

Accessible amenities: Impact on the share of sustainable travel within the PC4 regions of North Holland

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Abstract

People engage in a wide range of daily activities. Doing groceries, visiting friends, going to the gym. Regardless of whether you live in a small town or a large city, certain amenities are necessary for the daily way of life. However, travel behavior varies widely, some fully rely on public transport, others primarily use their car and the Dutch population instinctively goes for their bicycle. Carlos Moreno, founder of the concept of the 15-minute city, believes that when your direct living space is organized in such a way, everyone can access all necessary amenities within a 15-minute cycle or walk. Existing literature mainly focusses on how the built environment can be redesigned to achieve this vision, or focusses mostly on work to home commute.

Another aspect that is interesting to look at is whether the amount of close by amenities actually impacts the share of sustainable travel. Within this research the province of North Holland has been taken as subject. By combining multiple datasets on mobility and availability of amenities, certain correlations between local and regional amenities on the share of sustainable travel have been found.

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1. Introduction

The 15-minute city, a concept introduced by Carlos Moreno, aims to improve quality of life and reduce the need for non-sustainable transportation. The goal is simple: shift from a monocentric city with segregated functions to a polycentric city where residents can meet their daily needs within a short radius (figure 1). While it claims to improve social cohesion, local economy and the impact of climate change, it might also introduce gentrification and widen inequality (Moreno, z.d.).

The concept of Carlos Moreno comes with a lot of question, specifically about the implications for smaller towns. Most research found on the subject consists of the realization of his ideas in larger cities. Many tests and possibilities for e.g. Paris have been explored (Moreno et al., 2024). This all makes total sense, around 54% of the population lives in high urbanized areas, with increasing numbers each year (Boulangue et al., 2017). On the other hand, still a large part of the population moves around in less urban areas. More and more researchers are interested in which ways the concept can be implied outside the largest cities (Poorthuis & Zook, 2023).

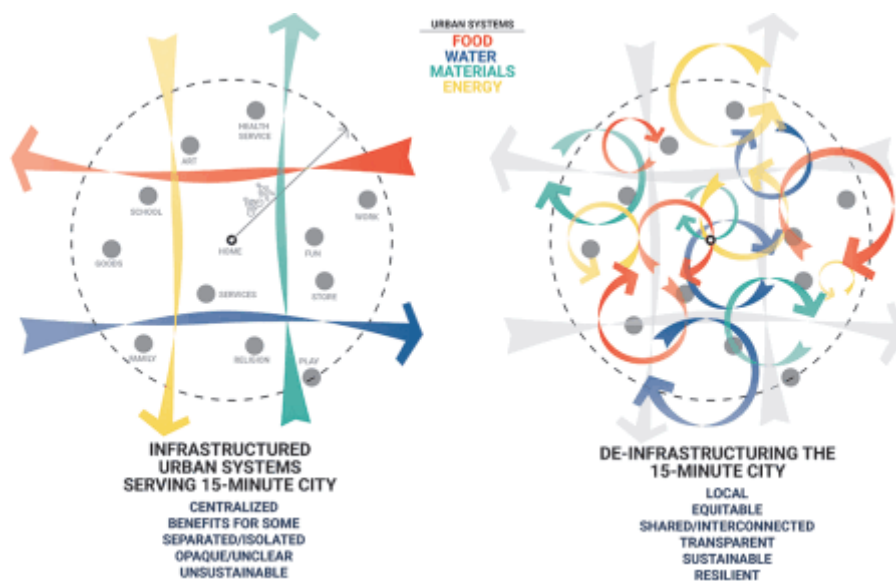


Figure 1 Transition from monocentric to polycentric system; benefits highlighted (Baumgartner, 2024)

Local amenities tend to disappear from small towns, this makes that residents have to rely on e.g. supermarkets, general practitioners and schools further away (NOS Nieuws, 2026). Agglomeration benefits for policy makers and companies make that they tend to centralize amenities in larger cities. Under the idea of 'borrowed size', meaning that the residents of smaller towns can use central amenities due to great networks, conventional urban growth is justified. It is natural that towns in good connection to larger metropolises have better access to more amenities. However, this does not make the concept of 'borrowed size' fair to all, as still a lot of towns and residents might not be able to make use of the design. (Meijers & Burger, 2015)

More and more people desire to live in urbanized area, partly due to the easy access of amenities (Alhazzani et al., 2021). With this information it can be carefully said that people like to have close access to amenities, so why keep agglomerating in larger cities? To circle back to the concept of the 15-minute city as Carlos Moreno intended, it might be more interesting to look at self-sufficiency of towns. Functions are no longer separated and residents have their basic needs met in a short radius. By adapting to more self-sufficient rural areas, the way people move around changes.

Transportation has had a significant role within sustainable development for a long time. It was first recognized in 1992, as the UN started to worry about the impact of transportation on the climate. It was expected to be the largest sector within energy demand and now it is integrated in multiple SGD goals. All kinds of branches are intertwined with the subject; food security, health, economic growth and of course infrastructure. The focus on sustainable travel is enormous, conferences worldwide are held and action is undertaken to make sure the impact of transportation stays maintainable. (*Sustainable Transport* | Department Of Economic And Social Affairs, z.d.)

In order to get a grip on how much impact transportation really has on the climate, it can be interesting to have a look at the drivers behind choices made regarding mode of transport. A lot of research has already been executed on this topic (Ministerie van Infrastructuur en Waterstaat, 2025a). The Institute for Transport Policy Analysis (KiM) in the Netherlands found that in most cases people tend to choose the nearest available amenity within the category. The share however, differs per category. For example, the share is a lot larger for shopping than hospitality.

The most prominent reasons to take the car are bad weather and situations in which a lot of luggage needs to be taken. Other reasons consist of comfort and speed. Around 8 out of 10 motorists deliberately chooses not to use the car from time to time. Half of them as a reason to move more throughout the day, but also more than 15% simply because it is easier. (Van Beuningen, 2021). The use of the bicycle is mostly habitual, but also for health benefits, fresh air and speed. Around half of the relocations per bicycle are for recreational purposes (Ministerie van Infrastructuur en Waterstaat, 2025c).

The way populations relocate changes over time. The first car in the Netherlands drove around 130 years ago (*De Eerste Auto in Nederland Reed 130 Jaar Geleden in Venlo – FEHAC*, z.d.), the first commercial plane ride happened only a hundred years ago (Debbie & Debbie, 2025). Technology keeps developing and so does the population. The National Strategy on Spatial Planning and the Environment of the Netherlands speaks about new ways of moving around towards 2050. People are expected to have less rigid and predictable routines, which makes the need for a strong infrastructural network even greater. The plans towards 2050 highlight that a safe, robust and sustainable mobility system has to be realized. Within this system, choices of the population regarding

location have to be taken into account. This way transportation by bicycle and foot gets easier and more efficient (Ministerie van Algemene Zaken, 2026).

Not only do these developments in infrastructure stimulate a more sustainable way of travelling, it also prevents further transport poverty. Transport poverty describes everyone that is not able to get to their preferred destination due to health issues, lack of transportation methods or the weight of costs (*Indicator Risico op Vervoersarmoede*, z.d.-a).

Sustainability and transport poverty are just two points that make this research relevant. In order to become future proof on both accounts, it is interesting to have a look at how urban design can influence the way people access their daily needs. Within this research we are not looking at why people tend to be drawn to high density urban areas or how we can design the best network for transportation, but rather if the location of amenities that function as destinations influence the way people relocate themselves. Therefore, the main research question is as followed:

- How does the proximity of different amenities influence the share of sustainable travel within the PC4 regions in North-Holland?

2. Method

Within this research the goal is to establish in which ways the presence of certain amenities influence the share of sustainable travel. The research is conducted with data and literature from existing sources, a quantitative approach was adopted. The data sources used in this research are from the open database of the Central Bureau of Statistics (CBS) (*StatLine*, n.d.) of the Netherlands. These databases contain a lot of information on mobility, behavior and the availability of amenities.

Many research has been done on the topic of transportation, especially in relation to the built environment. Results from e.g. Journal of Transport and Health conclude a positive relation between choosing transportation by foot, bicycle or public transport and the housing diversity score and gross dwelling density. On top it also discovered a negative relation between taking private motor vehicle trips and e.g. street connectivity and proximity to supermarkets (Boulangue et al., 2017).

Most research focusses on commute to and from work, just like the research from Matthew McKibbin (2011). One of the most interesting results shows the relation between destination accessibility (workplace in this case) and non-car mode share. When the accessibility of the workplace increases through public transport, it directly impacts the amount of car usage. The other way around shows the same result. When accessibility to the workplace improves by car, instead of by public transport, the usage of the car increases (McKibbin, 2011).

Both research are a good example of the premise uphold in this research; When the ease and possibilities are there, people will choose a more sustainable mode of transport. From sustainable mobility research of CBS (Van Beuningen, 2021). it is determined that transport by foot, bicycle, followed by train and other forms of public transport are the most sustainable ways to relocate oneself. Transportation by car or plane are the most harmful ways to travel in terms of climate, although not all models can be fully compared. On top, this research of CBS already shows, as mentioned in the introduction, that 8 out of 10 people leaves the car at home from time to time. From this group, more than 15% simply does this out of ease. This shows another way in which the premise comes true.

The research area consists of the province of North-Holland, located in the Netherlands, specifically the different PC4 regions (figure 2). The mobility, behavioral and amenity data from CBS are filtered in such a way they are compatible for further research. After checking whether both datasets contained the same set of PC4, this comes to a total of 334 unique PC4. For each of these PC4, the available amenities per category and the mobility behavior of its residents will be calculated on two scales; the amount within a radius of 1 kilometer and the amount between a radius of 1 and 5 kilometer.

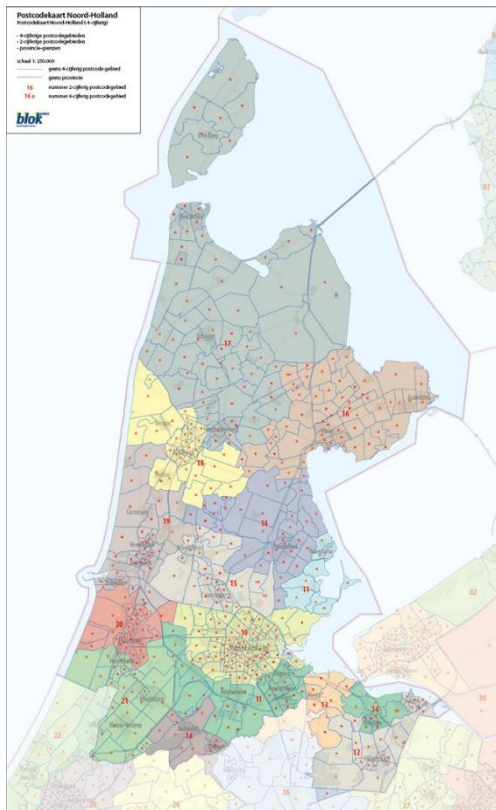


Figure 2 Map PC4 regions North-Holland (Blokplan, z.d.)

These radiuses are chosen based on existing literature. 80 percent of all relocations by bicycle are within a radius of 5 kilometer. Within this 5 kilometer the largest part of transport takes place by foot or bicycle, outside this radius the share decreases rapidly. This is exactly why it is an interesting radius, outside this perimeter, the choice for mode of transport is most likely influenced by the distance rather than the practicality. Within this radius, it might be profitable to see whether the implementation or extra amenities increase the share of sustainable transport even further. (Ministerie van Infrastructuur en Waterstaat, 2026)

Within this radius of 5 kilometer, another tipping point is found. There is a definite maximum distance of what residents are willing to bridge by foot. All distances, e.g. to the supermarket, hairdresser or school, below 1 kilometer most people are good with to walk. Any distance above and they are more likely to find a different mode of transport. The ring between these two distances, 1 and 5 kilometer, is thus the most interesting point in order to gain share of sustainable travel when looking at improvements of locally available amenities (CROW Kennisbank, z.d.).

Each of the used datasets will now be discussed. How are they conformed and how are they used in order to obtain an answer to the main research question?

2.1 ODiN Mobility data

One of the largest datasets, build from thousands of participants, is the ODiN (Dutch National Travel Survey) data (Centraal Bureau voor de Statistiek, 2024). This data includes the documentation of all trips on one day from the participant. Each datapoint consists of a lot of variables, only a few very needed for the research. Before the large dataset could be implemented within the research, it was thoroughly filtered out. Only the necessary variables were kept and within each category a selection of outputs was made. This creates a dataset consisting of the following information on each trip;

- PC4 where the trip originated, filtered for the province of North Holland
- The objective of the trip, filtered on 4 categories:
 - Services/Self-care (3)
 - Shopping/Groceries (4)
 - Education (5)
 - Social/Recreation (7)
- The distance travelled with the relocation, split up in < 1 km and > 1 km
- Which mode of transport was used*:
 - Car (Driver) (1)
 - Car (Passenger) (2)
 - Train (3)
 - Bus/Tram/Metro (4)
 - Cycling (5)
 - Walking (6)
 - Other (7)

*From which the use of the car and 'other' modes of transport are not categorized as sustainable travel.

Multiple entries per PC4 are found in the dataset, which each have their own data for each variable. In order to be able to say something about the behavior within the PC4 as a whole, additions had to be made. By constructing an elaborate function in Excel, the amount of sustainable trips (ST) within a range of 1 kilometer was calculated. Within this formula the specific distances and sustainable modes of transport have been filtered. After this step has been taken for each unique PC4, another formula was derived from the previous to similarly calculate the total amount of trips per PC4. Both formulas, including corresponding variables, can be found in appendix 1.

Now that the number of sustainable trips (ST) locally and the total amount of trips are known, the share of ST can be calculated. This is simply done by taking the amount of ST as a part of the whole amount of trips and multiplying this by 100%.

The descriptives regarding this dataset can be found in table 1:

Tabel 1 Descriptives of variables from appendix 4 (ODiN database)

Descriptive	Value
Minimum amount of ST < 1km	0
Maximum amount of ST < 1km	33
Average amount of ST < 1km	6.11
Minimum amount trips total	1
Maximum amount trips total	225
Average amount trips total	45.20
Minimum share of ST	0%
Maximum share of ST	60%
Average share of ST	14.82%

An overview of all results per PC4 can be found in appendix 4.

2.2 PC4 amenity availability

On top of the Dutch National Travel Survey data, another database from CBS has been used. This specific database consists of information on the available amenities within each PC4. The data shows an overview of all different kinds of amenities within certain proximities of the PC4. Each PC4 has its own value for the nearest location per amenity and depending on the amenity also information on how many are available within a 1, 3, 5, 10 or 20 kilometer radius (Centraal Bureau voor de Statistiek, n.d.). As not all amenities share the exact same datapoints, a general selection is filtered.

The chosen amenities are categorized on function:

- B (Groceries) = Supermarkets and convenience stores
- H (Hospitality) = Cafés, Cafeterias and restaurants
- K (Childcare) = After-school care and nurseries
- S (School) = Middle schools
- D (Doctor) = General practitioners

For each of these categories, data of the availability (in numbers) is known within a 1 kilometer radius as well as a 5 kilometer radius from each of the PC4 in North Holland. The amount per amenity has been added to create an overview of these five categories. For each of the categories a new column will be created with 'ringdata'. This data gives information on the amount of new locations of the amenity between the proximity of 1 and 5 kilometer. This 'ringdata' gives the opportunity to compare behavior within a radius of 1 kilometer and outside of that perimeter.

The data on the amount of amenities per PC4, within a 1 kilometer proximity as well as within the range of 1 to 5 kilometer are made logarithmic. This is done as the impact of an extra amenity decreases as there are more available. Opening a second supermarket has more influence on human travel behavior than opening e.g. the twelfth. On top, making the datapoints logarithmic allows to correct skewed proportions and diminish the influence of outliers.

The descriptives regarding this dataset can be found in table 2:

Tabel 2 Descriptives of variables from appendix 5 (amenity database)

Descriptive	Value
Minimum amount 'Groceries' local (<1km)	0
Maximum amount 'Groceries' local (<1km)	2.0
Average amount 'Groceries' local (<1km)	0.74
Minimum amount 'Groceries' regional (1-5km)	0
Maximum amount 'Groceries' regional (1-5km)	3.1
Average amount 'Groceries' regional (1-5km)	1.71
Minimum amount 'Hospitality' local (<1km)	0
Maximum amount 'Hospitality' local (<1km)	2.6
Average amount 'Hospitality' local (<1km)	0.88
Minimum amount 'Hospitality' regional (1-5km)	0
Maximum amount 'Hospitality' regional (1-5km)	3.5
Average amount 'Hospitality' regional (1-5km)	1.96
Minimum amount 'Childcare' local (<1km)	0
Maximum amount 'Childcare' local (<1km)	1.4
Average amount 'Childcare' local (<1km)	0.67
Minimum amount 'Childcare' regional (1-5km)	0
Maximum amount 'Childcare' regional (1-5km)	2.7
Average amount 'Childcare' regional (1-5km)	1.68
Minimum amount 'School' local (<1km)	0
Maximum amount 'School' local (<1km)	0.8
Average amount 'School' local (<1km)	0.34
Minimum amount 'School' regional (1-5km)	0
Maximum amount 'School' regional (1-5km)	2.0
Average amount 'School' regional (1-5km)	1.13
Minimum amount 'Doctor' local (<1km)	0
Maximum amount 'Doctor' local (<1km)	1.1
Average amount 'Doctor' local (<1km)	0.29
Minimum amount 'Doctor' regional (1-5km)	0
Maximum amount 'Doctor' regional (1-5km)	2.1
Average amount 'Doctor' regional (1-5km)	1.01

An overview of all results per PC4 can be found in appendix 5.

2.3 Combining mobility data and available amenities

The data is now organized in such way, further calculations can be made. Per PC4 the share of sustainable travel is known as well as the availability of each category of amenity. With these two datasets, a regression can be made. The objective of the regression is to establish if and in what matter the availability of amenities influence the share of sustainable travel within the province of North-Holland. For this regression the following variables have been used:

- Dependent variable = Share of sustainable travel within a PC4 (%_ST_TOT)
- Independent variables:
 - Amount of local (<1km) amenities per PC4:
 - 'Groceries' (B_L_LOG)
 - 'Hospitality' (H_L_LOG)
 - 'Childcare' (K_L_LOG)
 - 'School' (S_L_LOG)
 - 'Doctor' (D_L_LOG)
 - Amount of regional (1-5km) amenities per PC4:
 - 'Groceries' (B_R_LOG)
 - 'Hospitality' (H_R_LOG)
 - 'Childcare' (K_R_LOG)
 - 'School' (S_R_LOG)
 - 'Doctor' (D_R_LOG)

Comparing the regression results of the effects of local and regional amenities on the share of sustainable travel can provide interesting information. It can show if there are any prospect regarding redesigning certain urban structures. The regression results will be presented in the next chapter.

Next to the regression, a Pearson correlation table has been created to test for multicollinearity between the independent variables. Those outcomes will also be presented in the following chapter. The programming codes used in Google CoLab to obtain all results can be found in appendix 2.

3. Results

The results of the research will be shortly presented in this chapter, it gives a first indication of where the research has lead. Table 3 gives an organized overview of the regression, the full OLS Regression Result can be found in appendix 3. Within table 3 the significance level of each variable has been color coded. The variables in green are either significant or borderline significant. The variables in red are not significant in the slightest. The first impressions of the model are as followed:

- R-squared = 0.304, in other words, 30.4% of the share of sustainable trips can be explained by the chosen independent variables.
- The regression as a whole is statistically significant (Prob (F-statistic) = 1.16e-20)
- Only the variable local 'childcare' (K_L_LOG) is statistically significant (0.049).
- The variables local 'hospitality' (H_L_LOG) (0.094) and regional 'hospitality' (H_R_LOG) (0.052) are borderline significant and would be significant with a significance level of 10%.

All other variables are not statistically significant according to the OLS Regression Model. In order to test for multicollinearity, a Pearson Correlation Table has been constructed. Figure 3 shows the results. The correlation table helps to understand why the model is statistically significant as a whole, but does not consists of a lot of statistically significant independent variables. Interesting points from the Pearson Correlation table:

- High multicollinearity can be found between all regional amenity categories. All variables show a multicollinearity > 0.94
- Between the local amenity categories, multicollinearity can not be found with certainty. Most values fall between 0.7 and 0.9, which can imply multicollinearity, but it does not necessarily has to be the case.
- Across the local and regional amenity categories, no indication for multicollinearity is found, as almost all combinations of variables show a value of multicollinearity < 0.70
- The variable with the lowest multicollinearity is local 'schools' (S_L_LOG). Only with the variable of local childcare shows the variable possible multicollinearity.

Interesting findings regarding the regression model will be discussed more in depth in the following chapter.

Tabel 3 OLS Regression Results (Dependent variable: Share of sustainable travel)

Independent variable	Coefficient	Significance
Local 'Groceries' (B_L_LOG)	4.839	0.156
Local 'Hospitality' (H_L_LOG)	4.300	0.094
Local 'Childcare' (K_L_LOG)	7.960	0.049
Local 'School' (S_L_LOG)	-3.524	0.534
Local 'Doctor' (D_L_LOG)	4.626	0.316
Regional 'Groceries' (B_R_LOG)	7.031	0.160
Regional 'Hospitality' (H_R_LOG)	-7.281	0.052
Regional 'Childcare' (K_R_LOG)	0.921	0.886
Regional 'School' (S_R_LOG)	-7.964	0.222
Regional 'Doctor' (D_R_LOG)	3.345	0.555
Observations	334	
R²	0.304	
Adjusted R²	0.282	
F-statistic	14.08	
Prob (F-statistic)	1.16e-20	

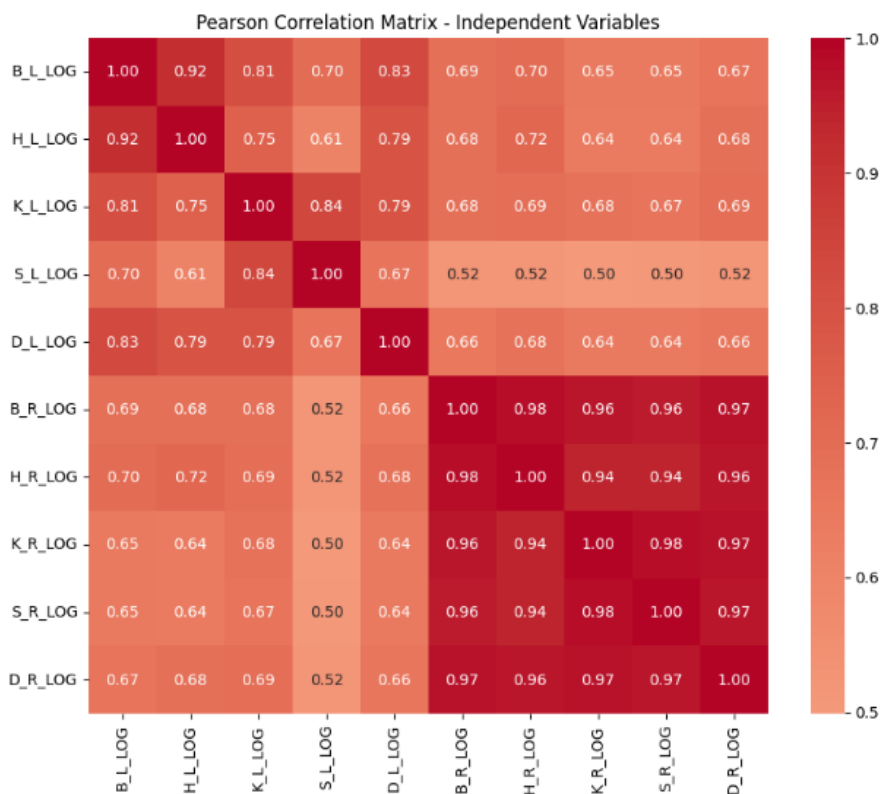


Figure 3 Pearson Correlation results (Independent variables)

4. Discussion

Now that all results are ready, we can determine what they mean and compare them to existing literature to see if they show any surprising results. Coming back to the research presented at the beginning of chapter 2, it was expected that the amount of local amenities would definitely influence the share of sustainable travel, as previous studies found a positive relation between accessibility and the use of sustainable modes of transport. (Boulangé et al., 2017) (McKibbin, 2011)

With the current results, this premise can not be confirmed on all accounts. Most independent variables within the regression do not show statistical significance, which makes the corresponding effect on sustainable travel uncertain. The variables that are (borderline) statistically significant are local childcare and local, as well as regional, hospitality. Within this discussion, those variables will be highlighted.

Apart from whether the independent variables are statistically significant, the multicollinearity has also been discussed. As the model as a whole is statistically significant, but most of the independent variables are not, it is interesting to discuss whether multicollinearity can explain this outcome.

At last, some limitations and recommendations around the research will be presented.

4.1 Significant independent variables

Three out of the ten independent variables show (borderline) statistical significance. Local childcare (K_L_LOG) has a strong and significant positive relation to the dependent variable share of sustainable trips. With a coefficient of 7.960, this result shows that when the availability of local childcare increases, the share of sustainable trips increases strongly. This result aligns with the expectations prior to the research. Based on the found literature, it was expected that people would choose the nearest available amenity. (Ministerie van Infrastructuur en Waterstaat, 2025a). With an increased availability in childcare locally (<1km), it follows that people would select a sustainable mode of transport.

The independent variables of local (H_L_LOG) and regional (H_R_LOG) hospitality are both borderline significant, which makes that they will be shortly discussed. Each of the variables has a complete different relation to the dependent variable. How the available local hospitality increases the share of sustainable travel, the regional hospitality decreases this even stronger. These results are not surprising, more local hospitality (<1km) creates more incentive to dine close to home. People would not mind having to walk, according to the found research (*CROW Kennisbank*, z.d.). When the available regional hospitality increases, but the accessibility does not, people are more likely to travel by car.

4.2 Regression model and multicollinearity

Only about a few variables can be said that a decent result has been obtained. Apart from that, the OLS Regression Model (appendix 3) does show statistical significance as a whole. The Pearson correlation table helps to understand. Between all regional amenity categories there is multicollinearity, which means the model cannot determine with certainty which variable has what effect. Because of this the standard error of the independent variables can be out of proportion, which makes that the variables are perceived as insignificant (even though they might not be). Not all amenity categories show multicollinearity, what causes the model as a whole to be statistically significant.

4.3 Limitations and recommendations

With this research the goal has been to determine whether the built environment can influence the way people relocate themselves. Based on quantitative data, a regression model has been constructed. These databases have been conformed in such way that they are compatible with one another. In doing so, certain datapoints and variables have been lost.

Few assumptions have been made, but regardless will they have had their impact on the research. The most prominent assumption has been about the topic of human behavior. The way the population moves around is taken as a logical choice. However, humans tend more to act based on habits, preference (Gärling & Axhausen, 2003). Choices are not that easy to bend into scientific research. By redesigning the local built environment, certain people will probably change their routines, but a vast amount of resident are also likely to stick to what they know.

Some recommendations for further research would be to add some demographic factors into the model. E.g. age or income can drastically influence the distances the population bridges on a daily basis. On top, a more elaborate database on the available amenities might help in obtaining a results with more robust results. Think of exact locations of the amenities, or a broader range of categories. With this, more variety in the independent variables can be obtained, which will decrease the level of multicollinearity.

5. Conclusion

With combining data on population mobility and availability of amenities within the PC4 regions of North-Holland, a OLS Regression Model has been constructed in order to give more insights in which ways the local and regional amenities influence the share of sustainable travel. Some interesting points were found. Hospitality has the strongest effect on people's behavior. More restaurants further away, the more people tend to go by car, but restaurants close by cause people to travel sustainably. The variable of local childcare is the one with the most certainty, as it was strongly statistically significant. The more local childcare in the area, the higher the share on sustainable trips.

On the main question 'How does the proximity of different amenities influence the share of sustainable travel within the PC4 regions in North-Holland?' no strong answer can be given (yet) as most of the variables were unfortunately not statistically significant. By implementing demographic factors and broadening the variety of independent variables, more robust results can be obtained.

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Appendix 1 Excel formulas

The Excel function used in order to calculate the amount of sustainable trips within a range of 1 kilometer (with explanation in table):

```
=(COUNTIFS($A:$A,G2,$C:$C,1,$D:$D,">=3",$D:$D,"<=6")
+COUNTIFS($A:$A,G2,$C:$C,2,$D:$D,">=3",$D:$D,"<=6"))
```

\$A\$A, x	Column A consists of all entries per PC4, this part makes sure one specific PC4 is selected.
\$C\$C, 1 / \$C\$C, 2	Column C shows the distance travelled for each entry. (1) corresponds with the distance travelled between 0.1 and 0.5 kilometer and (2) of 0.5 and 1.0. This ensures the range of <1 kilometer.
\$D\$D,">=3", \$D:\$D,"<=6"	Column D shows mode of transport for each entry. Modes 3 through 6 are identified as sustainable.

The total amount of trips within the PC4 was calculated by only using the first part of the function: =(COUNTIFS(\$A\$A, x)).

Appendix 2 Programming codes

Regression table code

```
import pandas as pd

import statsmodels.api as sm

from google.colab import files

uploaded = files.upload()

df = pd.read_csv("Lokaal_Ringdata_Regressie_LOG.csv", sep=';')

display(df)

X = df[[

    "B_L_LOG", "H_L_LOG", "K_L_LOG", "S_L_LOG", "D_L_LOG",

    "B_R_LOG", "H_R_LOG", "K_R_LOG", "S_R_LOG", "D_R_LOG",

]]

X = sm.add_constant(X)

y = df["%_ST_TOT"]

model = sm.OLS(y, X).fit()

print(model.summary())
```

Pearson Correlation table code

```
import seaborn as sns

import matplotlib.pyplot as plt

plt.figure(figsize=(10,8))

sns.heatmap(

    pearson_corr, annot=True, fmt=".2f", cmap="coolwarm", center=0)

plt.title("Pearson Correlation Matrix - Independent Variables")

plt.show()
```

Appendix 3 OLS Regression Model

OLS Regression Results						
=====						
Dep. Variable:	%_ST_TOT	R-squared:	0.304			
Model:	OLS	Adj. R-squared:	0.282			
Method:	Least Squares	F-statistic:	14.08			
Date:	Thu, 25 Jun 2026	Prob (F-statistic):	1.16e-20			
Time:	19:18:36	Log-Likelihood:	-1226.4			
No. Observations:	334	AIC:	2475.			
Df Residuals:	323	BIC:	2517.			
Df Model:	10					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]

const	6.8477	2.712	2.525	0.012	1.513	12.182
B_L_LOG	4.8387	3.402	1.422	0.156	-1.855	11.532
H_L_LOG	4.2999	2.557	1.682	0.094	-0.730	9.330
K_L_LOG	7.9603	4.020	1.980	0.049	0.052	15.868
S_L_LOG	-3.5236	5.655	-0.623	0.534	-14.650	7.602
D_L_LOG	4.6264	4.602	1.005	0.316	-4.428	13.681
B_R_LOG	7.0307	4.988	1.410	0.160	-2.782	16.843
H_R_LOG	-7.2806	3.735	-1.949	0.052	-14.629	0.068
K_R_LOG	0.9211	5.442	0.169	0.866	-9.785	11.627
S_R_LOG	-7.9642	6.503	-1.225	0.222	-20.757	4.829
D_R_LOG	3.3449	5.663	0.591	0.555	-7.796	14.486
=====						
Omnibus:	82.083	Durbin-Watson:	1.944			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	201.752			
Skew:	1.181	Prob(JB):	1.55e-44			
Kurtosis:	5.986	Cond. No.	59.4			

Appendix 4 ODIN Database

The table shows the results from the ODIN data. It gives the amount of sustainable trips (<1km) and total trips registered. Column '%_ST_TOT' gives the share of sustainable trips per PC4 within North Holland in percentage (%).

PC4	Count_ST_<1km	Count_T_TOT	%_ST_TOT					
1011	13	50	26.00	1636	0	5	0.00	
1012	20	58	34.48	1641	0	8	0.00	
1013	23	85	27.06	1643	0	2	0.00	
1014	0	18	0.00	1645	2	13	15.38	
1015	17	76	22.37	1647	0	11	0.00	
1016	22	47	46.81	1648	0	9	0.00	
1017	23	78	29.49	1654	0	5	0.00	
1018	24	141	17.02	1657	4	14	28.57	
1019	20	108	18.52	1658	0	2	0.00	
1021	3	19	15.79	1671	9	32	28.13	
1022	6	22	27.27	1674	1	10	10.00	
1023	0	15	0.00	1676	0	3	0.00	
1024	21	76	27.63	1678	0	2	0.00	
1025	15	53	28.30	1679	0	20	0.00	
1026	0	1	0.00	1681	1	4	25.00	
1027	0	3	0.00	1684	0	4	0.00	
1028	0	2	0.00	1687	16	41	39.02	
1031	0	45	0.00	1688	4	19	21.05	
1032	6	28	21.43	1689	17	126	13.49	
1033	15	35	42.86	1691	0	3	0.00	
1034	12	73	16.44	1693	4	34	11.76	
1035	12	62	19.35	1695	0	27	0.00	
1036	0	23	0.00	1696	5	15	33.33	
1043	0	3	0.00	1697	0	2	0.00	
1051	10	77	12.99	1701	0	27	0.00	
1052	24	59	40.68	1702	6	36	16.67	
1053	20	83	24.10	1703	5	53	9.43	
1054	28	100	28.00	1704	2	37	5.41	
1055	22	78	28.21	1705	7	82	8.54	
1056	17	88	19.32	1706	0	12	0.00	
1057	19	63	30.16	1711	2	7	28.57	
1058	23	93	24.73	1713	6	40	15.00	
1059	19	57	33.33	1715	5	31	16.13	
1060	3	16	18.75	1716	5	18	27.78	
1061	2	37	5.41	1718	11	34	32.35	
1062	15	66	22.73	1721	4	25	16.00	
1063	2	15	13.33	1722	0	22	0.00	
1064	6	81	7.41	1723	3	18	16.67	
1065	5	45	11.11	1724	2	4	50.00	
1066	9	94	9.57	1731	4	28	14.29	
1067	10	62	16.13	1732	0	2	0.00	

1068	8	56	14.29	1733	2	22	9.09
1069	6	48	12.50	1734	0	4	0.00
1071	10	28	35.71	1735	4	12	33.33
1072	32	79	40.51	1736	0	5	0.00
1073	14	33	42.42	1738	1	10	10.00
1074	7	37	18.92	1741	14	78	17.95
1075	9	24	37.50	1742	8	51	15.69
1076	10	66	15.15	1744	0	11	0.00
1077	6	30	20.00	1746	3	5	60.00
1078	24	99	24.24	1747	4	24	16.67
1079	19	85	22.35	1749	5	25	20.00
1081	1	24	4.17	1751	1	25	4.00
1082	14	60	23.33	1752	0	5	0.00
1083	4	28	14.29	1753	0	1	0.00
1086	6	18	33.33	1755	0	3	0.00
1087	17	90	18.89	1756	3	19	15.79
1091	13	52	25.00	1757	0	6	0.00
1092	11	51	21.57	1759	2	8	25.00
1093	13	71	18.31	1761	8	75	10.67
1094	10	51	19.61	1764	4	19	21.05
1095	7	63	11.11	1766	0	23	0.00
1096	2	24	8.33	1767	1	5	20.00
1097	8	74	10.81	1768	0	7	0.00
1098	21	86	24.42	1771	3	33	9.09
1102	22	94	23.40	1773	0	1	0.00
1103	0	71	0.00	1774	0	5	0.00
1104	14	53	26.42	1775	4	31	12.90
1105	3	23	13.04	1777	4	21	19.05
1106	19	120	15.83	1778	2	6	33.33
1107	5	57	8.77	1779	2	18	11.11
1108	0	16	0.00	1781	9	46	19.57
1109	1	39	2.56	1782	3	84	3.57
1111	13	74	17.57	1783	0	25	0.00
1112	17	111	15.32	1784	6	46	13.04
1113	6	28	21.43	1785	10	51	19.61
1115	5	25	20.00	1786	0	3	0.00
1121	16	82	19.51	1787	0	29	0.00
1127	0	5	0.00	1788	4	64	6.25
1131	9	43	20.93	1789	0	5	0.00
1132	11	76	14.47	1791	17	74	22.97
1135	7	59	11.86	1792	0	2	0.00
1141	8	108	7.41	1793	0	5	0.00
1151	2	34	5.88	1794	1	7	14.29
1156	0	8	0.00	1795	2	11	18.18
1161	1	25	4.00	1796	1	4	25.00
1165	0	2	0.00	1797	0	4	0.00
1171	3	66	4.55	1811	2	19	10.53
1175	0	9	0.00	1813	6	25	24.00

1181	26	225	11.56	1814	5	35	14.29
1182	13	50	26.00	1815	11	41	26.83
1183	22	179	12.29	1816	9	47	19.15
1184	0	12	0.00	1817	5	34	14.71
1185	14	79	17.72	1821	2	18	11.11
1186	33	162	20.37	1822	3	41	7.32
1187	12	159	7.55	1823	14	59	23.73
1188	6	97	6.19	1824	6	30	20.00
1189	0	3	0.00	1825	7	44	15.91
1191	5	74	6.76	1826	7	41	17.07
1401	1	20	5.00	1827	7	67	10.45
1402	6	54	11.11	1829	0	24	0.00
1403	8	23	34.78	1831	1	12	8.33
1404	6	28	21.43	1834	1	23	4.35
1405	0	3	0.00	1842	0	2	0.00
1406	2	17	11.76	1843	0	6	0.00
1411	8	56	14.29	1844	0	2	0.00
1412	2	34	5.88	1846	0	2	0.00
1421	3	38	7.89	1851	15	90	16.67
1422	14	101	13.86	1852	8	70	11.43
1423	2	44	4.55	1853	0	15	0.00
1424	0	20	0.00	1861	2	34	5.88
1426	0	6	0.00	1862	2	40	5.00
1427	2	8	25.00	1871	2	35	5.71
1431	10	70	14.29	1873	1	4	25.00
1432	4	34	11.76	1901	5	72	6.94
1433	3	44	6.82	1902	9	46	19.57
1435	6	25	24.00	1906	0	28	0.00
1436	0	6	0.00	1911	18	124	14.52
1441	25	157	15.92	1921	10	27	37.04
1442	7	31	22.58	1931	2	13	15.38
1443	10	44	22.73	1934	3	35	8.57
1444	9	46	19.57	1935	0	10	0.00
1445	9	38	23.68	1941	0	16	0.00
1446	0	22	0.00	1942	6	24	25.00
1447	10	109	9.17	1943	15	72	20.83
1448	29	162	17.90	1944	8	55	14.55
1452	2	5	40.00	1945	6	43	13.95
1454	0	2	0.00	1946	2	19	10.53
1456	0	5	0.00	1947	2	10	20.00
1461	1	27	3.70	1948	2	57	3.51
1462	6	76	7.89	1949	2	11	18.18
1463	0	5	0.00	1951	2	26	7.69
1464	0	12	0.00	1961	2	9	22.22
1471	0	14	0.00	1962	7	47	14.89
1472	0	2	0.00	1963	0	34	0.00
1473	0	2	0.00	1964	14	70	20.00
1474	3	29	10.34	1965	9	64	14.06

1475	0	4	0.00	1966	2	52	3.85
1481	0	2	0.00	1967	6	49	12.24
1483	1	3	33.33	1969	0	3	0.00
1484	0	1	0.00	1971	13	46	28.26
1486	0	2	0.00	1972	6	36	16.67
1487	0	5	0.00	1973	5	38	13.16
1501	8	53	15.09	1974	3	42	7.14
1502	7	33	21.21	1975	1	16	6.25
1503	2	19	10.53	1981	2	28	7.14
1504	1	23	4.35	1985	6	33	18.18
1505	2	36	5.56	1991	17	150	11.33
1506	12	56	21.43	1992	2	26	7.69
1507	6	68	8.82				
1508	0	9	0.00				
1509	8	26	30.77				
1511	7	67	10.45				
1521	17	90	18.89				
1525	0	3	0.00				
1531	13	89	14.61				
1534	0	2	0.00				
1541	4	75	5.33				
1544	4	44	9.09				
1546	1	5	20.00				
1551	5	52	9.62				
1561	12	44	27.27				
1562	14	79	17.72				
1566	13	73	17.81				
1567	24	72	33.33				
1601	10	39	25.64				
1602	6	32	18.75				
1606	2	18	11.11				
1607	0	8	0.00				
1608	0	9	0.00				
1611	5	52	9.62				
1613	11	68	16.18				
1614	4	12	33.33				
1616	8	48	16.67				
1617	0	8	0.00				
1619	1	47	2.13				
1621	6	22	27.27				
1622	0	29	0.00				
1623	5	25	20.00				
1624	8	38	21.05				
1625	13	66	19.70				
1628	6	103	5.83				
1631	0	2	0.00				
1633	0	28	0.00				
1634	0	2	0.00				

Appendix 5 Amenity Database

This table shows the amount of amenities per category (logarithmic) on a local and regional scale per PC4 within North Holland.

PC4	B_L_LOG	B_R_LOG	H_L_LOG	H_R_LOG	K_L_LOG	K_R_LOG	S_L_LOG	S_R_LOG	D_L_LOG	D_R_LOG
1011	1.6	3	2.3	3.5	0.9	2.6	0.4	1.9	0.6	2.1
1012	2	3	2.6	3.5	0.7	2.6	0.2	1.9	0.7	2.1
1013	1.5	2.9	1.9	3.4	1	2.4	0.4	1.7	0.5	1.9
1014	0.9	2.8	1.4	3.3	0.9	2.3	0.6	1.6	0.3	1.8
1015	1.9	3	2.3	3.5	1	2.6	0.5	1.9	0.9	2
1016	2	3	2.5	3.5	1.1	2.6	0.5	1.9	0.9	2.1
1017	1.8	3	2.4	3.5	0.9	2.7	0.4	2	0.7	2.1
1018	1.2	3	1.7	3.5	0.9	2.5	0.4	1.8	0.5	2
1019	0.9	2.7	1.1	3.3	0.9	2.2	0.4	1.6	0.3	1.8
1021	1.3	2.1	1.6	2.6	1	2	0.6	1.5	0.7	1.3
1022	0.8	2.2	1	2.6	0.8	2	0.5	1.5	0	1.4
1023	1.1	2	1.1	2.3	1	1.9	0.4	1.4	0.3	1.3
1024	1.2	1.9	1.1	2.2	1	1.9	0.6	1.3	0.5	1.2
1025	0.9	2	1.1	2.4	0.8	2	0.5	1.4	0.3	1.3
1026	0	1.5	0	1.6	0	1.5	0	0.9	0	0.9
1027	0	1.8	0	1.9	0.4	1.7	0	1.2	0	1
1028	0	1.1	0.1	1.2	0.3	1.2	0.2	0.7	0	0.6
1031	1.2	2.1	1.6	2.6	1	2	0.5	1.5	0.7	1.3
1032	0.9	2.1	1.3	2.4	0.7	2	0.4	1.5	0.3	1.4
1033	0.8	2	1	2.3	0.6	2	0.3	1.5	0.5	1.3
1034	1	2.1	0.7	2.3	0.9	2	0.5	1.5	0.3	1.4
1035	0.8	1.9	0.7	2.2	0.8	1.9	0.5	1.5	0.2	1.3
1036	0.5	2	0	2.3	0.7	1.9	0.3	1.5	0.2	1.3
1043	0.2	2.7	0.7	3.1	0	2.4	0	1.7	0	1.8
1051	1.4	2.9	1.9	3.5	1.3	2.5	0.5	1.8	0.6	1.9
1052	1.7	3	2.2	3.5	1.4	2.6	0.6	1.9	0.8	2
1053	1.9	3	2.3	3.5	1.3	2.6	0.7	1.9	0.9	2
1054	1.6	3	2.2	3.5	1.2	2.6	0.5	2	0.7	2.1
1055	1.4	2.9	1.7	3.4	1.2	2.5	0.6	1.8	0.7	1.9
1056	1.6	3	1.9	3.5	1.4	2.6	0.7	1.9	0.8	2
1057	1.7	3	2	3.5	1.4	2.6	0.8	1.9	0.8	2
1058	1.4	3	1.8	3.4	1.3	2.6	0.5	1.9	0.5	2
1059	1.4	2.9	1.8	3.3	1.3	2.6	0.4	1.9	0.4	2
1060	0.8	2.2	0.6	2.3	0.7	2	0.4	1.5	0.3	1.4
1061	1.2	2.9	1.3	3.3	1	2.5	0.7	1.8	0.5	1.9
1062	1.1	2.9	1.4	3.3	1.1	2.5	0.5	1.9	0.5	1.9
1063	1.3	2.7	1.4	3	1	2.4	0.7	1.7	0.7	1.8
1064	1.2	2.7	1.2	3.1	0.9	2.4	0.5	1.8	0.5	1.8
1065	1.3	2.8	1.5	3.1	1	2.5	0.6	1.9	0.4	1.9
1066	0.7	2.5	0.8	2.8	0.9	2.3	0.4	1.7	0.4	1.7
1067	1.2	2.4	1	2.6	1.1	2.2	0.7	1.6	0.5	1.6

1068	1.3	2.5	1.4	2.7	0.9	2.3	0.5	1.7	0.6	1.6
1069	1.2	2.3	1.3	2.4	1	2.1	0.7	1.6	0.5	1.5
1071	1.6	3.1	2.1	3.5	1.2	2.7	0.8	1.9	0.8	2.1
1072	1.7	3	2.2	3.5	1.2	2.6	0.4	1.9	0.7	2.1
1073	1.7	3	2.1	3.5	1.3	2.6	0.5	1.9	0.7	2
1074	1.6	3	2.2	3.5	1.4	2.6	0.6	1.9	0.7	2
1075	1.6	3	2	3.5	1.4	2.6	0.7	1.9	0.6	2
1076	1.4	2.9	1.8	3.4	1.3	2.6	0.7	1.9	0.4	2
1077	1.4	3	1.6	3.5	1.1	2.6	0.7	1.9	0.6	2
1078	1.6	3	1.9	3.5	1.4	2.5	0.6	1.8	0.8	2
1079	1.4	2.9	1.7	3.4	1.3	2.5	0.6	1.8	0.7	1.9
1081	1.1	2.6	1.2	2.9	0.8	2.4	0.2	1.7	0.4	1.6
1082	1.4	2.7	1.5	3.1	0.9	2.4	0.4	1.7	0.5	1.8
1083	1.2	2.7	1.3	3.1	0.9	2.4	0.5	1.7	0.2	1.7
1086	0.4	1.9	0.6	2.1	1.1	1.8	0.4	1.2	0.3	1.2
1087	1	1.2	1.2	1.5	1.2	1.5	0.7	0.9	0.3	0.6
1091	1.5	3	1.9	3.5	1	2.5	0.6	1.8	0.7	2
1092	1.7	2.9	2	3.4	1.2	2.4	0.7	1.8	0.9	1.9
1093	1.8	2.9	2.1	3.4	1.2	2.4	0.6	1.8	1.1	1.9
1094	1.8	2.8	2	3.3	1.2	2.4	0.6	1.7	1	1.9
1095	1.3	2.6	1.6	3.1	1	2.3	0.5	1.6	0.7	1.8
1096	0.4	2.7	0.8	3.2	0.5	2.4	0.2	1.7	0.1	1.8
1097	1.1	2.8	1.4	3.3	0.9	2.4	0.4	1.8	0.5	1.9
1098	1.3	2.7	1.5	3.2	1.2	2.4	0.6	1.7	0.7	1.8
1102	1	2.1	1.2	2.4	0.6	2	0.3	1.5	0.5	1.5
1103	1	2	1	2.3	0.9	2	0.4	1.5	0.6	1.4
1104	1	2	0.7	2.3	0.8	2	0.4	1.5	0.7	1.4
1105	0.4	2	0.7	2.2	0.3	1.9	0	1.4	0.4	1.4
1106	0.7	2	0.7	2.2	0.7	1.9	0.4	1.4	0.2	1.4
1107	0.7	1.9	0.7	2	0.7	1.8	0.4	1.3	0.3	1.3
1108	0	2	0.2	2.2	0.7	1.9	0.2	1.4	0.2	1.4
1109	0	1.6	0.3	1.8	0.7	1.6	0.5	1.1	0	1.2
1111	1	2.2	1.2	2.5	1	2	0.5	1.5	0.3	1.6
1112	0.7	2.3	1.1	2.6	0.7	2.1	0.3	1.6	0.2	1.7
1113	0.8	1.8	0.6	2	0.6	1.8	0.2	1.2	0.1	1.1
1115	0.7	2.3	0.9	2.6	0.7	2.2	0.5	1.6	0.3	1.7
1121	1	1.7	1.2	1.8	0.9	1.7	0.6	1.2	0.6	1
1127	0	1.3	0.2	1.5	0.4	1.3	0.3	1	0	0.9
1131	1.3	1.6	1.3	1.6	0.5	1.1	0.4	1	0.2	0.6
1132	0.8	1.8	0.1	1.7	0.5	1.1	0.4	1	0.1	0.7
1135	1	1.7	0.9	1.7	0.7	1	0.4	1	0.4	0.6
1141	0.8	0.9	0.9	1.3	0.7	0.9	0.5	0.7	0.2	0.3
1151	0.3	0.7	0.5	1.1	0.4	0.9	0.1	0.7	0.1	0.3
1156	0.4	0.2	0.6	0.2	0.7	0	0.3	0	0.3	0
1161	1	1.2	1	1.4	0.6	1.1	0.3	0.7	0.4	0.5
1165	0.8	1.6	0.9	1.7	0.7	1.4	0.2	1	0.3	0.8

1171	1	2	1	2.1	0.9	1.8	0.4	1.3	0.3	1.3
1175	0	1.8	0.2	1.9	0	1.7	0	1.2	0	1.1
1181	1.1	2.3	1.3	2.5	1	2.1	0.5	1.5	0.4	1.3
1182	0.9	2.2	1.2	2.4	1	2	0.3	1.4	0.4	1.3
1183	0.9	2.3	1	2.5	0.7	2.1	0.3	1.5	0.3	1.4
1184	0.6	2	0.9	2.3	0.1	1.9	0	1.3	0	1.2
1185	1.2	2	1.3	2.2	1	2	0.5	1.3	0.4	1.2
1186	0.8	2	0.6	2.2	0.6	1.9	0.3	1.3	0.1	1.2
1187	0.8	1.9	0.7	2.1	0.8	1.8	0.4	1.2	0.1	1
1188	0.8	2	0.5	2.2	0.7	1.9	0.5	1.3	0.3	1.1
1189	0.3	0.6	0.3	1.4	0.3	0.8	0	0	0	0
1191	0.7	1.8	0.8	2.2	0.7	1.6	0.4	1	0.1	1
1401	1.3	1.8	1.6	2	1	1.7	0.5	1.3	0.5	1.1
1402	1.2	1.9	1.4	2.1	1	1.8	0.5	1.3	0.4	1.2
1403	0.9	2	0.8	2.2	0.7	1.8	0.4	1.3	0.4	1.1
1404	1.4	1.7	1.8	1.9	1.1	1.7	0.5	1.3	0.5	1.1
1405	1.1	1.8	1.4	2.1	1	1.7	0.5	1.2	0.4	1.1
1406	1.1	1.8	1.5	2.1	1	1.8	0.4	1.3	0.1	1.2
1411	0.7	1.9	0.9	2.1	0.6	1.7	0.3	1.2	0.3	1.1
1412	0.7	1.9	0.8	2.1	0.9	1.7	0.5	1.2	0.3	1.1
1421	1	1.5	1.2	1.7	0.5	1.5	0.2	1	0.3	0.7
1422	0.9	1.5	0.9	1.8	0.6	1.5	0.3	0.9	0.2	0.8
1423	0.7	1.5	0.8	1.7	0.6	1.4	0.4	0.9	0	0.7
1424	0.5	1.6	0.4	1.8	0.6	1.5	0.3	1.1	0	0.9
1426	0	1.4	0.2	1.5	0.2	1.2	0.2	0.8	0	0.6
1427	0.8	1.6	0.6	1.9	0	1.6	0	1.1	0	0.9
1431	0.9	1.6	1.1	1.7	0.6	1.5	0.3	1.1	0.4	1
1432	0.6	1.7	0.6	1.9	0.4	1.6	0.5	1	0.1	1
1433	0.6	1.4	0.6	1.6	0.6	1.3	0.4	0.8	0.3	0.9
1435	0.5	1.4	0.4	1.5	0.5	0.9	0.2	0.4	0.2	0.6
1436	0.3	1.5	0.4	1.7	0.3	1.3	0	0.8	0	0.9
1441	1.1	1.9	1.4	2	0.6	1.8	0.3	1.4	0.4	1.2
1442	1.2	1.9	1.2	2.1	0.7	1.8	0.4	1.4	0.5	1.2
1443	0.8	1.9	0.8	2.1	0.8	1.8	0.3	1.4	0.5	1.2
1444	0.6	1.9	0.5	2.1	0.6	1.7	0.3	1.3	0.5	1.2
1445	0.8	1.9	0.8	2.1	0.8	1.7	0.5	1.3	0.2	1.2
1446	0.5	1.8	0.5	2.1	0.7	1.6	0.2	1.2	0.3	1.2
1447	0.7	1.9	0.3	2.1	0.7	1.8	0.5	1.3	0.3	1.2
1448	0.6	1.9	0.7	2.1	0.8	1.7	0.4	1.4	0.3	1.2
1452	0.3	0.9	0.3	1.1	0.4	1.2	0.4	0.8	0.3	0.6
1454	0	1.4	0	1.6	0	1.5	0	1.1	0	1
1456	0	1.7	0.4	2	0.3	1.5	0.2	1.1	0	1
1461	0.8	1.9	1.2	2	0.5	1.7	0.4	1.3	0.2	1.2
1462	0.7	0.7	0.8	1	0.4	0.9	0.2	0.4	0.3	0.3
1463	0	0.8	0.1	1	0	1	0	0.7	0	0.4
1464	0	0.9	0.3	1.2	0.3	1	0.1	0.6	0	0.5

1471	0	1.8	0	2.1	0	1.5	0.3	1	0	1.1
1472	0.2	1.2	0	1.2	0	1.1	0.2	0.7	0.2	0.7
1473	0	0.8	0.3	0.8	0.3	0.7	0.2	0.4	0	0.3
1474	0.6	0.3	0.3	0.8	0.4	0.8	0.2	0.6	0.2	0.2
1475	0	0.7	0.3	0.8	0.4	0.6	0.3	0.3	0	0.3
1481	0	1.6	0	1.5	0	1.4	0	1	0	0.8
1483	0.6	0.6	0.8	1	0.4	0.6	0.4	0.4	0.2	0.3
1484	0.7	0.3	0.5	1.1	0	0.7	0	0.7	0.3	0.1
1486	0	0.8	0	1.2	0	0.8	0.1	0.7	0	0.3
1487	0	0.8	0.3	1.1	0.3	0.5	0.3	0.5	0	0.3
1501	1.1	2	1.7	2.1	1	1.8	0.5	1.3	0.4	1.3
1502	1.1	2	1.5	2.2	0.8	1.9	0.3	1.3	0.4	1.3
1503	0.8	1.9	0.7	2.2	0.9	1.8	0.5	1.2	0.4	1.2
1504	0.9	2	0.8	2.2	0.8	1.8	0.6	1.3	0.4	1.2
1505	0.7	2	0.7	2.2	0.8	1.8	0.6	1.3	0.1	1.2
1506	1.2	2	1.6	2.2	0.7	1.9	0.3	1.3	0.3	1.3
1507	0.6	1.8	0.5	2.1	0.5	1.7	0.2	1.2	0.3	1.1
1508	0.7	2	0.6	2.3	0.6	1.9	0.2	1.4	0.3	1.3
1509	0.6	1.8	0.6	2.1	0.8	1.7	0.3	1.1	0.4	1.1
1511	0.7	1.8	0.9	2.1	0.7	1.7	0.4	1.3	0.2	1.2
1521	1	1.9	1.2	2	0.7	1.9	0.3	1.3	0.2	1.2
1525	0	1.7	0.3	1.9	0	1.7	0.3	1.1	0	1
1531	0.9	1.8	0.9	1.9	0.8	1.7	0.4	1.1	0.5	1
1534	0	1.6	0	1.8	0	1.4	0	0.9	0	0.9
1541	0.9	1.9	0.8	2.1	0.8	1.8	0.4	1.3	0.3	1.3
1544	0.7	1.9	0.8	2.1	0.7	1.8	0.4	1.2	0.3	1.3
1546	0	1.1	0.3	1.3	0.4	1.2	0.3	0.7	0	0.8
1551	0.4	1.6	0.1	1.7	0.5	1.5	0.1	1	0.2	0.8
1561	1.2	1.8	1.3	1.9	0.9	1.8	0.2	1.3	0.6	1
1562	0.8	1.7	0.8	1.9	0.8	1.7	0.3	1.2	0.3	1
1566	0.7	1.7	0.7	1.7	0.7	1.7	0.3	1.1	0.1	0.9
1567	1	1.7	0.7	1.9	1	1.8	0.6	1.1	0.3	1
1601	1.2	1.5	1.6	1.5	0.7	1.3	0.5	0.9	0.2	0.8
1602	0.8	1.6	0.4	1.8	0.8	1.2	0.4	0.9	0.2	0.7
1606	0.3	1	0.3	1	0.6	1.1	0.3	0.7	0.1	0.4
1607	0.3	1.1	0.3	1.1	0.2	1	0.1	0.7	0.1	0.4
1608	0	0.7	0.3	0.9	0.2	0.8	0.2	0.5	0	0.3
1611	0.8	1.7	0.8	1.9	0.5	1.5	0.4	1.1	0.3	0.9
1613	0.8	1.6	0.7	1.6	0.6	1.4	0.4	1.1	0.4	0.9
1614	0.8	1.5	0.3	1.5	0.3	1.3	0.3	1	0.3	0.8
1616	0.9	1.4	0.7	1.3	0.6	1.2	0.4	0.9	0.2	0.8
1617	0	1.4	0.4	1.4	0.2	1.4	0.1	1	0	0.7
1619	0.5	1	0.5	1.2	0.5	0.9	0.3	0.7	0.3	0.4
1621	1.5	1.8	2	1.8	0.8	1.9	0.4	1.4	0.5	1.2
1622	0.8	1.8	0.7	2.1	0.8	1.7	0.5	1.1	0.4	1
1623	1	1.9	1.3	2.2	0.8	1.9	0.3	1.4	0.2	1.2

1624	1.1	1.9	1.2	2.2	0.9	2	0.5	1.4	0.3	1.2
1625	0.8	2	0.7	2.2	0.8	2	0.2	1.4	0.2	1.2
1628	0.7	1.9	0.5	2.2	0.8	1.9	0.5	1.3	0.3	1.2
1631	0	0.9	0.3	1	0	0.9	0	0.6	0	0.4
1633	0.6	0.9	0.4	1.1	0.7	0.9	0.3	0.7	0.2	0.5
1634	0	1.6	0.2	2	0	1.3	0	0.9	0	0.8
1636	0	0.5	0.3	0.8	0.4	0.7	0.3	0.7	0	0.3
1641	0.3	1.2	0.3	1.1	0.4	1.2	0.3	0.8	0.3	0.6
1643	0.2	1.2	0.3	1.1	0.3	1.2	0.2	0.8	0.2	0.6
1645	0.4	0.8	0.4	1	0.4	1	0.4	0.7	0.2	0.4
1647	0	1.7	0.2	1.9	0.5	1.5	0.2	1	0.2	0.9
1648	0.6	0.9	0.7	1	0.4	1.1	0.3	0.8	0.3	0.6
1654	0	1	0.2	1.1	0.4	1.2	0.2	0.8	0.2	0.7
1657	0.3	0.3	0.3	0.5	0.6	0.8	0.3	0.6	0.3	0.2
1658	0	0.3	0	0.5	0	0.8	0	0.5	0	0.3
1671	0.7	1	1.1	1.5	0.6	0.7	0.5	0.7	0.3	0.3
1674	0	1.2	0.2	1.6	0.3	1	0.3	0.8	0	0.5
1676	0	0.9	0	1.2	0.2	1	0.2	0.8	0	0.5
1678	0.1	1	0.1	1.1	0.3	0.9	0.1	0.7	0	0.3
1679	0.4	0.7	0.6	0.8	0.4	0.9	0.2	0.6	0.3	0.5
1681	0	1.5	0.3	1.4	0.1	1.2	0.1	1	0	0.5
1684	0.2	1.2	0	1.3	0.4	1	0.3	0.8	0	0.3
1687	0.7	1.3	0.7	1.3	0.6	1.4	0.3	0.9	0.2	0.7
1688	0.4	1.2	0.5	1.3	0.6	1.4	0.3	0.9	0.3	0.7
1689	0.7	1.9	0.5	2.1	0.9	1.9	0.3	1.3	0.3	1.2
1691	0.3	1.1	0.4	1.2	0	1.1	0.3	0.8	0	0.5
1693	0.8	1.1	0.7	1.4	0.5	1	0.4	0.8	0.2	0.4
1695	0.8	1.9	0.6	2.2	0.9	1.9	0.4	1.3	0.4	1.1
1696	0.1	1.6	0.4	1.6	0.6	1.8	0.2	1.2	0.2	1
1697	0	1.3	0	1.3	0.4	1.4	0.3	1	0	0.8
1701	1.1	1.7	1.2	1.8	0.7	1.7	0.4	1.2	0.4	1.1
1702	1.1	1.8	1.1	1.9	0.8	1.8	0.5	1.3	0.4	1.1
1703	0.8	1.8	1	1.9	0.8	1.8	0.4	1.4	0.3	1.2
1704	0.3	1.8	0.3	1.9	0.4	1.8	0.2	1.3	0.2	1.1
1705	0.4	1.8	0.3	1.9	0.7	1.8	0.4	1.3	0.3	1.1
1706	0.3	1.8	0.2	1.9	0.5	1.7	0.3	1.2	0.3	1.1
1711	0	1.3	0.3	1.2	0.5	1.3	0.2	0.9	0	0.7
1713	0.9	1.4	0.6	1.3	0.7	1.3	0.3	0.9	0.2	0.6
1715	0.9	1.2	0.5	1.2	0.4	1.3	0.3	0.8	0.2	0.6
1716	0.9	1.2	0.5	1.2	0.6	1.3	0.5	0.7	0.2	0.6
1718	0.5	1.1	0.6	1.1	0.7	1	0.4	0.7	0.4	0.4
1721	0.8	1.9	0.7	2	0.6	1.8	0.4	1.3	0.3	1.1
1722	0.8	1.6	0.8	1.8	0.5	1.6	0.3	1	0.3	0.9
1723	1	1.4	1.1	1.5	0.7	1.3	0.4	0.9	0.4	0.8
1724	0.5	1.5	0.5	1.5	0.5	1.3	0.3	0.9	0.1	0.8
1731	0.7	1	0.5	1.1	0.3	1	0.1	0.6	0.1	0.3

1732	0	1.1	0	1.1	0	1	0	0.7	0	0.4
1733	0.8	1	0.7	1	0.6	1	0.4	0.6	0.1	0.3
1734	0	1.2	0.1	1.2	0	1.2	0	0.8	0	0.5
1735	0.6	1.1	0.4	1.1	0.4	1.1	0.3	0.8	0	0.4
1736	0	0.9	0	1	0	1.1	0	0.7	0	0.4
1738	0.4	1.2	0.3	1.3	0.4	1.2	0.3	0.7	0.3	0.4
1741	1.1	1.3	1.3	1.6	0.7	1.3	0.4	0.9	0.3	0.8
1742	0.4	1.5	0.6	1.7	0.4	1.4	0.3	1	0.1	0.8
1744	0.2	1.3	0.2	1.5	0.2	1.1	0.2	0.9	0	0.7
1746	0.4	1.2	0.5	1.3	0.5	0.9	0.3	0.7	0.2	0.5
1747	0.8	1.2	0.6	1.3	0.5	0.9	0.2	0.8	0.2	0.5
1749	0.7	1.2	0.7	1.3	0.3	0.9	0.3	0.7	0.2	0.4
1751	0	1.5	0.5	1.7	0.6	1.3	0.2	1	0.3	0.7
1752	0	0.6	0	1.2	0.4	0.9	0.2	0.7	0.2	0.3
1753	0.2	0.6	0.5	1.2	0	0.8	0	0.6	0	0.4
1755	0.2	0.4	0.8	1.1	0.4	0.4	0.2	0.3	0.2	0.1
1756	0.6	0.5	0.5	0.7	0.8	0.4	0.4	0.2	0.3	0.1
1757	0	1.1	0.3	1.2	0	1.1	0	0.8	0	0.4
1759	0.6	0.8	0.9	1.1	0.5	0.6	0.2	0.3	0.2	0.2
1761	0.7	1.1	0.7	1.2	0.5	0.8	0.4	0.5	0.2	0.4
1764	0.5	0.9	0.4	1	0.4	0.8	0.1	0.5	0.2	0.3
1766	0.2	1	0	1.1	0.4	0.4	0.2	0.4	0	0
1767	0	0	0.4	0.1	0.4	0.4	0.3	0.1	0	0.3
1768	0	1.2	0	1.4	0.1	1	0	0.6	0.2	0.4
1771	0.6	0.8	0.6	0.9	0.6	0.8	0.4	0.5	0.2	0.3
1773	0	0	0	0	0.3	0	0.3	0	0	0
1774	0.3	0.7	0.2	0.6	0.3	0.7	0.2	0.4	0	0.1
1775	0.7	0.4	0.5	0.6	0.6	0.5	0.5	0.4	0.2	0.1
1777	0.8	0.5	0.6	0.9	0.6	0.5	0.3	0.3	0.4	0.2
1778	0	0.9	0.4	0.9	0	0.8	0	0.5	0	0.5
1779	0.6	0.4	0.8	0.8	0.4	0.3	0.4	0.1	0.3	0.1
1781	1.2	1.6	1.6	1.8	0.9	1.6	0.6	1.1	0.5	1
1782	0.9	1.6	1.3	1.9	0.9	1.6	0.6	1.1	0.4	1
1783	1	1.6	1	2	0.6	1.6	0.3	1.2	0.3	1
1784	1.1	1.6	0.9	2	0.8	1.6	0.5	1.2	0.5	1
1785	0.7	1.7	0.6	2	0.7	1.6	0.4	1.2	0.3	1
1786	0	1.7	0.1	1.8	0	1.4	0	1	0	1
1787	0.8	1.3	0.8	1.4	0.1	1.2	0.1	0.8	0.2	0.4
1788	0.5	1.3	0.5	1.4	0.6	1.1	0.3	0.8	0	0.5
1789	0	1.7	0.5	2	0	1.6	0	1.2	0	1.1
1791	0.9	1.3	1.2	1.4	0.5	0.7	0.5	0.6	0.3	0.5
1792	0.9	1.3	0.4	1.5	0.4	0.8	0.3	0.7	0	0.5
1793	0	1.3	0	1.5	0	0.9	0	0.8	0	0.5
1794	0.6	0.4	0.5	0.3	0.6	0.3	0.2	0.1	0	0
1795	0.4	0.6	0.7	1.1	0.3	0.2	0.2	0.1	0.1	0.1
1796	0.8	0.8	1.5	1.3	0.2	0.2	0.2	0.2	0	0.1

1797	0.2	0.7	0.5	1.1	0	0.3	0	0.3	0	0.2
1811	1.8	2	2.2	2	1	1.9	0.5	1.4	0.5	1.3
1813	1.1	2.1	1.4	2.4	0.9	1.8	0.4	1.3	0.4	1.3
1814	1.3	2.1	1.4	2.4	1	1.9	0.6	1.4	0.8	1.3
1815	1.2	2.1	1.7	2.4	0.9	1.9	0.4	1.4	0.6	1.3
1816	1	2.1	0.9	2.4	0.7	1.8	0.5	1.3	0.3	1.3
1817	0.8	2.2	0.9	2.4	0.8	1.9	0.5	1.4	0.3	1.3
1821	1	2.1	1.3	2.4	0.4	1.9	0	1.4	0.3	1.3
1822	0.2	2.1	0.2	2.4	0.7	2	0.3	1.5	0.1	1.3
1823	1.1	2.1	1.4	2.4	0.7	2	0.2	1.5	0.4	1.4
1824	0.7	2.2	0.9	2.4	0.7	2	0.4	1.5	0.3	1.4
1825	0.9	2	0.6	2.3	0.8	1.9	0.5	1.4	0.2	1.2
1826	1	2	0.7	2.3	0.8	1.9	0.5	1.4	0.3	1.3
1827	0.4	1.7	0.2	1.7	0.8	1.8	0.5	1.3	0.2	1
1829	0.8	2.2	0.8	2.4	0.9	2	0.4	1.5	0.4	1.4
1831	0.4	1.7	0.4	1.8	0.7	1.7	0.3	1.2	0.3	0.9
1834	0.6	2	0.5	2.1	0.8	1.9	0.3	1.5	0.1	1.3
1842	0.2	1.4	0.4	1.4	0	1.5	0	1.1	0	0.9
1843	0	0.8	0.3	1	0	0.6	0.2	0.6	0	0.3
1844	0	0.2	0.2	0.6	0.2	0.5	0.2	0.6	0	0.1
1846	0	0.3	0.2	0.8	0.2	0.5	0.2	0.4	0	0
1851	0.8	1.9	0.9	2.1	0.7	1.7	0.4	1.2	0.2	1.2
1852	0.8	1.7	0.7	1.8	0.7	1.6	0.4	1.2	0.2	1.1
1853	0.1	1.6	0	1.6	0.2	1.5	0	1.2	0	0.9
1861	1	1.5	1.2	1.7	0.4	1.3	0.3	0.9	0.1	0.6
1862	0.7	1.6	0.8	1.9	0.5	1.3	0.4	1	0.1	0.6
1871	0.5	1.3	0.6	1.5	0.2	0.9	0.1	0.6	0.1	0.5
1873	0.6	1	0.8	1.3	0.4	0.5	0.3	0.3	0	0.5
1901	1.1	1.5	1.3	1.7	0.8	1.4	0.5	1	0.4	0.8
1902	0.9	1.6	0.8	1.8	0.8	1.4	0.5	0.9	0.4	0.8
1906	0.8	1.8	0.8	1.9	0.6	1.7	0.3	1.3	0.2	1.1
1911	0.7	1.6	0.8	1.8	0.7	1.5	0.3	1.1	0.2	1
1921	0.8	1	0.5	1.3	0.7	0.9	0.4	0.6	0.3	0.4
1931	0.8	1.1	1.5	1.3	0.7	0.9	0.4	0.5	0.3	0.3
1934	0.7	1.3	0.8	1.7	0.5	1.2	0.3	0.8	0.2	0.4
1935	0.4	1.6	0.7	1.8	0.4	1.6	0.3	1.2	0	0.9
1941	1.4	2	1.6	2.1	0.7	1.7	0.3	1.3	0.4	1.3
1942	1.2	2	1.5	2.2	0.7	1.7	0.4	1.3	0.6	1.3
1943	1	2	1.2	2.2	1	1.7	0.6	1.3	0.6	1.3
1944	1.1	2	1.2	2.2	0.9	1.7	0.6	1.3	0.5	1.3
1945	1.1	2	1.1	2.2	1	1.8	0.5	1.3	0.5	1.3
1946	1	2	0.8	2.2	1	1.7	0.7	1.3	0.5	1.3
1947	1.4	2	1.5	2.1	0.6	1.7	0.3	1.3	0.3	1.3
1948	0.4	2.1	0.5	2.2	0.5	1.7	0.4	1.3	0.1	1.3
1949	0.4	1.4	1.2	1.7	0.4	1.1	0.3	0.7	0.3	0.7
1951	0.8	2	0.9	2.2	0.4	1.8	0.3	1.3	0.3	1.3

1961	1.4	2	1.5	2.1	0.9	1.8	0.5	1.3	0.7	1.2
1962	1.2	2	1.3	2.1	0.8	1.8	0.5	1.3	0.6	1.2
1963	0.3	1.9	0.4	2	0.6	1.7	0.5	1.3	0.1	1.2
1964	1.2	2	1.3	2.2	0.7	1.8	0.3	1.3	0.5	1.3
1965	0.7	2.1	0.7	2.2	0.7	1.8	0.4	1.3	0.4	1.3
1966	0.9	2.1	0.7	2.2	0.9	1.8	0.6	1.3	0.6	1.3
1967	0.5	2	0.7	2.2	0.4	1.8	0.3	1.3	0.2	1.3
1969	0.4	2.1	0.4	2.2	0.2	1.8	0	1.3	0.1	1.3
1971	1.1	2	1.4	2.1	0.9	1.6	0.4	1.2	0.5	1.1
1972	1.3	1.8	1.6	1.9	0.8	1.5	0.5	1	0.7	0.9
1973	1.3	1.6	1.3	1.9	0.9	1.4	0.6	0.9	0.5	0.9
1974	1.1	1.6	0.7	2	0.7	1.3	0.4	0.9	0.1	0.9
1975	1.1	1.7	1.4	1.9	0.5	1.4	0.3	0.9	0.1	1
1981	0.1	2	0.6	2.1	0.1	1.7	0	1.2	0.1	1.1
1985	0.6	2	0.6	2.1	0.8	1.9	0.5	1.4	0.3	1.2
1991	0.9	1.8	0.5	2	0.9	1.9	0.6	1.4	0.3	1.2
1992	0.2	1.8	0.1	1.9	0.4	1.9	0.2	1.4	0.3	1.1