability, because it re-utilises already urbanised land for new purposes and economic functions. In addition, such industrial areas also represent cultural value to society, because they are linked to shared memories and identity of the city. Recently, the Dutch government has emphasised the redevelopment of industrial areas into new uses as a means to strengthen the cities, maximize land use and stimulate the economy (Louw & Bontekoning, 2007). However, this transformation process from an obsolete industrial area into an industrial heritage area with a new use that is fully integrated into the rest of the city and its social fabric is a big challenge. Reasons are that old industrial areas host large scale infrastructure costly to re-utilise, are often spatially isolated from the rest of the city and are associated with decline and unemployment. While it can be argued that living in cities and redevelopment of former factories are becoming increasingly popular, currently there is little knowledge about the preferences of residents choosing to live in industrial heritage areas. Therefore the main question related to this is what uses should be created in these areas and for whom in order to make these areas more liveable.

There is a large body of literature concerning what people prefer for their housing and housing mobility. Among such research, three aspects are found to be influential for the choice of housing. These aspects are housing and housing environment attributes, as well as people's life trajectory and lifestyle. Relevant dwelling attributes are: dwelling type, number of rooms, total size, room size, tenure, price, outdoor space & size and year built. Furthermore, environmental attributes are also of influence, especially for urban neighbourhood with various facilities available (Molin et al., 1997; Goetgeluk, 1997; Boumeester et al., 2008). Goetgeluk (1997) and Boumeester et al. (2008) also looked into the relation between socio-demographics and dwelling and neighbourhood preferences of residents. According to their findings, age, income, household situation and ownership are the most important determinants of housing choice. While preferences guide the choice and behaviour of people, this ideal house however, might not always be within reach. In that sense, the life trajectory approach offers insight in the triggers which make a household decide to actually move. Therefore, the life trajectory is important for decisions on housing and is explained by the socio-demographics, such as changes in the family formation and job career. However, the decision to move is not only determined by the life trajectory but also the lifestyle of people. For instance, some students will decide to stay with their parents, while others decide to move. This is related to restrictions and preferences of these specific households. Classical approaches explain these differences only based on socio-demographic characteristics (age, household status, income). Some however argue that these are no longer sufficient to explain differences between various households; they claim differentiation in housing behaviour has increased due to demographic, socioeconomic and sociocultural shifts in Western economies and a greater variety in lifestyle cultures (Jansen, 2011). There are different lifestyle concepts but in general, it is explained as a qualitative description of tastes, values, preferences and motives (Ben Hammouch, 2007).

A repetitive theme in lifestyle research is the difference between rural people and city dwellers. This is a shift from the previously mentioned notion of 'urbanism as a way of life' (Wirth, 1938). Today cities use this as a way to distinguish themselves and the urban lifestyle is a popular notion (van Diepen & Musterd, 2009). Van Diepen and Musterd (2009) take a behavioural approach for the influence of lifestyle on housing decisions where they indicate that people with a certain lifestyle will move to a house and location that fits their needs best. They connect urbanity at the geographical level with the plentiful availability of facilities and services, and the ease of life due to less time consuming daily tasks and recurring activities. At the individual level, urbanity is associated with the activities people engage in; urbanites visit cultural events, often meet local people (instead of family and friends) and outsource housekeeping activities. Urbanity is thus mainly related to activity behaviour aspects. An activity based lifestyle approach therefore is best suited for this research. Driessen en Beereboom (1983) developed an activity based lifestyle approach in their research of housing decisions. They identified that four dimensions are the foundation of the behavioural variables they researched: recreational activities, work-related, practical use activities and vital expansive activities. In their research, the respondents were divided into seven lifestyle groups. The various groups had some difference in preferences concerning their living environment. In more recent research, by Frenkel, Bendit and Kaplan (2012) a similar approach was used and they concluded that the lifestyle of knowledge-workers was related to their residential choice. In that research, they identified four lifestyle groups based on activity patterns; culture-orientated, work-orientated, home-orientated and sport-orientated activities. All in all, in order to understand the housing decision or motives for moving to a house, dwelling and neighbourhood preferences, life trajectory and lifestyle characteristics are important to investigate.

To explore this study in the context of redevelopment areas, we focused on the residents of the former Philips industrial site, Strijp-S, a 27 ha area, which has been redeveloped into a culture and creativity oriented mixed-use neighbourhood. It is centrally located in Eindhoven, The Netherlands as it is situated within the inner belt of the city. At the end of the 20th century however, Philips moved their production line elsewhere and a lot of the factories became vacant. In 2002 the municipality and project developer Volker Wessels purchased the land and started planning the redevelopment. The two stakeholders combined their efforts into a joint venture; Park Strijp Beheer (Cerutti & Stam, 2011). In the following years, Philips withdrew incrementally from the property and in 2004 parts of the property and factories were sold to two housing cooperations; Trudo and Woonbedrijf. Trudo was the first to develop on Strijp-S; starting from October 2004 'Het Klokgebouw' was transformed into a "creative factory" one storey at a time. In order to generate vitality in the area, room was given to the working creative class (Hezemans, 2004) and the concert venue PopEi (Dieleman, 2004). In February 2013 the first residents arrived at Strijp. Now it is a vital part of

the city as it offers various leisure possibilities and serves as one of the main locations of the Dutch Design Week (DDW, 2016). The area is still in transformation; several factories have already been redeveloped, but also new projects have been added and others are yet to come. The area is served by its own railway station and a bus line to the airport. Strijp-S has been considered as a successful case since it has become a popular place to live, visit and work and was awarded with a prestigious prize (West 8, 2013).

An important focus of the redevelopment is creativity; the creative industry is seen as promising and the foundation for the new identity of Strijp-S (West 8, 2004). There is no functional clustering, instead the aim is to create a mix in functions such as creative companies, offices, housing, and facilities like restaurants, cafes and shopping. Therefore, “creativity” has been an important driver of the Strijp-S development. It has been the foundation of the vision of, and marketing for the neighbourhood also in terms of the residential target group and the planned facilities. Strijp-S is a successful example of industrial heritage redevelopment. Therefore having insights into the area and its residents’ decisions to live in that area might be useful for the redevelopment of other areas to.

The remainder of the paper is structured as follows. First the methodology section explains the survey and the data collection. Then, the data and results section describes the sample characteristics and the results of lifestyle analysis and the tree analysis. Finally, the paper concludes with a discussion of major conclusions and recommendations.

3 METHODOLOGY

For this research, we looked into the residents of Strijp-S, their lifestyles and motives to live in the area. We collected data from 149 residents of Strijp-S via an online questionnaire. The questionnaire was distributed amongst the residents of the Strijp-S neighbourhood. Respondents were asked about their

- socio-demographics such as age, household situation, income and education;
- preferences for both their previous and current dwelling and neighbourhood characteristics such as dwelling type, size distance to city centre and work, etc.;
- motives for moving out of their previous home and moving to Strijp-S such as work, education, household situation and housing and neighbourhood characteristics;
- lifestyles based on leisure activity patterns by using 23 statements regarding their work, culture, sport and home-oriented activities. Respondents were asked to what extent they agreed with these statements on a 5 level likert scale from absolutely disagree to absolutely agree. These statements are taken from the study of Frenkel, Bendit and Kaplan (2012) and can be seen on Table 1.

The collected data was analysed in several steps. At first basic descriptive statistics of the responses were conducted. From there, the relevant variables for further analysis were selected. Then, in order to classify the respondents into lifestyle groups, first a reliability test was done to identify relevant variables, then by a factor analysis these variables were combined into latent lifestyle factors. In the last step, a cluster analysis was done by k-means clustering to form the actual lifestyle groups. After these steps, both the output of the descriptive statistics and the cluster analysis were used for a tree analysis. From this, decision trees of the choice of residents to move to Strijp-S were examined further. All of these analyses were executed using SPSS. These steps can be seen in figure 1.

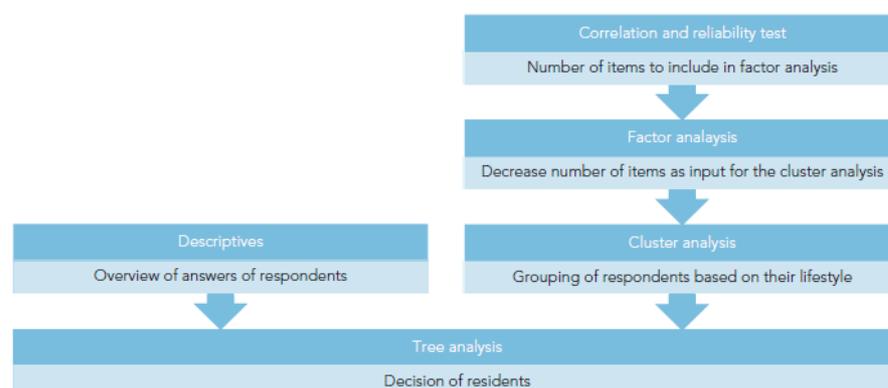


Figure 1: Data analysis process

Work-orientated	Promoting my career is currently the most important thing in my life
	I participate in many conferences and professional courses
	I work until late in the evening and also on weekends
	I am highly available for my employer outside of my work hours
Culture-orientated	I frequently go to restaurants and coffee shops
	I frequently hang out in discotheques, bars and clubs
	I frequently go to the theatre and music shows
	I frequently go to operas and concerts
	I frequently go to museums, exhibitions and galleries
	I frequently go to courses and seminars
	I frequently go to the cinema
	I enjoy living in an urban area that offers abundance of opportunities and population diversity
	I am socially involved in my community
Sport-orientated	I frequently dedicate time to outdoor sport activities
	I frequently jog or walk in parks and public open spaces
	I frequently use sport facilities near my residence
	I frequently engage in outdoor activities in parks, gardens and open spaces
	I frequently engage in outdoor sport activities such as cycling
Home-orientated	I frequently gather with friends at home
	I like to walk around the neighbourhood
	I like to work in the garden, design the house or engage in other hobbies at home
	I have social relations with my neighbours
	I prefer to live in a quiet neighbourhood

Table 1: Leisure activity-pattern factors (Frenkel, Bendit, & Kaplan, 2012)

4 DATA AND RESULTS

In total 208 respondents filled in the questionnaire. However, 59 of the collected cases were incomplete. Therefore, 149 eligible respondents remain. This is about 14% of the Strijp-S residents. Below the results for the each step of data analysis process as shown in Figure 1 will be explained.

Socio-Demographics		Sample	%
Age	18-25 y	45	30.2
	26-30 y	59	39.6
	31-40 y	26	17.4
	41+ y	19	12.8
Household situation	single	70	47.0
	together	63	42.3
	other	16	10.7
Education	Lower vocational education	1	0.7
	Highschool; lower level	3	2.0
	Vocational education	9	6.0
	Highschool; average and high level	7	4.7
	Professional education	56	37.6
	University	70	47.0
Work	Other	3	2.0
	full time (more than 35 h)	89	59.7
	part time (12 + 35 h)	29	19.5
Household income (net minimal income)	less than 12 h (or no work)	31	20.8
	Unknown, 0 +	19	12.8
	625 +	41	27.5
	1875+	46	30.9
	3125+	29	19.5
Student	4375+	14	9.4
	Yes	41	27.5
	No	108	72.5

Table 2: Overview of socio-demographic variables of the sample

4.1 Descriptive Results

As can be seen in table 2, the majority of the respondents are below 40 years old, single or living with a partner, highly educated, working full time, and middle income. Table 3 shows the differences between previous and current housing and neighbourhood preferences of respondents. The current housing situation of residents differ compared to their previous housing in terms of size and price. After moving to Strijp-S, the residents have less rooms (60.4 %), their house is smaller (40.9 %), their living room is smaller (40.9 %), they loose outdoor space (45.6 %) and pay more rent (76.9 %). An explanation could be found in the life trajectory approach; residents might have less need for large housing and therefore downsize from their previous dwelling such as youngsters living with family or elderly people.

Change in Dwelling		Sample	%
Nr Rooms	Less rooms	90	60.4
	Same room nr	33	22.1
	More rooms	26	17.4
Size	More than 20 m2 smaller	61	40.9
	Same size (-20 to +20)	34	22.8
	More than 20 m2 bigger	54	36.2
Living room	Smaller living room	61	40.9
	Same size (-10 to +10)	33	22.1
	Bigger living room	36	24.2
	No living room (loft)	19	12.8
Shared	Independent to independent	104	69.8
	shared to independent	39	26.2
	independent to shared	2	1.3
	shared to shared	4	2.7
Current rent	Less or same rent	22	23.2
	More rent (max 250 Euro)	39	41.1
	More than 250 Euro extra rent	34	35.8
Outdoor space	No outdoor to no outdoor space	7	4.7
	No outdoor to outdoor space	23	15.4
	Outdoor space to no outdoor space	68	45.6
	Outdoor space to outdoor space	51	34.2

Table 3: Differences between previous and current dwelling and neighborhood preferences

In figure 2, the motives for moving out of the previous house can be seen. The first two categories are related to the housing career; the dwelling and environmental characteristics. These include motives like size, tenure, maintenance of dwelling/neighbourhood and disturbance by neighbours. Also the household career seems of importance, especially moving out of the parental / student home and living together as a couple. The work and education careers were combined into one, because presumably the motives for moving are similar, such as accessibility to the work or education location. The category 'Other' includes several motives to move that were only invoked rarely; like financial reasons, splitting up, getting kids or moving closer to family.

According to results, a large group of residents actively chose to live in Strijp-S; almost 70% has only searched for dwellings at Strijp-S and most of them did not even look at other dwellings at all. Figure 3 shows the number of respondents who indicated that a particular reason was of importance to them. Most residents found the dwelling characteristics to be relevant, but this is closely followed by the various types of neighbourhood characteristics. Of these especially distance to the city centre and the image of Strijp-S as a creative neighbourhood are prominent. The 'other' category represents people who had motives to move to Strijp-S that were not related to the built environment. One respondent explained that (s)he moved in at the home of his/her partner, so the most important reason is neither related to the dwelling itself nor the environment.

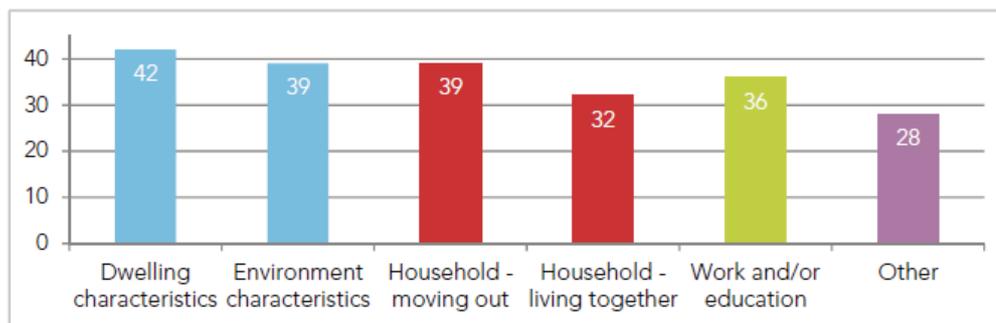


Figure 2: Motives for moving out of previous house

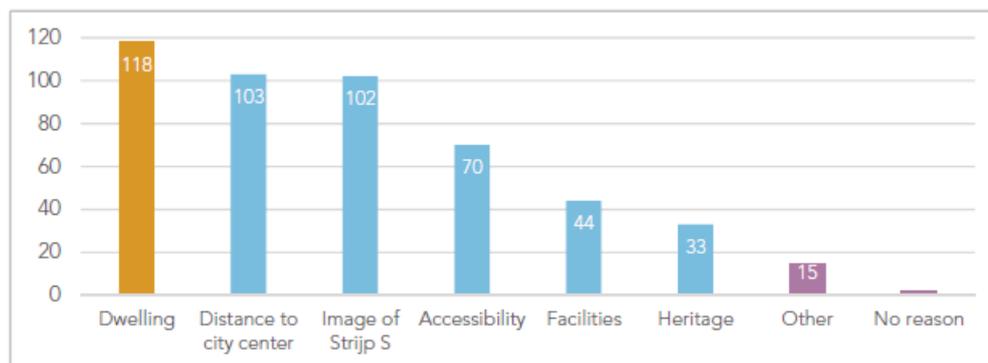


Figure 3: Reasons to move to Strijp-S

4.2 Lifestyle Results

As found in the literature research, residents' lifestyles could offer more insight into their housing preferences. This is thought to improve understanding of the choices of residents, because it classifies them by their behaviour and attitudes instead of socio-demographic characteristics as age and income. For this, the 23 activity based statements of Frenkel et al. (2012) were used in this study. They uncovered four different activity patterns; culture, sport, work and home-orientated. These same statements were used in a factor analysis under the residents of Strijp-S, attempting to find similar lifestyle patterns. Then the residents were clustered into groups with similar lifestyles. As explained in the methodology, first a factor analysis was done in order to decrease the number of clustering variables. Then a cluster analysis was used in order to identify groups of similar residents.

Of the 23 statements, two were excluded due to high correlation with each other (0.679);

- I participate in many conferences and professional courses
- I frequently go to courses and seminars

The rest of the items were found to be adequate for performing a factor analysis, because an overall Kaiser–Meyer–Olkin value of .706 was reached.

A factor analysis using the principle axis factoring extraction method and Varimax rotation (with Kaiser) was executed. In order to find the optimal number of factors, various analyses were run; each resulting in a different number of factors (three to six). Where Frenkel et al. (2012) found four factors, this research chose to continue with six factors. This was grounded by both the explained variance and the eigenvalue. These six factors are sport, culture, work, going out, community and home activities.

The six obtained factors were then used in the cluster analysis. In this step the actual lifestyle typologies were obtained by grouping people that have similar answers on the cluster variables. k-means clustering was used to form the groups. Therefore the number of clusters had to be decided beforehand. Two considerations had to be taken into account. On the one hand, the number of clusters should be high to keep as much information on the residents, because if all the residents are grouped into one cluster no distinction can be made. On the other hand, the clusters need to be reasonably sized. As 30 was the envisioned minimal number of cases per cluster, no more than 5 clusters could be formed. Therefore, at first a cluster analysis with 5

clusters was performed. The first and last cluster however consisted of too few cases (21 and 26), thus another clustering procedure with 4 cluster solutions was executed. This resulted in a better suitable classification as all clusters consisted of more than 30 respondents and were evenly sized. The four cluster solution is also supported by the variance ratio criterion (VRC) of Calinski and Harabasz (1974).

Figure 4 illustrates the four clusters. The se clusters are distinguished especially on the sport and work factor. Cluster 1 and 3 are both very sportive, while 2 and 4 tend to practice sport less. Cluster 2 and 3 are more focused on work. For cluster 1 and 4 their work is less important. As the sport factor is most distinctive for the first cluster, these residents are designated as Sporty Sam. The third cluster scores high on sport as well, but also scores high on most other factors. Because of the high levels, this cluster is called Racing Riley. The second cluster scores high on work and going out and is therefore named Enthusiastic Elliott. The last cluster can be identified by their low scores on most factors and thus have a more relaxed, easygoing way of life. Therefore they are called Mellow Morgan.

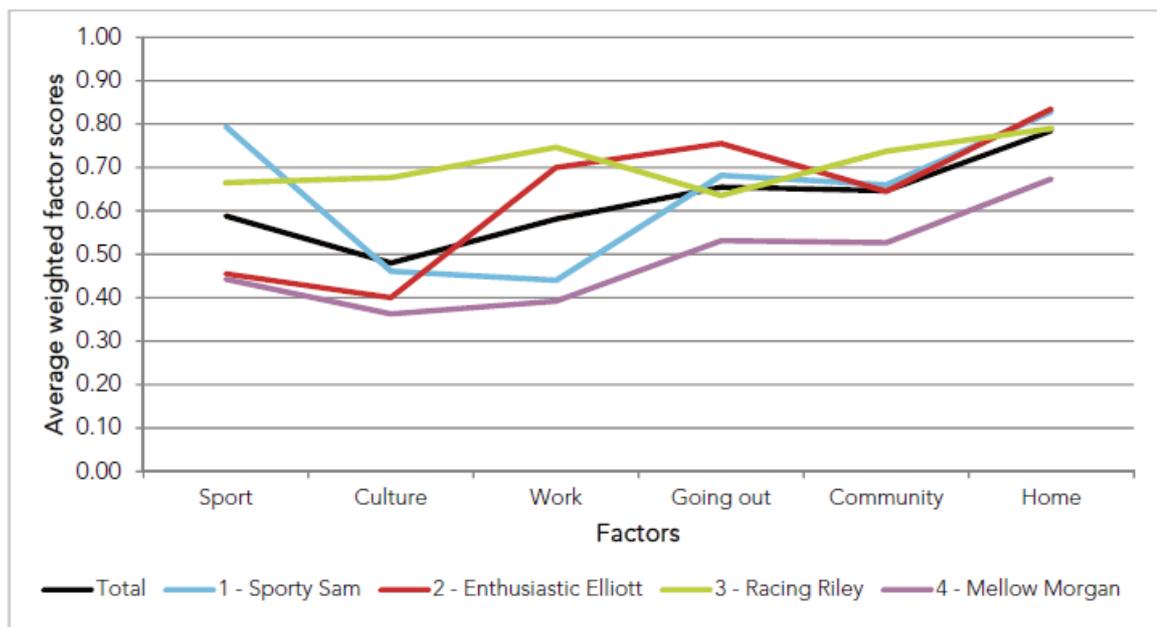


Figure 4: Results of cluster analysis

Looking at the clusters and corresponding socio-demographics and dwelling characteristics, it is found that the Sporty Sam cluster is composed of residents who are very sportive and less focused on work. They are mainly singles and earn average income. They choose average housing size. The Racing Riley cluster is composed of residents who are highly interested in sport and culture, spend much of their time on work and oriented towards community. These residents are full time workers and chose housing with one room (no living room). The Enthusiastic Elliott cluster is composed of residents who find work important, often go out to restaurants and bars and don't spend much time on sports and culture. These residents are young and single and chose large housing. Finally the Mellow Morgan cluster is composed of residents who have easy going lifestyle, older than average Strijp-S residents, living together with a partner, working less hours than average, have the lowest income and chose small housing.

4.3 Tree Analysis

Tree analysis was used to get a deeper understanding of the decision to live in Strijp-S. This type of decision model predicts the value of the dependent variable by grouping respondents based on the independent variables. From the obtained tree, the relationships between the various variables can be observed. As this research focuses on the choice for Strijp-S, the most important reason to choose to live on Strijp-S of respondents was used as the dependent variable. The motives to move to Strijp-S can be divided into three main reasons; dwelling characteristics, neighborhood characteristics and other reasons. This grouping is done to have enough responses per reason in order to conduct the tree analysis. As the 'other' category was mainly concerned with motives unrelated to the built environment and was rather small, these respondents (12) were left out of the analysis. The obtained models thus describe the main reason for groups of residents

to choose their current home; either the dwelling itself or because of the neighbourhood Strijp-S. In the model, lifestyle and socio-demographic variables are included as explanatory variables for the motives to move to Strijp-S.

As can be seen in figure 5, the main sociodemographic variable is being a student or not. Students tend to focus more on the dwelling characteristics. This might be explained by the focus on housing prices, as they often have less to spend. The next distinction involves the lifestyle groups. Racing Riley found mainly the neighbourhood characteristics of importance (68.2%) when choosing their current dwelling (node 3). For the other lifestyles the amount of time they spend on work is relevant (node 5 and 6). Residents who work full time put the dwelling characteristics first, while part time workers slightly focus more on the neighbourhood. For them, especially the image of the neighborhood is important (33.3%).

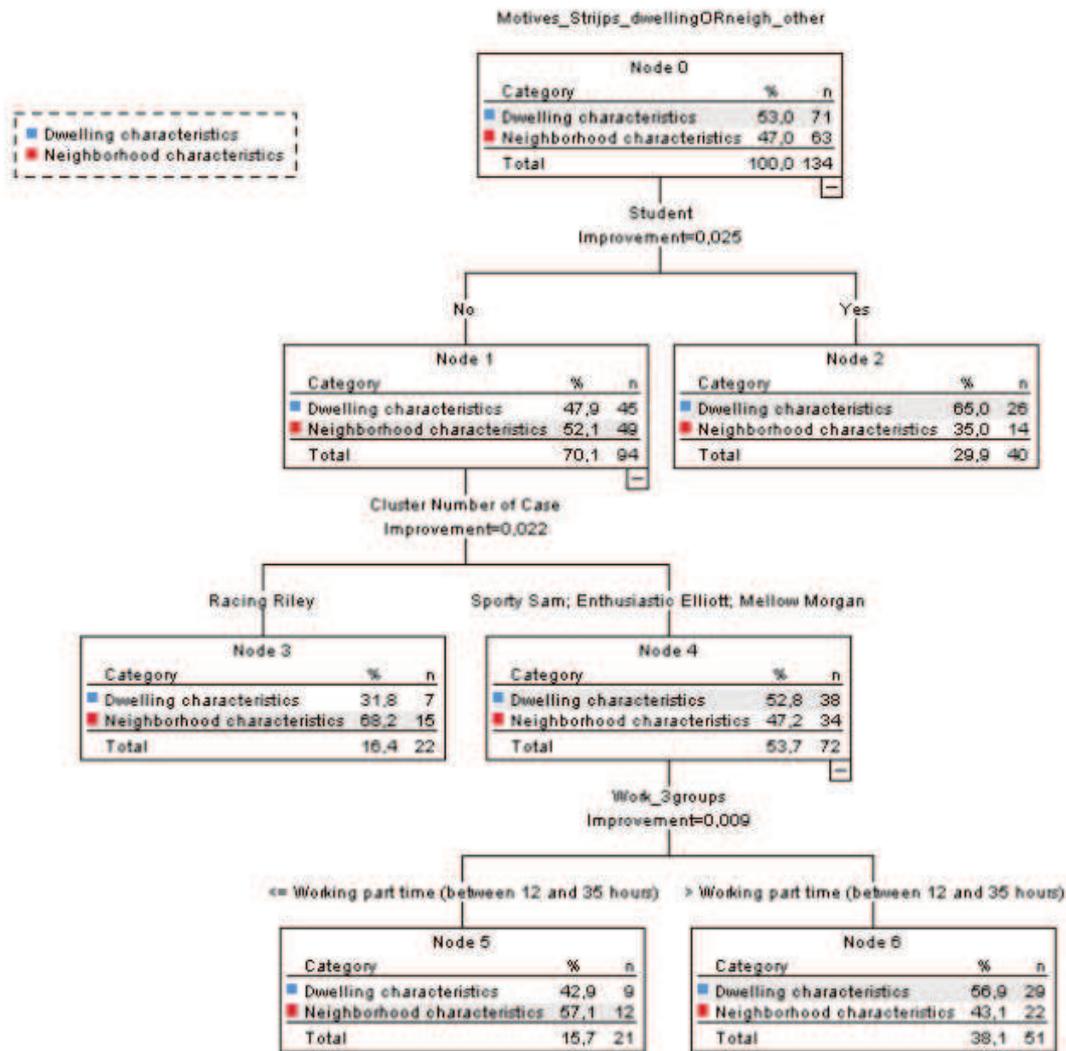


Figure 5: Results of tree analysis for motives to move to Strijp-S

5 DISCUSSION & CONCLUSION

As the city population keeps increasing (Beets et al., 2015), there is increasing pressure on urban areas. Simultaneously former industrial areas have become vacant over the past years, because production has moved to other countries (Pike, 2009). As cities have grown larger, these areas have been an interruption of the urban structure. These industrial areas however offer a chance to be redeveloped into new and integral parts of cities (VROM-raad, 2009) due to the reduction of land consumption, their industrial heritage and location within the city. This research strived to portray residents of redeveloped industrial heritage areas and capture their motives for moving to these areas in order to get a better understanding of the attractiveness of this type of neighbourhood.

We collected data from 149 residents of Strijp-S, a regenerated industrial heritage area in Eindhoven, The Netherlands, by means of an online questionnaire. Results of the collected data show that Strijp-S residents are mainly young, high educated singles or couples. Regarding, the motivation of people to move to Strijp-S, it is found that around 70% of respondents looked into dwellings only in the Strijp-S area. The distance to the city centre and the image of Strijp-S as a creative neighbourhood were mentioned to be important for their decision to move. Based upon the activity pattern items, four lifestyles groups were found: Mellow Morgan, Enthusiastic Elliott, Racing Riley and Sporty Sam. The lifestyles found in this research were mainly distinguished by residents' attitude towards sport and work rather than culture and at home activities. However, creativity and culture was an important driver in developing Strijp-S. It was expected that the research to lifestyle would show culturally orientated residents. Therefore, there might be a difference in people deciding to live in this neighborhood and people who come to Strijp-S in order to work or visit the culture facilities.

Furthermore, both the sociodemographic variables and the lifestyle clustering of Strijp-S residents offer insight in the type of residents that actively choose to live in such areas. In that respect, an interesting outcome is the change in dwelling characteristics. Drawing from the literature review, it was expected that residents advance in their housing career, thus when moving they choose bigger, more comfortable housing. In this research, however the opposite was found. Most Strijp-S residents have downsized from their previous dwelling. This kind of behaviour can be expected from the elderly, as their children have move out and therefore have less need for bigger housing. While they do show the most decline in total size, number of rooms and size of living room, younger residents also show a decrease. This might be related to the attractiveness of the neighbourhood and residents might be willing to accept smaller housing in order to live in this specific neighborhood. This is also confirmed when looking into the decision to move to Strijp-S. Residents who found dwelling characteristics more important are more likely to increase their housing situation, but do pay more in order to get this level of comfort. Furthermore, neighbourhood characteristics are mainly preferred by non-students, Racing Riley or residents who are in other clusters and work less than 12 hours. This research enables forming ideas in terms of new uses, environmental characteristics and marketing for the redevelopment of other industrial heritage sites with similar characteristics.

For project developers of residential industrial heritage projects, this study can give recommendations on the target group that is interested in the redevelopment. A potential group are young, highly educated singles and couples without kids. While this might look like a small defined group, the lifestyle research shows that there still is differentiation in their attitude towards especially work and sport and their choice of dwelling. Moreover, it is seen that all respondents conduct going out, and community related activities very frequently. This should be taken into account such as making mixed-use areas when redeveloping industrial heritage sites. Furthermore, other groups should not be excluded as also elderly and some household with children have chosen to live in Strijp-S. These groups thus could be attracted to living in industrial heritage areas, but the dwellings of Strijp-S might not have been suitable for their needs. When these groups are also of interest for developing future projects, their needs should be considered from the start of the redevelopment. In addition, the marketing of the neighbourhood seems relevant. In this research it was found that the image of Strijp-S as a creative neighbourhood was an important neighbourhood characteristic that pulled residents to Strijp-S. Therefore when redeveloping industrial neighbourhood a clear vision for the neighborhood should be found to distinguish the neighbourhood. Using this vision as part of marketing the neighbourhood, will help attract residents.

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