

# Local sharing in Gothenburg: An investigation of promising districts and proposal of sharing initiatives

Master's thesis in Master's Programme Infrastructure and Environmental Engineering

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MASTER'S THESIS ACEX30

**Local sharing in Gothenburg: An investigation of promising  
districts and proposal of sharing initiatives**

*Master's Thesis in the Master's Programme Infrastructure and Environmental Engineering*

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CHALMERS UNIVERSITY OF TECHNOLOGY  
Göteborg, Sweden 2021

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Cover:

The sharing characteristics of sharing initiatives, used in this thesis to present the key aspects of the sharing economy.

Department of Architecture and Civil Engineering  
Göteborg, Sweden, 2021

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## **ABSTRACT**

Sharing economy is attracting more and more attention worldwide in the last decade. Local sharing economy that contributes to increase the duration of the consumed household items is gradually regarded as an effective solution to the promotion and adaption of urban sustainable development. The thesis aims to support city planners in investigating the potential of the sharing strategies at the local level, the case study of Gothenburg city was investigated with respect to the determination of the promising sharing areas and the proposals of sharing initiatives.

The modifications of SEsam were used to illustrate the patterns of consumption and willingness of participating in the sharing economy for both the household archetypes and neighborhood areas in Gothenburg. The consumption patterns present that the clothes occupy the largest consumption in quantities, followed by the equipment and hobbies which is the second largest. The tools, vehicles, equipment and hobbies are the top three categories that people in Gothenburg show the most interest in participating in the sharing economy as both users and providers as observed in willingness patterns. Besides, similar geographical distributions are observed between the consumption and willingness patterns. Based on the consumption and willingness patterns, the results of clustering analysis suggest that the neighborhood type C composed of only five centrally positioned districts should be regarded as the promising sharing areas as it is characterized by overall highest consumption and willingness patterns compared with the other clusters.

Sharing initiative library coupled with the filter (the smart Map) was applied to assist in proposing the sharing initiatives in the districts of neighborhood type C. It reveals that all sharing categories should be considered, however, various priorities should be given, clothes sharing is of the most importance for instance. Nonetheless, it is suggested that the selection of the specific sharing initiatives of sharing sectors should be further evaluated under the local context.

Key words: Environmental impacts, Gothenburg City, Household consumption, Sharing economy, Willingness of participation



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## Notations

ACPHA	The average consumption patterns for household archetypes
AWPPHA	The average willingness patterns as providers for household archetype
AWPUHA	The average willingness patterns as users for household archetypes
TCP	The total consumption patterns for all neighborhood areas in Gothenburg city
TWPP	The total willingness patterns as providers when participating sharing initiatives for all neighborhood areas in Gothenburg city
TWPU	The total willingness patterns as users when participating sharing initiatives for all neighborhood areas in Gothenburg city
B2P	Business-to-Person
P2P	Peer-to-Peer
C <sub>i</sub>	The amounts of consumed products aggregated into seven categorizations by households within the same household archetype in the survey
MV <sub>c</sub> (TCP, TWPU, TWPP)	The mean values of indicators in the three character sets for all clusters
P <sub>i</sub>	the number of households that are willing to participate the sharing economy as provides within the same household archetype in the survey
ShareHA <sub>c</sub>	The share of defined household archetypes for all clusters
TCP <sub>c</sub> , TWPU <sub>c</sub> , TWPP <sub>c</sub>	TCP, TWPU, TWPP for all clusters
TotalHA <sub>c</sub>	The total number of defined household archetypes in the same cluster
U <sub>i</sub>	the number of households that are willing to participate the sharing economy as users within the same household archetype in the survey
n	The number of households within the same household archetype for neighborhood areas
n <sub>c</sub>	The number of households in the same cluster
n <sub>s</sub>	The number of households within the same household archetype in the survey

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# 1 Introduction

The chapter describes the background of the sharing economy, including its benefits, challenges, and the brief introduction of the case study Gothenburg city. The aim, assumptions, limitations of the presented study are also presented.

## 1.1 Background

Sharing economy is attracting more and more attention worldwide in the last decade. It is considered as a “mega-trend” since the sharing economy market is estimated to reach nearly \$335 billion by 2025 (PricewaterhouseCoopers, 2015). It is also expected as a new pathway to the sustainable form of consumption since it is shifting the way of people perceiving the value of goods or services and transforming consumption behavior from ownership to collaborative usage (Hamari et al., 2016; Martin et al., 2019; Milanova & Maas, 2017), which facilitates the transition to the circular economy. Especially the benefits brought by sharing economy to combat the climate change of local and community consumption are appealing to the consumers (Hamari et al., 2016). Besides, due to the fact that the shareable household goods account for almost a quarter of the household expenditure and a third of household wastes, sharing strategies increasing the duration of the consumed housed items are proposed as an effective solution to the promotion and adaption of sustainable consumption behavior (Demailly & Novel, 2014). It has been agreed that nearly 7% of household expenditure and about 20% of waste are anticipated to be saved under the optimal operation of sharing initiatives (Demailly & Novel, 2014). Furthermore, Arbeláez Vélez, (2019) argued that the rapid growth of populations especially in cities puts enormous pressure on urban sustainable development. As a result, concentrating in local sharing economy including the levels of cities (Sarkar et al., 2019), districts (Whetstone et al., 2020), community (Markendahl et al., 2018) and neighborhood (Akin et al., 2021) might have the potential to address this challenge.

Due to the popularity and the enormous potential benefits that sharing economy could bring, numerous sharing initiatives and actions have been implemented worldwide to strive for the sustainable future and a plethora of studies have been increasingly conducted to analyze the performances of the sharing actions contributing to the sustainable household consumption. However, It has been acknowledged that there is no common agreement on the definition on the concept of “sharing economy” and that confusion still exists extensively since it is a still-evolving concept attribute to the complex and diverse sharing characteristics of sharing initiatives, which leads to various “close cousin” of sharing economy such as second-hand economy, collaborative economy, peer-to-peer economy, gig economy and on-demand economy under multiple circumstances (Markendahl et al., 2018). The intricate relations between these terms make it difficult to draw the explicit conceptual and empirical boundaries of the sharing economy, which results in the ambiguous of the characteristics of sharing economy.

The implemented sharing strategies can be generally classified into business-to-people (B2P) and peer-to-peer (P2P) depending on their business settings (Wilhelms et al., 2017). Rather than the traditional B2P sharing business model that refers to the companies, municipalities provide their own assets to people, for instance, car pools

(Car2Go and DriveNow, Zipcar), bike pools (U-bike.se and EU-bike), clothes (Kladoteket and Lånegarderoben), the new types of peer-to-peer (P2P) sharing business setting, which means providers and users are connected in the sharing initiatives either directly or through the sharing intermediary platforms, receives more popular among the public as they can not only have access of household products but sharing their own items to others, which provides an alternative to shift towards the sustainable consumption (Wilhelms et al., 2017). Besides, it is assumed presumably that the P2P setting seems to play a more significant role in stimulating optimal usage of the underutilized household products than B2P where the provided products are likely to be updated regularly to attract the consumers.

Therefore, focusing on the P2P sharing in local areas might be an effective way to the urban sustainable development in the way of making the optimal usage of the underutilized household products.

## 1.2 Case study

The city of Gothenburg is located in the west coast of Sweden and it is the second largest cities in Sweden with more than 580 000 populations in 2020(Gontia et al., 2019; SCB, *Municipalities in Figures*, n.d.2021). The administrative demarcating of Gothenburg presents at 4 different levels currently(Statistics Gothenburg, 2020). The city is firstly divided into 4 urban areas including Northeast, Center, Southwest and Hisingen. They are then divided into 10 district committee areas (SDN), which are further made up of 30 intermediate areas (MO), 95 neighborhood areas (PRI) and 900 base areas(Statistics Gothenburg, 2020). The study centers on the neighborhood level to provide the information in a detailed and comprehensive manner.

The city of Gothenburg is a vibrant and innovative city that strongly commits to sustainability. Gothenburg is one of the European cities that is participating in the programme Urban Innovative actions which aims to find solutions in order to meet the challenges involving climate adaptation (Smart City Sweden, n.d. 2021). It is also a pioneer in reducing the environmental impact and creating an environmentally friendly living condition for everyone (The Environmental Administration of Gothenburg, 2018). Reducing climate impact, increasing resource management and promoting a healthier living environment are part of the the city's environmental quality goals and program (The Environmental Administration of Gothenburg, 2018).

The consumption-based carbon budgets in Figure 1.1 were presented to reach the global emission targets of 1.5°C and 2°C(The Environmental Administration of Gothenburg, 2018). The 1.5°C carbon budget means that the emissions need to be reduced to zero by 2030, 32% of the emissions shall be reduced per year.

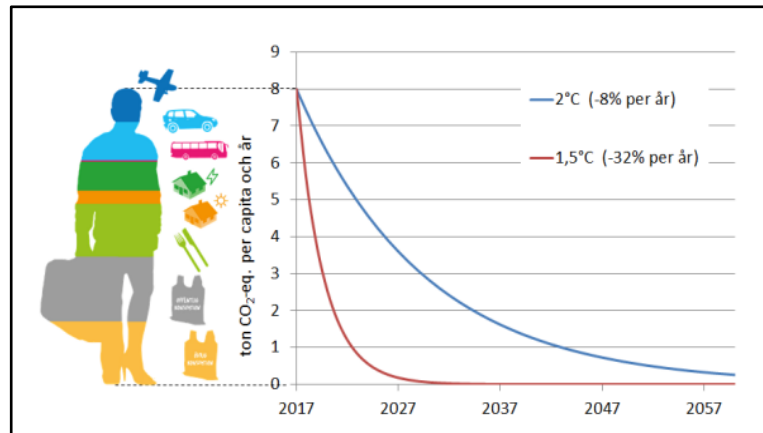


Figure 1.1 Emission budget for the 1.5- and 2-degree targets, respectively for the city of Gothenburg(The Environmental Administration of Gothenburg, 2018).

The city of Gothenburg is one of the world-leading test-beds for sharing economy cities and the environmental administration stated that the sharing economy should be actively supported and promoted to secure that sharing initiatives could gain more attention and have the markets, places and areas to be implemented (Smart City Sweden, n.d. 2021, The Environmental Administration of Gothenburg, 2018). Thus, large amounts of organizations and sharing initiatives have been implemented in the city. Collaborative Economy Gothenburg is a non-profit association that facilitates and promotes the collaborative economy in Gothenburg through a variety of means like lectures, activities, meetings and event to draw the public attention of the collaborative economy(Collaborative Economy Gothenburg, n.d. 2021). Another important sharing scheme in stimulating the sharing economy is the development of the website of Smart Map funded by the city of Gothenburg and the national programme Sharing Cities Sweden where more than 100 sharing initiatives encompassing various forms of sharing are collected are presented with the purpose of visualizing the sharing initiatives to the citizen across the Gothenburg city (Markendahl et al., 2018).

### 1.3 Aim

The aim of this thesis is to support planners in investigating the potential of the sharing strategies at the local level, the case study of Gothenburg city was performed. To fulfill the aim of the study, the following research questions need to be specified:

- Which districts are the promising sharing economy areas in Gothenburg city?
- What sharing initiatives can be implemented in the promising areas in Gothenburg city?

### 1.4 Assumptions

The promising sharing economy areas are characterized by the high levels of product consumptions and the willingness of public engagement.

To secure the successful implementation of the local sharing initiatives, the social-economic characteristics of households play a vital role. It is also noted that the consumption behavior is affected by the socio-economic characteristics (Arbeláez Vélez, 2019). Wier et al (2001) analyzed a large number of household archetypes that

are characterized by economic variables, demographic variables and sociocultural variables. Hence, analyzing the household consumption patterns in different household archetypes is useful to identify and prioritize the target products. This can be shared and provided quantitative information for decision-makers to design sharing schemes to reach the goals of sustainability (Whetstone et al., 2020). The high consumption levels might indicate that it is most likely that there are more under-utilized household products, hence, the appropriate implementation of sharing initiatives could stimulate optimal usage of the underutilized products. It has been pointed out the considering the consumption habits of sharable household products in local areas would play a significant role in designing the targeted sharing initiatives (Whetstone et al., 2020).

It is also assumed that the high levels of people's willingness of participation are more likely to secure the success of the sharing initiatives. It is noted that the providers and users are two distinct groups that should be particularly paid attention to in P2P sharing (Wilhelms et al., 2017). Hence, the willingness of participation considers both of the groups.

## **1.5 Limitations**

Only two aspects, the consumption patterns and the willingness of participation patterns were taken into consideration when determining the promising sharing economy areas in Gothenburg city. However, there might be other closely relevant characteristics such as household consumption inducing environmental impacts.

As already mentioned before, there is no common agreement on the definition of sharing economy, hence, it is vital to establish the boundary of sharing economy in this study, which, however, represents limited scope of the sharing economy. The sharing initiatives that are going to be investigated only centered on those that are related to the household consumption and can be applicable at the local level, which means that those initiatives that can be implemented broadly in the whole country are excluded in this study such as Airbnb. Since the sharing economy strategies are filtered by the specific criteria, the initiatives that are not under the defined criteria are not going to be investigated for example, the sharing strategies between businesses and companies, the sharing of intangible items like spaces, skills and knowledge. Food and house sharing are also not taken into account in this study even though they generate the highest environmental footprints(Ivanova et al., 2016). Detailed description about the scope of the sharing economy in this study can be seen in Section 3.1.



## 2 Methodology

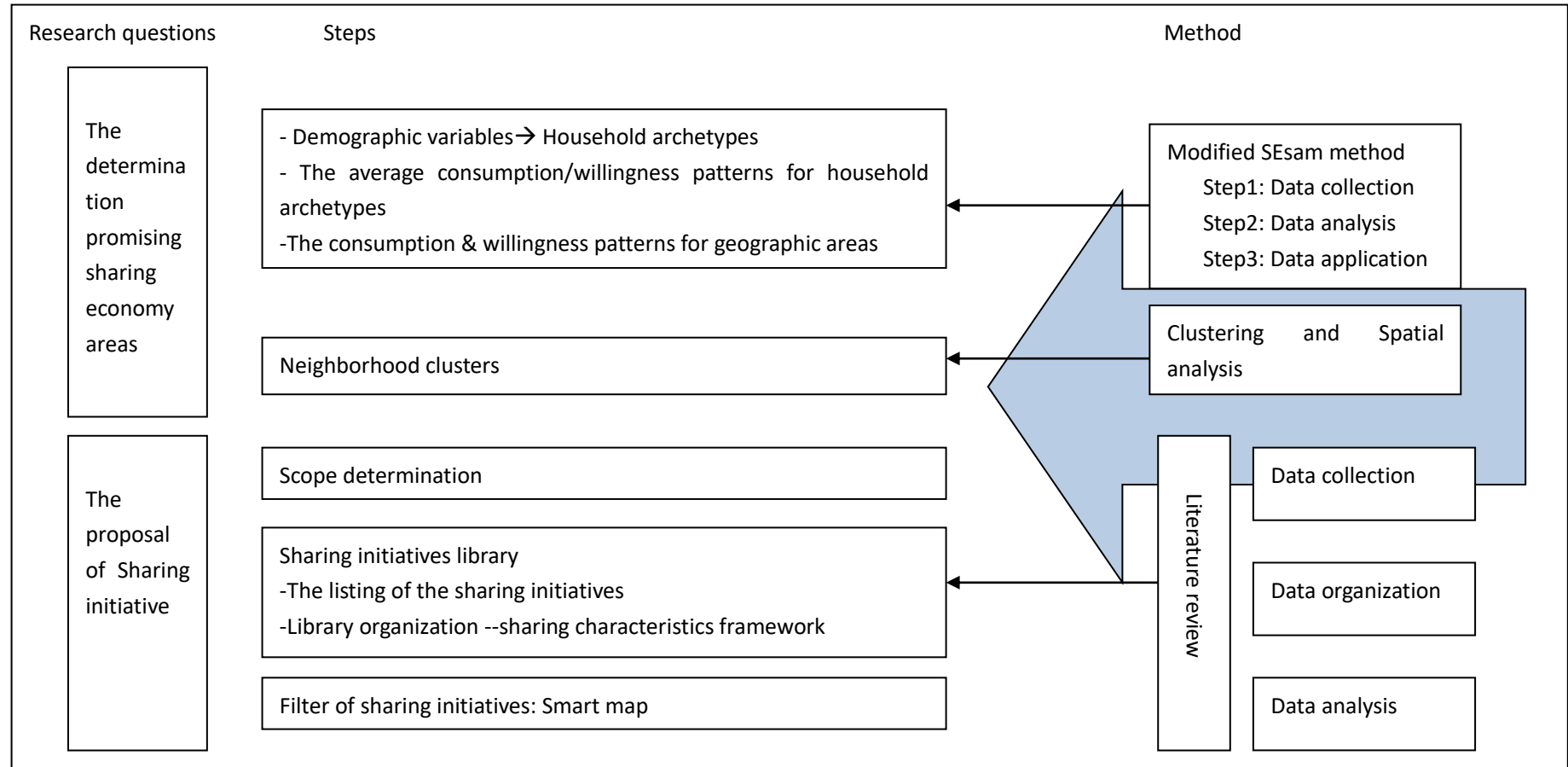


Figure 2.1 The diagram of the method.

This methods chapter provides step-by-step workflows to answer the proposed research questions. The modified SEsam methods together with the clustering analysis were applied to define the promising sharing economy areas in Gothenburg city and the integral consideration of Smart map and established the sharing initiatives library were used to help to the proposal of the appropriate sharing initiatives in the promising areas as visualized in Figure 2.1.

## **2.1 The modified SEsam method**

SEsam method is a systematic tool contributing to the sustainable implementation of sharing economy, which consists of several segments including transforming the household expenditure data into physical quantities; establishing the consumption patterns for different household archetypes; applying the consumption patterns of family archetypes to geographical areas and quantifying the environmental impacts (Whetstone et al., 2020). It is of worthy to note that the SEsam method applied in this report did not follow the whole procedures of the original SEsam when it was introduced by Whetstone et al (2020), several modifications have been made to determine the promising sharing economy areas in Gohenburg. Firstly, the amounts of the consumed products were considered as the units of the consumption patterns instead of the physical quantities where it was the unit that was provided by LCA data to estimate and quantify the environmental impacts of the products (Whetstone et al., 2020). Therefore, the units used in this method kept consistent with those used in the survey. Secondly, in addition to the consumption patterns that are considered in the SEsam method, this study also included the willingness of participation patterns to secure popularity of the proposed sharing initiatives. The willingness of participation patterns is characterized by the number of households that show interest in participating sharing sectors as users or providers in the neighborhood areas, which was described in the Section 2.1.3. The procedures of establishing the willingness patterns per household archetype and its application on the geographical areas in Gothenburg were the same as those of consumption patterns generally. Finally, the quantification of the environmental impacts of the proposed sharing initiatives were not included in this study.

### **2.1.1 Data collection**

The main data source was retrieved from the survey about the sharing economy in Gothenburg conducted in the February of 2021, which was provided directly. The information of the respondents was provided such as age, education level, dwelling type, employment, the number family members of households, income, the amounts of household items, a total 66 types, consumed last year, as well as the spatial data of all the households. It needs to be noticed that there are 6 major alternatives when answering the number of consumed household products, which are the exact number if they are less than 10, 10-20, 21-30, 31-40, 41-50, 51+. In addition, the responses of several voluntary questions related to sharing economy in the survey were also provided. The responses of two voluntary questions in the survey were used to present the

willingness of participation of the sharing economy in Gothenburg, which are “What goods would you like to have access to in the household via sharing initiatives?” and “What goods would you like to provide to others through sharing initiatives?”.

### 2.1.2 Data analysis

All the households participated in the survey are categorized in the household archetypes that were characterized by three social-demographic characteristics, the dwelling types, the level of income and whether having children, detailed descriptions of these three parameters and the creation of the household archetypes were provided by Whetstone et al (2020). Thus, a total of 12 household archetypes were determined.

The estimation of the average consumption patterns for all household archetypes defined as the mean value of quantities of each product type consumed by households within the same archetypes were conducted. First, the average values of consumed products were determined if the number of consumed products falls into the range designed in the survey when estimated the consumption pattern for a single household, for example, 15 was used if 10-20 items were bought by a family last year, thus, the consumption pattern of a single household can be determined. Then, the total amount of consumed products of household archetypes can be estimated by the sum of the consumption patterns of the households within the same household archetype. Finally, the consumption patterns for all the household archetypes can be estimated though dividing the total amount of consumed products of household archetypes by the number of the households in the corresponding household archetype, as shown in equation (2.1). Moreover, as mentioned already, a total of 66 types of products were examined in the survey, which was necessary to be aggregated into seven categorizations, which are cloths, furniture, appliances, tools, vehicles, equipment and hobbies, toys to ensure the comparable with the sectors of sharing economy in the Section 3.1, the aggregation of the products can be seen in Table A.22 in the Appendix.

$$ACPHA = \frac{Ci}{n_s} \quad (2.1)$$

*ACPHA*: the Average Consumption Patterns for Household Archetypes. Unit: the amounts of products per household archetype

*Ci*: the amounts of consumed products aggregated into seven categorizations by households within the same household archetype in the survey.

*n<sub>s</sub>*: the number of households within the same household archetype in the survey.

As already mentioned, the willingness of participation patterns of sharing initiatives was also estimated, considering both the user and providers. The products that were mentioned by the respondents were firstly fitted into eight product categorizations. The responses of products in those voluntary questions were transformed to numbers, which indicates the number of households that show interest to participate in each sector of sharing initiatives, namely sharing sectors, as users and providers respectively. This was followed by the estimation of the willingness patterns as users and providers for the household archetypes, defined as the ratio of households that are willing to provide or use household items of different sharing categories per household archetype, as shown

in equation (2.2).

$$AWPUHA \text{ or } AWPPHA = \frac{U_i \text{ or } P_i}{n_s} \quad (2.2)$$

*AWPUHA*: the Average Willingness Patterns as Users for Household Archetypes.

Unit: %

*AWPPHA*: the Average Willingness Patterns as Providers for Household Archetype.

Unit: %

*U<sub>i</sub>*: The number of households that are willing to participate the sharing economy as users within the same household archetype in the survey.

*P<sub>i</sub>*: The number of households that are willing to participate the sharing economy as provides within the same household archetype in the survey.

### 2.1.3 Data application

The *ACPHA*, *AWPUHA* and *AWPPHA* were then applied to estimate the total consumption and willingness patterns for the neighborhood areas in Gothenburg. The distribution of the numbers of household belonging to each household archetype in all the neighborhood area in Gothenburg was provided directly. The total consumption patterns of each neighborhood area in Gothenburg are defined as the amounts of consumed products by neighborhood areas, which can be estimated through multiplying *ACPHA* with the number of the households within the same household archetype in neighborhood areas of Gothenburg as illustrated in equation (2.3). (Whetstone et al., 2020).

$$TCP = ACEHA * n \quad (2.3)$$

*TCP*: The total consumption patterns for all neighborhood areas in Gothenburg city.

Unit: the amounts of products per neighborhood area

*n*: The number of households within the same household archetype for neighborhood areas.

Similarly, the willingness patterns as users or providers in neighborhood areas in Gothenburg, the number of households that are willing to engage in different sharing sectors in neighborhood areas, were also calculated, as specified in equation (2.4).

$$TWPU \text{ or } TWPP = AWPUHA \text{ or } AWPPHA * n \quad (2.4)$$

*TWPU*: The total willingness patterns as users when participating sharing initiatives.

Unit: the number of households

*TWPP*: The total willingness patterns as providers when participating sharing initiatives.

Unit: the number of households

To better visualize the geographical distribution of the *TCP*, *TWPU* and *TWPP* across Gothenburg, the spatial analysis was performed through applying Geographic Information System (GIS), the software applied in the study is ArcMap 10.7. The results of the *TCP*, *TWPU* and *TWPP* in excel file were then linked to the Gothenburg Map in

ArcMap. All datasets were determined to be categorized into 4 groups based on the absolute values respectively. The spatial distributions of the categories were presented directly.

## 2.2 Clustering analysis

Clustering analysis is a tool to classify a set of independent indicators into homogenous groups (Gontia et al., 2019). The application of clustering analysis can help to group all the neighborhood areas into several clusters based on the indicators of consumption and willingness participation patterns, which assists in determining the promising sharing economy areas ultimately.

The clustering of neighborhoods was based on three character sets, which are TCP, TWPU and TWPP, comprising a total of 23 indicators as presented in the Table A.20, A.19 and A.21 in Appendix, the descriptions of the character sets and the indicators were illustrated below.

1. The total consumption patterns (TCP) which refer to the amounts of consumed household products aggregated into seven categorizations, including clothes, furniture, appliances, tools, vehicles, equipment and hobbies and toys, for all neighborhood areas in Gothenburg.
2. The total willingness patterns as users (TWPU) which means the amounts of households that are willing to using household products through sharing initiatives grouped into the same sharing sectors listed in TCP respectively with the addition of books for all neighborhood areas in Gothenburg.
3. The total willingness patterns of providing (TWPP) which means the amounts of households that are willing to providing household products through sharing initiatives grouped into same as eight sharing sectors TWPU respectively for all neighborhood areas in Gothenburg.

Then K-mean clustering analysis in SPSS (the software: IBM SPSS Statistics 27.0) was conducted by the input of the calculated indicators where all the data were firstly normalized to avoid the impact of the extremely high values of indicators. The clustering analysis was performed based on the normalized indicators where the number of the clusters was firstly set, the partition of all the neighborhood areas were clusters by the iterative processes in SPSS.

The composition of the clusters can be obtained from the clustering analysis. Spatial analysis was then performed using GIS to visualize the spatial distributions of the clusters. All the neighborhood areas were grouped according to the cluster results which were achieved by giving the same name of the neighborhood clusters, A, B C and D for instance. After they linked the Gothenburg Map in the GIS, the geographical distribution of the clusters could be observed.

The mean values of all the indicators in each neighborhood area cluster group were then calculated applying equation (2.5). In addition to the indicators, the household archetypes of the clusters were also analyzed to capture the critical characteristics of each cluster, which means the share of the share of different household archetypes defined in the Section 2.1.2 for the clusters. It was estimated by firstly summing the

number of each household archetype of neighborhood areas partitioned into the same cluster, which was then divided by the total number of the households in that cluster, as shown in equation (2.6).

$$MV_c(TCP, TWPU, TWPP) = \frac{TCP_c, TWPU_c, TWPP_c}{n_c} \quad (2.5)$$

$MV_c(TCP, TWPU, TWPP)$ : The mean values of indicators in the three character sets for all clusters

$TCP_c, TWPU_c, TWPP_c$ :  $TCP, TWPU, TWPP$  for all clusters.

$n_c$ : The number of households in the same cluster.

$$ShareHA = \frac{TotalHA_c}{n_c} \quad (2.6)$$

$ShareHA$ : The share of defined household archetypes for all clusters.

$TotalHA_c$ : The total number of defined household archetypes in the same cluster.

## 2.3 Sharing initiative proposal

This Section illustrates the procedure of proposing the sharing initiatives that should be targeted in the promising sharing economy areas in Gothenburg city. As mentioned in the limitation of the study already, the sharing initiatives would only limit the scope of the study, the detailed descriptions of the sharing economy definition were presented in chapter 3.1. The sharing economy library would then be established aiming to provide a database of sharing initiatives to help to select the appropriate sharing initiatives that haven't been put into place yet. The smart Map is considered as the filter of sharing initiatives, which means the sharing initiatives were first examined in Smart Map, those sharing initiatives that have been implemented would be excluded.

### 2.3.1 Scope determination

The scope determination of the sharing economy is necessary since it limits the sharing initiatives to a specific area otherwise it is impossible to cope with the numerous implemented sharing activities and services globally. The present study centered on those sharing economy definitions contributing to the sustainable household consumption patterns. However, rather than exploring immense sharing economy definitions, this study only adopted and developed the definition proposed by (Frenken & Schor, 2017), which is *consumers granting each other temporary access to under-utilized physical assets ("idle capacity"), possibly for money*. The focus on this definition is that it is widely applied and suitable to analyze various sharing activities and services (Markendahl et al., 2018). Hence, it lays a fundamental role in defining the scope of the present study in a convenient manner. This paper was obtained through the check of reference list of the suggested literature by Markendahl et al (2018).

Under the general sharing economy definitions, eight sectors of sharing were then identified based on the categories of the sharable household items such as vehicles, books, tools etc. The detailed descriptions of all the sectors of sharing were then presented in the Section 3.1 following in the main sharing economy definition.

### **2.3.2 The collection of sharing initiatives**

Based on the sharing economy definition in Section 3.1, the fact sheets of sharing strategies were then created, as shown in Appendix, which is the listing of the identified sharing initiatives and services that have been implemented.

Concerning the data retrieval, the sharing solutions mentioned in literature were a major source. Some relevant literature and reports e.g. (Markendahl et al., 2018) were provided directly. The literature could also be retrieved through the search of the dataset of Chalmers library website with the key words identification like sharing initiatives, sharing strategies, sharing practices. Besides, the check of the references list of relevant literature was also a key approach to identify the sharing initiatives. Then the website of the sharing services could be checked to obtain the detailed descriptions in terms of sharing characteristics such as the sharable items, business setting, sharing platforms etc as shown in Section 3.2. Additionally, some reports of the sharing economy projects in local regions such as Hammarby Sjöstad and Karlstad in Sweden were also an essential source, the examples are the reports by (Delaney et al., 2019; Martin et al., 2019).

There were several considerations when creating the library of the sharing initiatives. First, the sharing initiatives must satisfy within the sharing economy definition. Secondly, the sharing solutions that were implemented in Sweden, at least in Europe, were preferable to be taken into account. This could increase the effectiveness of improvement of the sharing operations in Gothenburg in the case study Section due to the relatively similar contexts. Lastly, only the representative sharing practices in terms of sharing characteristics in Section 3.2 were described detailly, while other similar sharing strategies were just mentioned briefly to avoid repetition.

### **2.3.3 The organization of the sharing library**

After listing and descriptions of the determined sharing solutions separately, the organizations of them were critical since the key aspects of all the sharing initiatives could be highlighted in a clear and systematic manner. The sharing characteristics framework established in Section 3.2 were applied to organize the sharing initiative library since it was an effective tool to emphasize and compare the key aspects of the sharing initiative with respect to the sharable items, sharing modes, the sharing platforms, the relevant stakeholders etc.

Most of the literature in this Section was obtained through the check of the reference lists and the search on the Chalmers library website. A few pieces of literature such as (Delaney et al., 2019; Markendahl et al., 2018; Martin et al., 2019) were provided directly. The provided report by Markendahl et al (2018) shed the initial light on the sharing characteristics framework since it discussed the sharing initiatives and services from the sectors of sharing, the business settings, the sharing platforms and the relevant participants. Another suggested report by Delaney et al (2019) categorized the sharing initiatives based on the ownership of the sharing items. Behrend, (2020) compared the sharing modes like selling and renting in the sharing activities. The motivations of participation of the sharing activated are comprehensively investigated by. Accordingly,

a total of seven sharing characteristics were determined and described as shown in Section 3.2.

It is of worthy to note that two sharing characteristics were highlighted and used to classify the sharing initiatives respectively to give more specific and detailed description and organization of the sharing initiative library. One is the sharing platforms also named sharing intermediaries since almost all the sharing initiatives have their own sharing platforms that have similar operations and regulations, for instance, the logistic services, the transactions, the communication and the rating system etc. The other highlighted sharing characteristics is the sharable items, which are the cores of the sharing initiatives. It helps to understand the main shared products that the sharing initiatives center on, take the mobility sharing for example, both the Getaround and Compenda concentrate on P2P car sharing. The private cars are the main sharing assets in Getaround, while the Compenda focuses more on the sharing of RV, campervan and caravans. Besides, quite extensive household items were shared such as Peeyby and Hygglo, however, the forms of sharing varies within the same sharing initiatives, for instance, there are more products and alternatives of the tool sharing compared with cloth sharing.

#### **2.3.4 Filter: Smart Map**

The Smart Map was applied as a filter of sharing initiatives in sharing economy library to exclude the sharing initiatives that have been implemented already. The introduction of SmartMap (<https://www.smartakartan.se>) can be found in Section 1.2. The sharing initiatives implemented in the promising districts were firstly examined in Smart Map. This is achieved by initially defining the geographic scope of the promising areas in Google map, the sharing strategies that fall within the scope of the districts were collected. The way of organizing the collected sharing initiatives in SmatMap is the same as those in the sharing library as described in Section 2.2.3 with the addition column to check if those initiatives fall within the definition of the sharing economy, which means that those that do not satisfy the scope of the sharing economy would be excluded.

### **2.4 Limitations**

There are several limitations of the modified SEsam method applied in this study. The quality of the results of the survey depends heavily on the accuracy of the answers of the respondents participating in the survey. The consumption patterns of the household archetypes in the survey cannot represent the real situations since only a small portion of populations were accounted for in the survey, which might also affect the accuracy and the representativeness of the data. It is important to note that the critical assumption of SEsam method is that the products consumption patterns were estimated based on the approximation of the consumption patterns of identified household archetypes. As Whetstone et al (2020) illustrated that considering the consumption patterns of different household types would enable the targeted sharing initiatives to reduce the particular product consumption, hence, contributing to the environmental sustainability, which



means that the inequality between the households within the same household archetypes were neglected to a significant extent, hence, the mean masses of consumed products where the consumption based on are more representative in larger amount of families within the household archetypes then smaller ones. It is important to note that the overall income level and the masses of products consumed might be underestimated as they might be affected significantly by Covid-19. Additionally, the sharing initiatives that the respondents have mentioned in the survey are much broader than the scope of sharing economy defined in this study.

## 3 Background

This chapter provides the necessary and additional information to enhance the understanding of the report.

### 3.1 Sharing economy definition

*The definition of sharing economy in this report, generally adapted from the concept by (Frenken & Schor, 2017), is that consumers grant each other the temporary or permanent access of the under-utilized household items providing idle capacity at the local level.*

There are several terms that are of paramount importance to be explained.

- The setting of sharing activities is People-to-People (P2P), which indicates that it is the individuals that provide the products initially and use or consume the products in the end within the sharing activities. The P2P setting is a critical consideration of the study since it is substantially effective in stimulating the optimal usage of the under-utilized items, hence, improving the sustainable household consumption patterns (Martin et al., 2019).
- The sharing modes between individuals are inclusive to the large extent. The granting of access to the products temporarily (renting and borrowing) and permanently (selling and buying, donating, swapping) are both regarded as the means of sharing. The involvement of permanent access is due to the fact that it is also effective to contribute to achieve the full potential usage of the consumed household products, hence, reducing the resource use during production and the CO<sub>2</sub> emissions when being disposal.
- The notion of the underutilized household items is also key in the definition. The shareable products are only limited in the household domain. They must be firstly consumed or used by the householders or providers themselves. Then they provide the owners with idle capacity, allowing the owners to share with others (Frenken & Schor, 2017).
- According to the aim of this study, the sharing initiatives that have the potential to be implemented at the local level are mainly focused and analyzed, which is the main point of innovation in this study. It could provide the practical information for the local authorities and relevant stakeholders to design and implement the sharing activities. Furthermore, the CO<sub>2</sub> emissions inducing from long-distance vehicles can be avoided significantly as the sharing activities occur within the same or surrounding districts.

Additionally, it is essential to note that the sharing economy centers in consumption standpoint rather than production side, more specifically, the consumption is focused on household scale rather than companies or organizations, which indicates that these sharing initiatives most occur and implemented in residential area instead of industrial sites, this excludes the sharing of materials between companies such as industrial symbiosis. The following questions are proposed to better define the scope of the sharing economy solutions of this study.

**Are both the initial providers and the end-users the householders in the sharing**

### **initiatives?**

As mentioned above, one key characteristic of the sharing initiatives is that they connect the individuals eventually with respect to both providers and users. The interactions between individuals could be conducted either directly or through the digital or physical intermediaries. This phases out the single-side sharing mode which represents that the companies, organizations or even municipalities provide their own resources to the public since the providers are not households themselves. For instance, the renting service of car-pooling like Sun fleet, Car2Go, DriveNow, Zipcar; bike pools initiatives including Ubike.se, EU-bike offered by car companies or municipalities; even the stores designing and producing new cloths to rent them out one example called Klädoteket.

### **Do the existing household items provide the idle capacity?**

There are several characteristics identified as shareable goods in this study. The predominant one is that the motivation of owning the goods is to use or consume them by the owner themselves, which excludes other purposes of owning the products such as renting them out either for making profits or for free. Again, the sharing initiatives mentioned above are still beyond this criteria since the creation of the products not aim for owners to use the cars and bikes themselves but for lending them out, which indicates that the value of goods cannot appear until they are sold or lent.

The idle capacity of the consumed goods is presented when the owners do not utilize or consume the items all the time or do not want to use them anymore due to various reasons, providing the possibility for the owner to lend or sale them out make the optimal utilization of the goods (Frenken & Schor, 2017). Accordingly, those initiatives regarding the sharing of spaces, information, skills and knowledge are not involved. For example, people share their parking space with neighbors; the municipalities provide the underutilized urban land to the residents who are interested in farming; the sharing the skill of bicycle and electronics repairing. One exception is that the organizations provide their space for people to share their items with each other as the sharing of goods with idle capacity between householders are included in this mixed process. It is worth mentioning that a few examples do not fall under the scope of this study involving personal and single-used items involving food and hygiene products, make-ups and medicines that cannot be shared once being used. As a result, the typical household shareable goods such as books, clothes, toys, cars and bikes, tools, sport equipment and musical instruments are targeted in the study.

### **Is it possible that the sharing initiatives can be implemented locally?**

The local applicability is a key characteristic to this study even though it is challenging to evaluate since most sharing actions can either be performed extensively in countries or in the small districts scale. For instance, the business of the car renting services sun fleet covers the whole Sweden, however, it can also be regarded as a local strategy as it is required that the cars should be picked and returned in the same carpool. Another similar example is Fritidsbanken that is a Sweden-wide organization to rent out a variety of sport equipment to the public, one of the branches that is located in the small town of in districts can also reduce the household consumption and expenditure of the sport equipment in that specific area. The parameter of the term “local” is characterized as whether the transaction of sharing occur within the same or surrounding districts, for example, it can be considered as a local activity if the online transaction is made

between two people within the same district, otherwise, the transactions with the providers and uses are not located in the same district are not counted in this study. It needs to be supplemented that the sharing activities might also occur between the households in different districts for the sake of convenience if they are held at the boundary of the districts. Ride-sharing such as BlaBlaCar and hitchhiking is mostly suitable to the distance from one city to another, making it challenging to be put in local scale as the public vehicles and taxi services. It is important to mention that apartment sharing is excluded in this report since it is rare that people share their rooms with their neighbors.

In accordance with the general sharing economy definition, the definitions in terms of the form of sharing were then proposed.

According to the definition and the criteria framework of sharing economy, the sectors of sharing in terms of shareable household products are defined and presented in Table 3.1.

*Table 3.1 The definitions of sharing sectors.*

The sectors of sharing	Description
Vehicles	Refers to the access of vehicles like cars, bicycles, boats from private persons in the neighborhood area ideally; can interact directly or through the intermediaries like online peer-to-peer car rental platform; preferably in the sharing mode of lending-borrowing
Books	Refers to the access of books from private persons in the neighborhood area; can interact directly or through the intermediaries like online markets, local second-hand bookstores or markets where people can sale and purchase the second-hand books, but preferably in the sharing mode of lending-borrowing, swapping and donating
Toys	Refers to the access of toys from private persons in the neighborhood area; can interact directly or through the intermediaries like online markets, local second-hand stores or markets where people can sale and purchase the second-hand toys, but preferably in the sharing mode of lending-borrowing, swapping and donating
Tools	Refers to the access of tools from private persons in the neighborhood area; can interact directly or through the intermediaries like online markets, local second-hand stores or markets where people can sale and purchase the second-hand tools, but preferably in the sharing mode of lending-borrowing, swapping and donating
Clothes	Refers to the access of cloths from private persons in the neighborhood area; can interact directly or through the intermediaries like online markets, local second-hand stores or markets where people can sale and purchase the second-hand

	cloths, but preferably in the sharing mode of lending-borrowing, swapping and donating
Equipment and hobbies (sport, musical, electronic)	Refers to the access of equipment from private persons in the neighborhood area; can interact directly or through the intermediaries like online markets, local second-hand stores or markets where people can sale and purchase the second-hand equipment, but preferably in the sharing mode of lending-borrowing and donating
Furniture	Refers to the access of furniture from private persons in the neighborhood area; can interact directly or through the intermediaries like online markets, local second-hand stores where people can sale and purchase the second-hand furniture, but preferably in the sharing mode of lending-borrowing and donating
Appliances	Refers to the access of household appliances from private persons in the neighborhood area; can interact directly or through the intermediaries like online markets, local second-hand stores people can sale and purchase the second-hand appliances, but preferably in the sharing mode of lending-borrowing and donating

## 3.2 The sharing characteristics framework

The classification of the sharing economy varies significantly and has not been established maturely so far. The sharing activities are organized through summarizing the various aspects of the sharing economy also known as sharing characteristics framework, as presented in Figure 3.1.

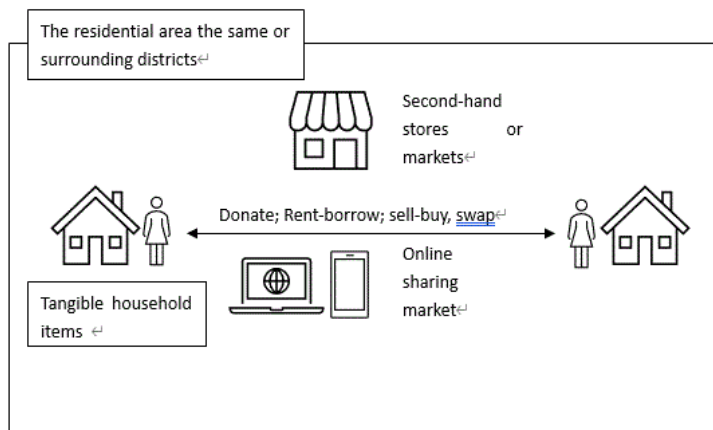


Figure 3.1 The visualization of the sharing characteristics.

### Sharable items

There are a large range of goods and services that can be shared, including tangible goods like cars (Böcker & Meelen, 2017; Martin et al., 2019; Wilhelms et al., 2017), bikes (Mao et al., 2021; Martin et al., 2019), tools (Böcker & Meelen, 2017; Martin et al., 2019), clothes (Zamani et al., 2017), toys (Ozanne & Ballantine, 2010), which are considered as household products. Several studies include the sharing of intangible items like public and private spaces such as apartment sharing (Böcker & Meelen, 2017), ride sharing (Böcker & Meelen, 2017) and car parking space sharing, even the sharing of skills like equipment repairing and experiences an example is the repair café that provides people to repair the broken products or share their language skills (Markendahl et al., 2018).

### Sharing modes

These items could be shared in various modes involving selling and purchasing as well as donating and swapping with the permanent change of ownership, lending and borrowing in which the owner grant the temporary use to the users without changing the ownership (Hamari et al., 2016).

### Relevant participants

The interaction between providers, organizers and users of sharing activities could occur between different participants like private individuals, companies, municipalities and organizations from all sectors of the society.

### Sharing Platforms

Sharing platform is one of the critical components in the sharing economy as they could exert various roles including offering places for the availability of the shareable

products, the transaction of the sharing economy.

#### Online markets

Online sharing marketplaces are widespread, which results in increasingly concern by researchers (Babel et al., 2019; Geissinger et al., 2020; Gordo López et al., 2020; Martin et al., 2019; Zamani et al., 2017). Internet-based sharing platforms have begun to emerge recently with a rapid growth rate since it provides the convenient and efficient services for people to share their household items that they do not use often, thus, it is considered as an approach to promote the sustainable consumption patterns (Böcker & Meelen, 2017; Martin et al, 2019). It is projected that the online resale with the annual growth rate of 39% from \$7 - \$36 billion would exceed the traditional thrift from \$21-28 billion with the growth rate of only 6% in the years of 2019 to 2024 (*ThredUP*, n.d. 2021). According to the criteria established above, only those online sharing platforms that fulfill the criteria are aimed to be included in the library. The sharing online markets should be P2P which indicates that they should connect the people directly, rather than providing the own assets on their website, which means that the products that are available on the website either for lending or sale should originate from people through a variety of means such as donating or posting the advertisement of the shareable products by people themselves. To explore the local adaptability of the online sharing platforms, it is favorable that they provide high possibility for the providers and users to meet with each other to preferably rent and borrow items. The access of the information about items for renting including the condition of the items, the renting price and allowed loan period is fundamental. In addition, the rough location of the provider and the distance between the borrowers are also essential to facilitate the sharing activity locally. The responsibility of securing the authenticity and the legality of the advertisement, the updating of the information on the website, the safe payment, the management of agreement and policies etc could not only improve the reliability of the platform but the degree of satisfaction of both parties.

#### Second-hand stores

Additionally, there are also studies analyzing physical intermediate platforms such as second-hand stores which are the traditional ways of sharing (Ozanne & Ballantine, 2010; Zamani et al., 2017). The second-hand stores refer to the stores that receive the donation of people, then sell or rent the second-hand items out. The physical stores are always in specific locations which connect the stakeholders in the local area. The key parameter of second-hand stores is the source of the products that should be from the public directly, but the concern exists about the indirect way from people which means that there is a third party between stores and people, for example, the store like “Återbruket” receives its products from recycling center where people donate and classify their products. The separation between the collecting and processing location and the shops might lead to the vehiclesation crossing different districts if the distances between those places are too far. This is, however, challenging for the organizers of the stores since the stores are only the places which offer the sharing services, the treatment and maintenance of the products are necessary and should be independent from the stores.

#### Multifunctional shared places

Multifunctional shared places refer to the exploration of the sharing potential of the



existing shops or markets, which indicates that including the sharing activities in addition to the main services of the places. Even though it does not prevail currently, the inspiration of the combination of the sharing initiatives with other activities or services like coffee service or cultural events might have a constructive impact in encouraging the participation of sharing events and improving the public environmental awareness. However, it usually couples with the sale of the new items since the sharing is just one of the activities served in those places.

### **3.3 Willingness of participation**

It is attempted to be analyzed with the purpose of bringing inspiration and guidance for local authorities and companies in designing and implementing the sharing activities in terms of encouraging the public to engage in the sharing activities. It has been revealed that the deep understanding of the participation of the sharing economy is lacking extremely although the sharing economy draws increasing interest by the whole society (Böcker & Meelen, 2017). One of the reasons is presumably that the willingness of public participation is extremely complex as it differs significantly in different sharing activities since they are affected by multitudes of factors.

The factors that might influence the engagement of sharing activities were firstly identified such as targeting appropriate sharing items, the social demographic groups of the participants and the motivations etc, which were followed by some case studies regarding how these factors are affecting the involvement and the popularity of sharing activities.

First, it is critical to implement the appropriate sharing initiatives in terms of the sharing assets that suit the demand of the people to achieve the optimization of the sharing activities and to reduce the consumption of new items. Different assets possess various values in terms of economic, social, practical and aesthetic, thus, it is apparent that the willingness of involvement in diverse sectors of sharing might not be uniform (Böcker & Meelen, 2017). For example, participating car sharing activities could bring substantial financial benefits for the users while the car sharers could also earn amounts of money to compensate the cost of the ownership potentially, which might drive people to share or rent cars (Böcker & Meelen, 2017). However, sharing tools or toys in the local area might be more convenient than car sharing. Accordingly, it can be assumed that the willingness of participation is related to the sharing of assets that possess various values. However, it was reported that understanding the consumption pattern of the different districts could potentially help to identify the most commonly consumed goods that can be shared, which can be useful in designing the sharing activities in specific areas (Whetstone et al., 2020).

Furthermore, it can facilitate the implementation and success of the sharing activities when considering the social-demographic characteristics of the people in the districts. People belonging to different social-demographic groups including age, gender, household type, education level etc are more likely to show various interest in participating in the diverse sharing activities due to the various budgets and consumption preferences. The sharing activities that are designed for a specific audience are more likely to increase the engagement. For instance, the toy sharing activities are

more popular in the districts where most households dwell in. While for the towns that contain most people that are middle-aged and with high income, the car sharing might be the popular one.

Apart from the social-demographic Multitudes of studies have investigated the motivations driving participation (Böcker & Meelen, 2017). It has been pointed out that the distinguishment of motivations into triple-P (profit, people and planet) is considered as a sustainable framework to analyze the motivations of joining in the sharing economy (Böcker & Meelen, 2017). And all these three dimensions of motivation could stimulate the involvement of the sharing economy (Böcker & Meelen, 2017; Hamari et al., 2016). Economy implications refer to the saving or earning money when people participate the sharing services, specifically, the products offered in sharing services are more affordable than other alternatives for consumers while the providers could earn extra disposable income or reduce the cost ownership when sharing their underutilized items with others (Pick & Schreiner, 2020). It is reported that the financial benefit is a main driver to stimulate participation (Milanova & Maas, 2017). Social benefits refer to people gaining the sense of community when interacting with other participants, which could also facilitate the engagement of sharing activities (Böcker & Meelen, 2017; Milanova & Maas, 2017). Motivations in environmental dimensions are the anticipation to contribute to the environmental sustainability such as reducing the production and consumption of new items through the sharing behaviors (Pick & Schreiner 2020). However, the effects of environmental motivations on stimulating the public participation still remain equivocal as the reports generated diverse even opposite conclusions under different contexts (Pick & Schreiner 2020).

It has been also evidenced that the motivations in involving the sharing activities are closely related to the social-demographic groups. The specific relationships are presented below.

**Age:** It is indicated that the younger people show a significantly higher interest in sharing household goods than elders (Hellwig et al., 2015). It is expected that economic incentive plays a higher role for young people to engage in sharing activities than those who are older (Böcker & Meelen, 2017). This is because young customers tend to have less money, thus, they would engage in the sharing initiatives where the shared assets are less costly than the ownership in the meanwhile provide the nearly same level of service (Pick & Schreiner 2020). It is estimated that people who provide their cars in the P2P sharing platform tend to be older and earn a relative high income since it might be difficult for younger people to afford cars. However, it is also important to note that the elder people are more willing to participate in the local sharing activities as they attach more importance in socializing with their neighbors (Cornwell et al., 2008).

**Gender:** It is evidenced that women are more active than men in term of the willingness to share and the sharing frequency and that women and are more motivated for the environmental purpose, which is in line with the study of Hellwig et al (2015) who perceive that woman are more likely to be intrinsically motivated and overestimate the benefits of the sharing economy (Böcker & Meelen, 2017; Hellwig et al., 2015).

**Education:** Environmental benefits are more concerned among highly educated groups than low or middle educated people (Böcker & Meelen, 2017).

**Income:** Similar to age, people with high income are less economically motivated than those who earn low or middle income but are more social and environmental driven.

**With or without children:** The families with children are expected to be more likely to be involved in the toy sharing compared with those who are single.

As can be seen from the relationships, implementing the sharing economy that could bring specific benefits could have a significant role in motivating the most people in the local area. The local authorities should consider the utilitarian aspects of the sharing economy, cost savings before implementing the car sharing if there are more young people living in that area. The environmental benefits should be stressed, such as how much CO<sub>2</sub> can be saved and increasing the efficiency use of the products, to those areas where women are dominant.

The examples of how these factors influence the sharing economy participation are presented in terms of the form of sharing, however, it is important to note that these case studies do not necessarily match the sharing strategies defined in the library as they provide the inspirations and managerial considerations for reference purpose.

### **Vehicle sharing**

It is projected that 50% of the car owners today will consider sharing their vehicles in the future and that customer numbers are rising rapidly in recent years (Horstkötter et al., 2014). Besides, it is also pointed out that mobility sharing is considered as one of the sharing economy sectors that could generate substantial amounts of revenue (Horstkötter et al., 2014). Thus, mobility sharing has the highest potential of growth and interest in the future (Horstkötter et al., 2014)

The participation of P2P car rental sharing platform involving the Getaround was investigated through applying a qualitative, interview-based approach (Wilhelms et al., 2017). The interview was conducted with 20 car owners and 21 renters who have the average 2 years' experience of P2P car sharing in German. For the car owners, they rent out their cars around every other week, for 1 or 2 days, while the car renters participate only once a month, for 1 or 2 days mostly. The motivations of both parties were also analyzed. Economy consideration is still a prominent concern for both providers and renters, but the social interactions and joy of experiencing the process of car rental also attract public participation (Wilhelms et al., 2017).

Through conducting an online survey with 1330 respondents in Amsterdam, Böcker & Meelen (2017) argued that car sharing is one of the most accessible sharing for the residents in Amsterdam, Getaround is one of the popular P2P car rental platforms. The results indicated that only a quarter of the respondents are willing to share their cars on the sharing platforms but two fifths of people prefer renting the cars, which indicates that more people are willing to rent cars rather than sharing cars through the P2P car rental sharing platforms (Böcker & Meelen, 2017). The unbalance between sharers and renters is in line with the findings presented by Wilhelms et al (2017) that the lack of the participation of asset owners is the main reason for the lower participation rate of sharing economy than projection (Wilhelms et al., 2017). The car sharing is highly economically driven for users, while providers also prioritize the environmental benefits (Böcker & Meelen, 2017).

The loyalty intention of customers participating in the sharing sectors (accommodation, car, bike, garment and food) was investigated by Pick & Schreiner (2020). A survey with 961 respondents who had experienced the sharing services in the last year was conducted in German in 2017. Approximately 30% of the respondents have participated in the car sharing that partly includes the P2P setting. Among car sharing participants, the average age is 33.5 where 35% middle-aged people (26-35) are involved, which is the highest proportion. Car sharing is more popular among men and high-income people who earn more than 2000 Euros monthly as they account for 60% and nearly 63% respectively. The percentile of respondents participating in car sharing from small cities with the population less than 50,000 and big cities where 250,000 people dwell in are quite similar (34%). The social and economic benefits of car sharing have the same impacts on loyalty intention.

### **Toy sharing**

An online survey of the 83 toy libraries was conducted with 397 respondents who are all the members of toy library in New Zealand (Ozanne & Ballantine, 2010). The social-demographic characteristics of the respondents were also analyzed. The results indicated that 90% were female and fell in the range of 25-39 years old. The toy library sharing was most popular among the households with the income between \$40,000-\$79,999 as 35% of them were willing to participate, followed by the higher income families (\$80,000-\$119,999 and more than \$120,000) with the participation rate of 29% and 28% respectively, the least active groups were the households with the income of less than \$4000. It is not surprising that 59% participants are families with children where households with two children were more active (51%), followed by one child (32%) and the three children were the last with 11%. It also concluded that the social implications were the dominant motivations in toy library.

### **Tool sharing**

In the same survey in Amsterdam, it is proved that more than 60% of the providers and users are willing to join in tool sharing in Peerby, particularly the power drill (Böcker & Meelen, 2017). It is also evidenced that most borrowers take part in this form of sharing activity for the benefits of economic and environmental, while environmental purpose is the most significant driver for people to share their tools rather than for the financial benefits (Böcker & Meelen, 2017).

### **Cloth sharing**

On the website of Thredup that is a P2P resale second-hand online market in US, it indicated that there is a growing trend of the willingness of purchasing second-hand garments as only 45% of women are open to used apparel in 2016, increasing significantly to 70% in 2019 (ThredUP, n.d. 2021). Nonetheless, 88% of them would consider second-hand shopping when the budgets get tight, which implies that the economic benefits are still the main motivator.

In the survey in German in the year of 2017, 148 respondents stated they had participated in garment sharing like Vinted which is the online market of second-hand fashion (Pick & Schreiner 2020). The social-demographic characteristics of participants were also investigated. The mean age of people involved in the garment sharing is 30.2

which consists of 70% of the young people between 18-35 years old, which indicates that it is the younger people who show more interest in garment sharing. It is apparent that women dominate this form of sharing compared with men (88% VS 12%). High-income groups with more than 2500 Euros per month are more active in garment sharing (35%), followed by the low-income groups (less than 1000 Euros per month) (20%). The garment sharing is more popular in small cities with less than 50,000 people as 50% of the garment sharing participants are from small cities. Moreover, the economic benefits are the most influential driver to encourage the engagement of garment sharing.

### Summary

Table 3.2 Summary of participation of SE in different locations.

The form of sharing	Platform	City/Country	Respondent	Participation ratio		Source
				provider [%]	renter [%]	
Vehicles		Amsterdam	1330	25	38	Böcker & Meelen, 2017
	Getaround/Turo	Gothenburg	612	61		Market research 2017
		Germany	916	42		Pick & Schreiner, 2020
Books		Gothenburg	612	47		Market research 2017
		Gothenburg	612	19		Market research 2017
Toys	Toy library	New Zealand	397	100		Ozanne & Ballantine, 2010
Tools		Amsterdam	1330	63	61	Böcker & Meelen, 2017
	Peerby	Gothenburg	612	46		Market research 2017
Clothes		Germany	916	16		Pick & Schreiner, 2020
		Gothenburg	612	15		Market research 2017

As shown in Table 3.2, substantial variations are exhibited in terms of participation in sharing initiatives in different regions around the world. Besides, different methods and that studies applied also make it challenging to compare between the sharing sectors. Moreover, there are few studies focusing on the participation of the sharing of equipment, furniture and appliances so far.

Table 3.3 The participation of people belonging to social demographics in sharing economy activities.

Social demographics		Vehicles	Books	Toys	Tools	Clothes	Equipment, Furniture, Appliance
Age	Young	28%				41%	
	Middle-aged	54%		90%		47%	
	Elder	18%				12%	
Gender	Female	40%		96%		88%	
	Male	60%		4%		12%	
Education	High						
Income	Low	18%		8%		20%	
	Middle	28%		64%		28%	
	High	54%		28%		52%	
Household type	Single						
	Couple						
	With kids			95%			
Sources		Pick & Schreiner, 2020		Ozanne & Ballantine, 2010		Pick & Schreiner, 2020	

The relations between the sharing sectors and the socio demographics are presented in Table 3.3. It can be noted that middle-aged men earning high income tend to participate in Vehicle sharing. While it is the middle-aged female, earning middle level of income and having kids that express more passion in involving in the toys sharing. Clothes sharing tends to be more popular among middle-aged women having a high level of income. However, the findings of relations between the sharing sectors and socio-demographics are extremely limited due to few studies analyzing this topic. The various classification standards of characteristics especially the income level and age make it more challenging. Moreover, few studies were found focusing on the sharing of furniture, appliances, books. This might be due to the fact that the scientific interests on the specific form of sharing are affected on the numbers of the sharing initiative being implemented, concretely, the P2P sharing of furniture, appliance have not drawn much public attention compared with mobility sharing.

## 4 Results

The results chapter presents the key findings of the report aiming to answer the proposed research questions. The first three sections respond to the first research question while the rest three sections are for the second.

### 4.1 The average consumption and willingness patterns for household archetypes

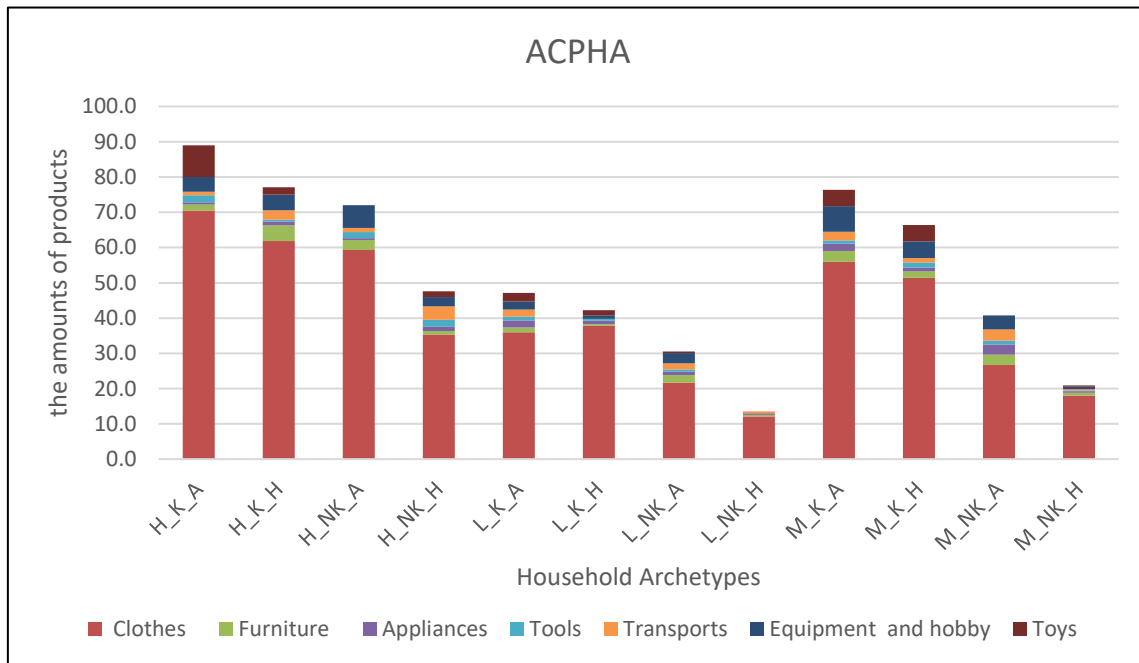


Figure 4.1 The average consumption patterns for household archetypes.

Figure 4.1 presents the different products consumption patterns for 12 household archetypes where the clothes share the largest consumption among all household archetypes, far more than other types of products, which is then followed by the equipment and hobbies. However, the consumption patterns for different household archetypes exhibit significant differences. In general, the families that earn high income consume more amounts of products than those who earn a middle income, while the low-income families consume the least products if the other two characteristics remain the same. Besides, for the families dwelling in the same house type and gaining the same level of income, those who have children tend to consume more products especially the cloths and toys than those who do not have children. More amounts of items particularly clothes, tools and equipment are consumed by the household dwelling in apartments than in houses.

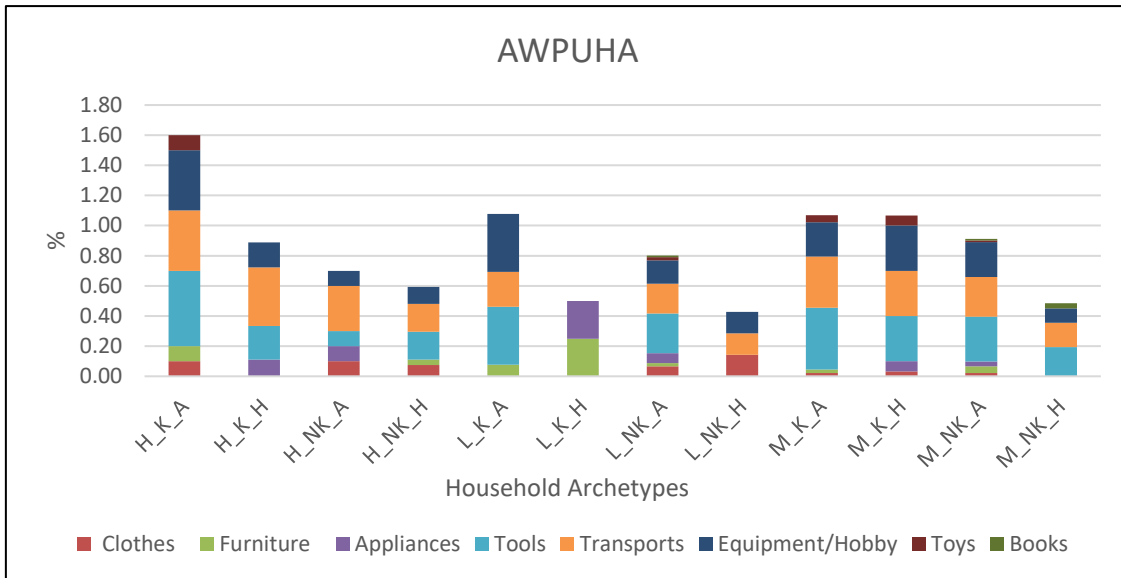


Figure 4.2 The average willingness patterns as users for household archetypes.

As can be seen from the Figure 4.2 that public engagement in different sectors of sharing initiatives varies significantly, concretely, it is the tools, vehicles and equipment/hobbies that people show the most interest to use or consume through sharing initiatives while the sharing sectors like clothes, furniture, appliances, toys and books are less popular. Besides, the household archetypes also exhibit various participating patterns remarkably. Households categorized in H\_K\_A are most likely to have access to products in sharing initiatives, which are followed by the L\_K\_A, M\_K\_A and M\_K\_H that present the similar interest generally. Additionally, it is also observed that households having kids and dwelling in apartments are more willing to act as users in the sharing economy compared with those without kids and living in houses if they earn the same level of income.

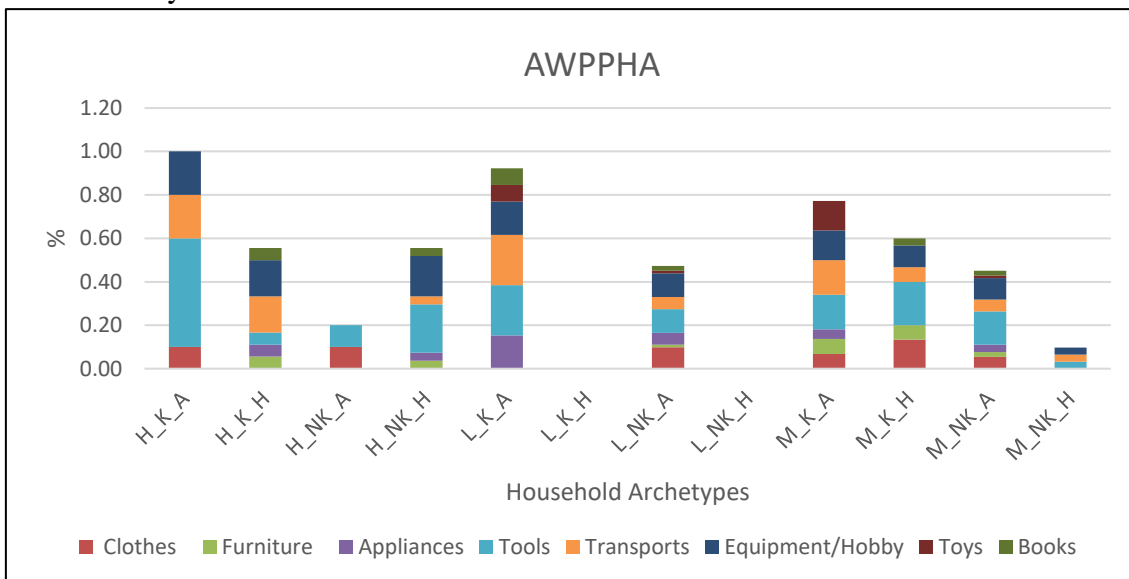


Figure 4.3 The average willingness patterns as users for household archetypes.



As can be seen from the Figure 4.3 that public engagement in different sectors of sharing initiatives varies significantly, concretely, it is the tools that people show the most interest to use or consume through sharing initiatives, nonetheless, people are still willing to share their vehicles and equipment/hobbies with other through sharing initiatives. These are far more popular than the other sharing sectors like clothes, furniture, appliances, toys and books are less popular. Besides, the household archetypes also exhibit various participating patterns remarkably. Households categorized in H\_K\_A are most likely to have access to products in sharing initiatives, which are followed by the L\_K\_A, M\_K\_A and M\_K\_H that present the similar interest generally. It is also observed that households having kids and dwelling in apartments are more willing to act as users in the sharing economy compared with those without kids and living in houses with the same level of income.

It should be noted that Table A.16., A.17 and A.18 in Appendix present the results of ACPHA, AWPUHA and AWPPHA in numbers respectively.

## 4.2 The total consumption and willingness patterns for neighborhood areas

Figure 4.4, 4.5 and 4.6 illustrate the spatial distribution of the TCP, TWPU and TWPP for neighborhood areas in Gothenburg respectively. The absolute values of TCP, TWPU and TWPP can be observed in Table A.19, A.20 and A.21. In general, the quantities of all product categories in consumption patterns are significantly higher than those in willingness patterns, the largest variations are observed in clothes where the amounts of clothes consumed are more than hundreds of times as many as those are shared or used through sharing activities. Besides, the number of households that provide their products of all categories in sharing initiatives lags those that have access to the items in Gothenburg. Geographically, the similar distributions can be witnessed between the consumption and willingness patterns, which is named typical distribution. The central areas represent both the highest level of product consumption and the willingness of participation while the outskirts regions register the lowest. In contrast, the areas represented by the highest levels share the least of the total areas of Gothenburg whereas the lowest level regions cover the most areas of the city. The intermediary areas present moderate levels of consumption and willingness patterns to a different extent.

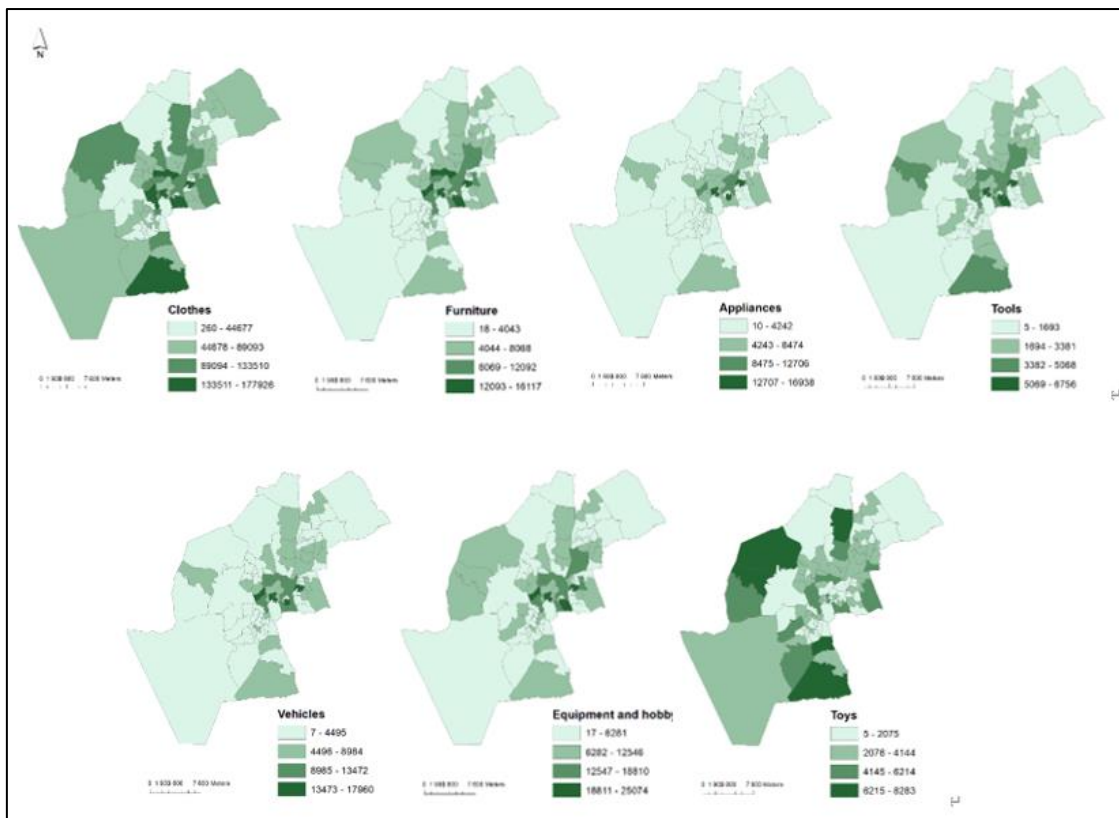


Figure 4.4 Spatial distribution of TCP. Units: the number of products.

Figure 4.4 illustrates the spatial distributions of the categories of the product consumptions. It can be seen that the clothes occupy the largest consumption in quantities, followed by the equipment and hobbies which is the second largest. The vehicles, furniture and appliances produce similar consumption levels. The households in Gothenburg purchased the lowest amounts of toys and tools last year. In addition to the quantities of product consumption, the geographical distributions of TCP are also displayed in Figure 4.4. The distributions of consumption of furniture, appliances, tools, vehicles, equipment and hobbies follow the general patterns as described previously. However, the distinct spatial distribution patterns of clothes and toys consumptions are presented. Especially, the largest areas witness the intermediate level of consumption of clothes and toys. Moreover, the toys are consumed mostly in the outskirts.

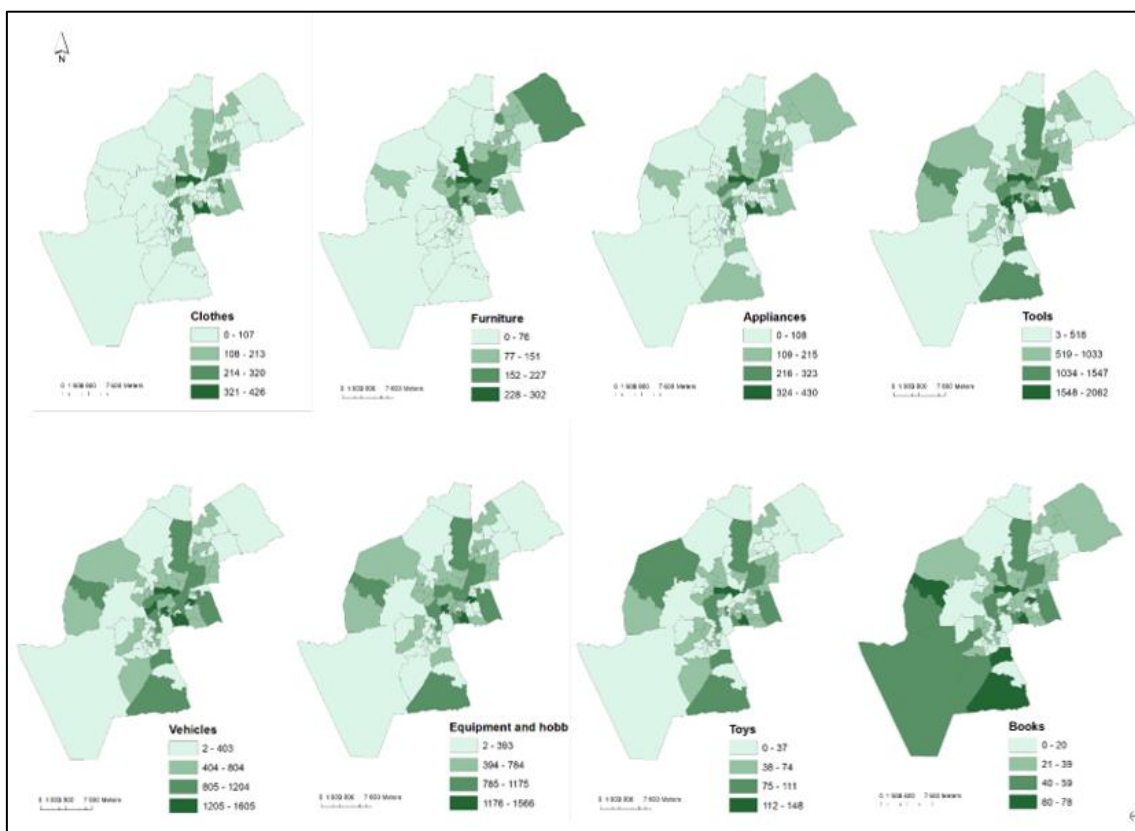


Figure 4.5 Spatial distribution of TWPU. Units: the number of households.

Figure 4.5 presents the spatial distribution of the TWPU. The tools, vehicles, equipment and hobbies are the top three categories that people particularly positioned in central regions of Gothenburg show the most interest in having access to via the sharing economy. Surprisingly, quite extensive areas across the city where people dwell in share the high willingness of participation level despite books receiving the least popularity, which means people express the least interest in obtaining books through sharing initiatives compared with other products.

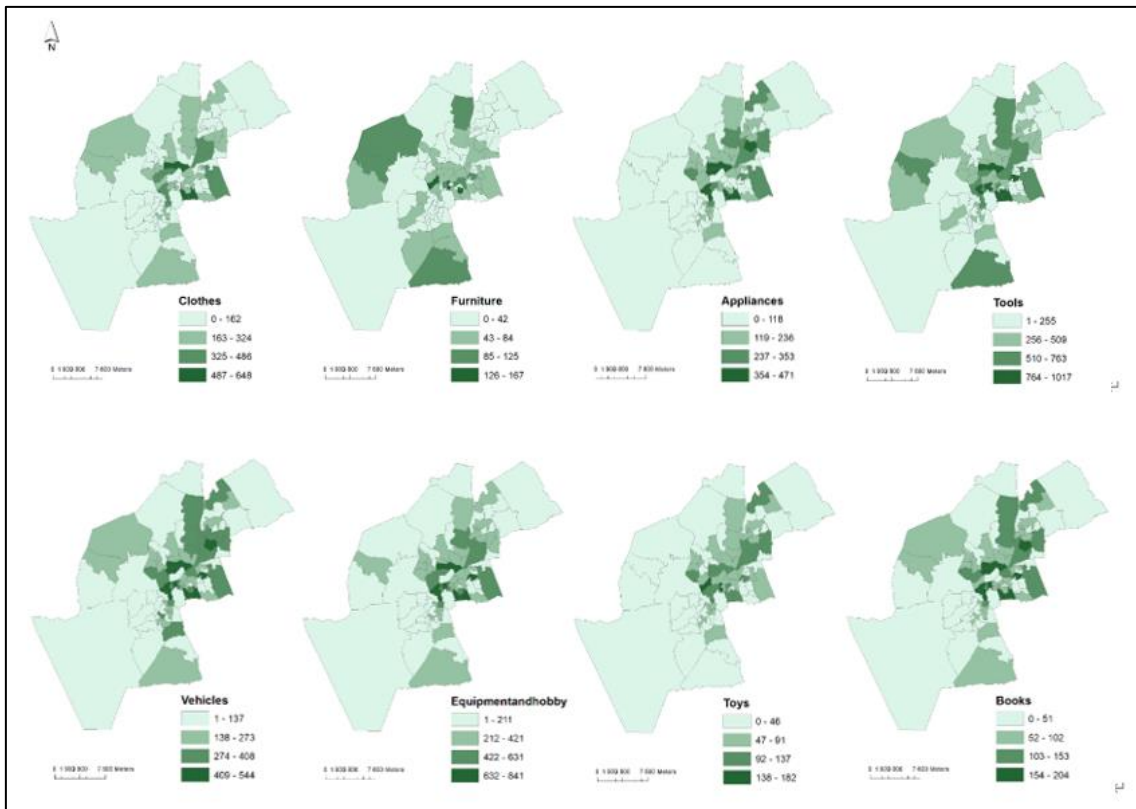


Figure 4.6 Spatial distribution of TWPP. Units: the number of households.

Spatial distributions of TWPP are exhibited in Figure 4.6. As mentioned already, the willingness of providing products in the sharing economy falls behind that of using products overall. The typical distributions are followed by all product categories in TWPP.

### 4.3 The results of clustering analysis

A total of four clusters were determined after multiple iterative processes after performing the clustering analysis. The spatial distributions of the four clusters are shown in Figure 4.7, the detailed compositions of neighborhood areas for all the cluster are presented in the Appendix.

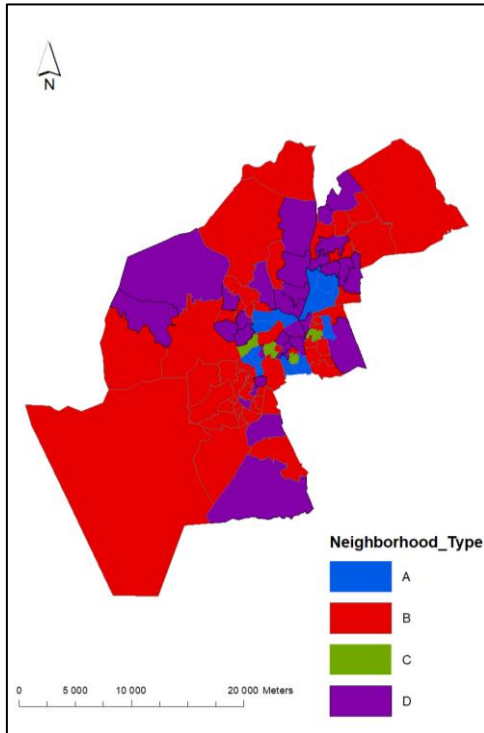


Figure 4.7 The geographical distribution of the four neighborhood types.

Figure 4.7 illustrates the spatial distribution of the four neighborhood types induced by clustering analysis. The neighborhood type A composed of 9 neighborhood areas and 51596 households is mostly located in the intermediary areas close to the center of the city. The neighborhood type B including fifty neighborhood areas and 70963 households covers most areas of Gothenburg, including the most outskirts and some central areas as it consists of more than half of the total neighborhood areas. The neighborhood type C consists of only five neighborhoods and 27532 families, which is positioned in the exact center of Gothenburg while the neighborhood type D composed of 32 neighborhood areas and 107074 households is situated in between the outskirts and central area with some areas adjacent to the border of the city.

The main characteristics of all the clusters in terms of the indicators and household archetypes are also analyzed. The results of mean values of the variables and the household archetypes for four neighborhood clusters were illustrated in Figure 4.8, 4.9, 4.10 and 4.11 respectively. Significant similarities that all clusters share are firstly discovered. It is the clothes that are of the most popularity among the residents in Gothenburg city which is considerably more than the rest of products in terms of the

number of products consumed. Besides, it can be also observed that the difference of the clothes consumption between four neighborhood clusters are more obvious than the other types of products. As for the willingness patterns, the tools, vehicles and equipment are the top three sharing sectors that people in Gothenburg show the most interest to participate both as users and providers. They also present more substantial differences than other sharing sectors like furniture, appliances, toys and books.

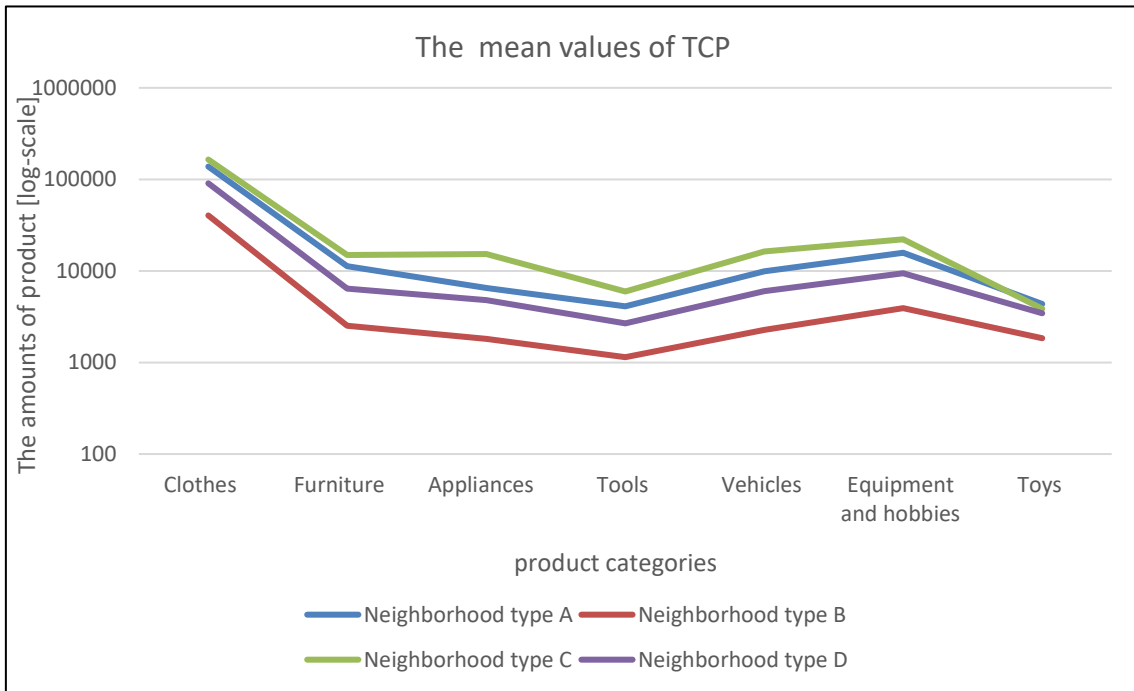


Figure 4.8 The mean values of indicators of TCP for four neighborhood types.

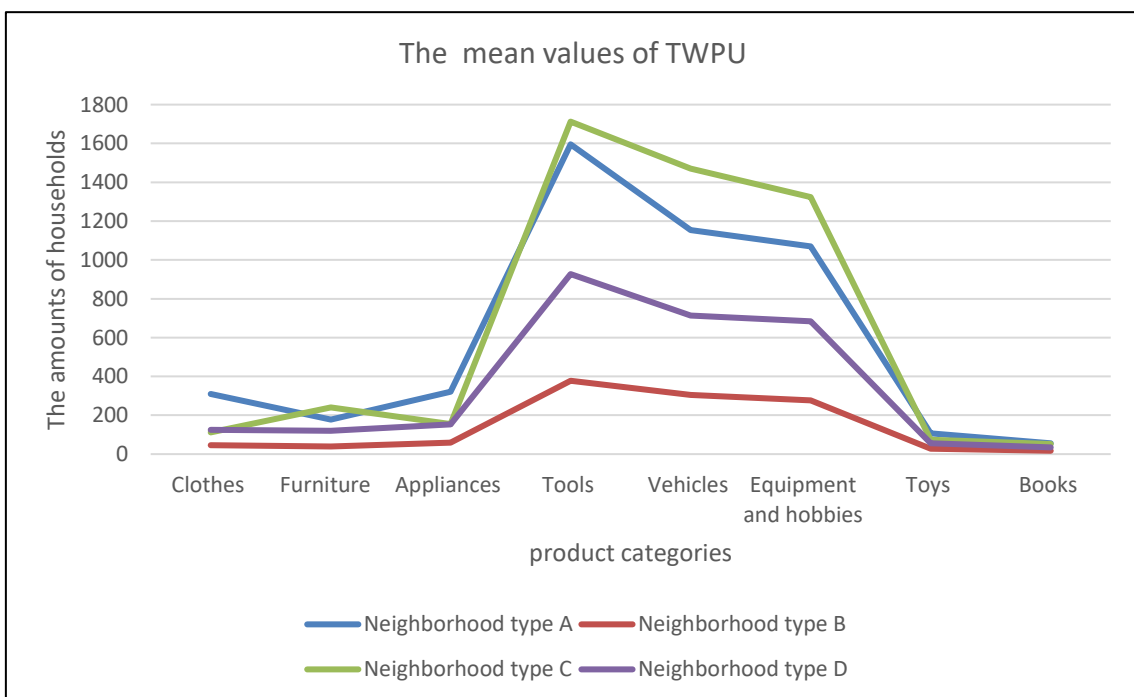


Figure 4.9 The mean values of 7 indicators of TWPU for four neighborhood types.

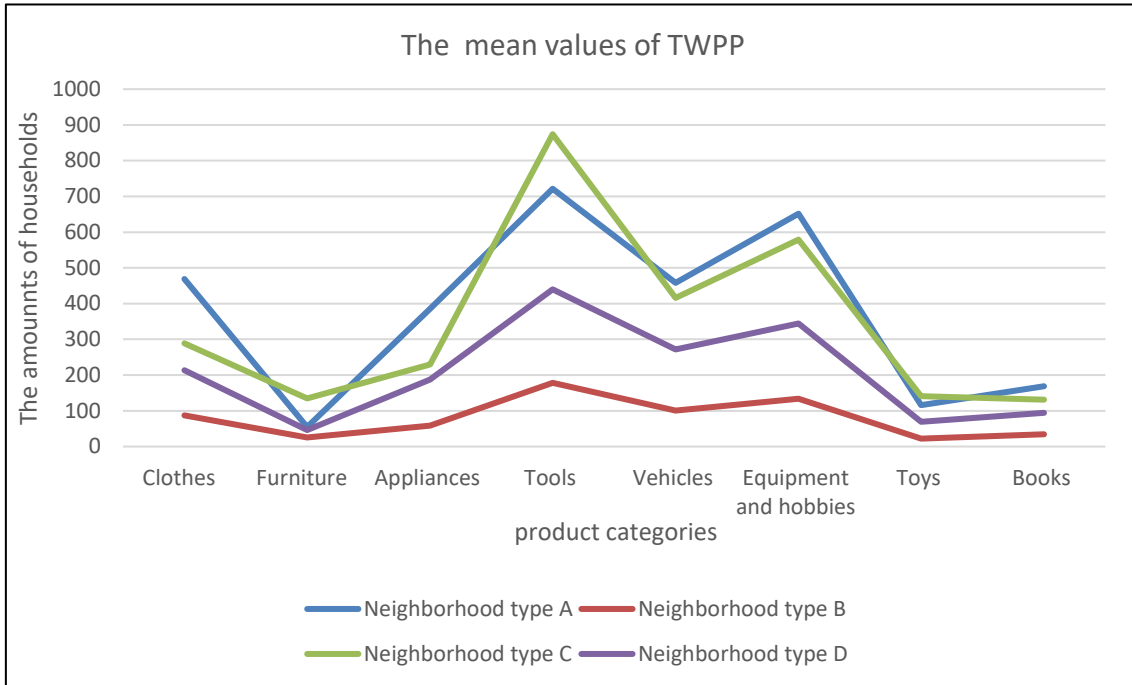


Figure 4.10 The mean values of eight indicators of TWPP for four neighborhood types.

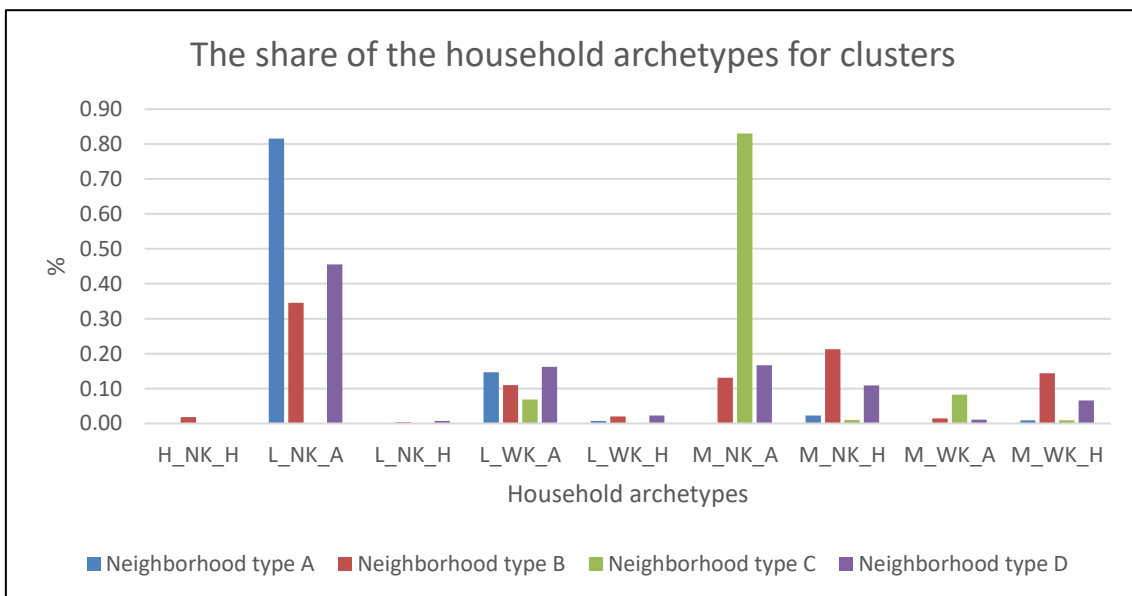


Figure 4.11 The share of household archetypes for four neighborhood types.

The neighborhood type A represents the second highest levels of consumption generally, but with the highest toy consumption. There are still a considerable number of households that are willing to obtain household products through sharing activities,

particularly in the categorizations of clothes, appliances, toys and books. Besides, this cluster type also contains the largest number of families that would like to provide their clothes, appliances, vehicles, equipment and hobbies, books to others. The household type L\_NK\_A accounts for slightly over 80% of the total households.

The neighborhood type B is characterized by the lowest levels of household product consumption. It is also distinct with the lowest number of families that use and share household items via the sharing economy. The L\_NK\_A is the dominant household archetype as it makes up more than 30% of the total households, M\_NK\_H is followed by around 20%, the rest household archetypes M\_WK\_H, M\_NK\_A and L\_WK\_A comprise approximately 10% respectively.

The neighborhood type C is characterized by the overall highest levels of consumption of all household products last year except for the toy consumption which is the second highest. It also contains the overall largest number of families that express the passion to have access to household items through sharing initiatives, especially in the sector of furniture, tools, vehicles, equipment and hobbies. This type also represents the highest patterns in sharing the furniture and tools with others. There are a significant number of the household archetype M\_NK\_A comprising over 80% of the total households of cluster C.

The neighborhood type D stands for the third highest levels of product consumption. It also represents the third level in terms of exhibiting the interest in having access and providing household goods through sharing schemes. The household archetype L\_NK\_A makes up just under a half of the total households, L\_WK\_A and M\_NK\_A account for around 15% respectively.

In short, it can be stated that the neighborhood type C is suggested to be the most promising sharing economy areas as it possesses the highest levels of both consumption and the largest number of households showing the interest to engage in the sharing economy.



## 4.4 The library of sharing initiatives

Table 4.1 The synthetization of sharing characteristics of the sharing initiatives.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment and hobbies	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
Streetbank		✓	✓	✓		✓				✓			✓	✓			✓		
Hyglo	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓			✓		
Peerby	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓			✓		
Swapshop		✓	✓	✓	✓				✓		✓	✓	✓	✓			✓	✓	
Thredup					✓				✓				✓	✓		✓	✓		
Getg	✓									✓			✓	✓			✓		

round	✓									✓			✓	✓			✓		
Campana	✓									✓			✓	✓			✓		
BabyQuip			✓							✓			✓	✓			✓		
Fretish						✓				✓			✓	✓			✓		
StyleLend					✓					✓	✓	✓	✓		✓		✓		
Återbruket	✓	✓	✓	✓	✓		✓		✓				✓	✓	✓			✓	
HolmensMarknad	✓	✓	✓	✓	✓		✓	✓	✓				✓	✓	✓		✓	✓	
Fritidsbanken						✓				✓			✓		✓			✓	
Leksaksbiblioteket			✓							✓			✓		✓			✓	
Fran			✓	✓			✓		✓	✓			✓	✓					✓

sson s Hör na																			
Kvib ergs Mar knad	✓	✓	✓	✓				✓	✓			✓	✓	✓					✓

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The sharing initiatives were summarized in the Table 4.1. The detailed descriptions of these sharing initiatives can be seen in the appendix. It can be seen from the Table 4.1 that the sharing of tools, toys, books and clothes are more widespread than the other sharing sectors such as vehicles, equipment, furniture and appliances. The lend-borrow and sell-purchase are two predominant means among sharing initiatives compared with donating and swapping. There are rare sharing initiatives where consumers interact with each other directly, most products are processed or treated by the intermediaries like companies, municipalities and associations for the purpose of profit or non-profit. The sharing platforms that the intermediate applied to are categorized into online-markets, second-hand stores and multifunctional sharing places. It can be observed that online -markets seem to be the most popular sharing platform adopted by companies while the municipalities prefer the traditional second-hand stores.

The most typical characteristics for the mobility sharing economy are that the car users can rent the car through the website and app developed by the car rental companies where the information of the available cars posted by people are presented. The Getaround and Campana focus on the car rental exclusively. The exception is the Återbruket that is the second-hand recycling stores operated by the Uppsala municipality where only limited bikes are offered. Similar patterns are encountered in equipment and hobbies sharing, people can only lend-borrow their equipment and hobbies to others through online markets run by companies except for Fritidsbanken that is a second-hand store only offering the sports equipment funded by municipalities. Only one sharing schemes Fretish concentrate on the musical instrument sharing exclusively.

The rest sharing sectors exhibit more diverse sharing characteristics. Both municipalities and companies involved in creating the book sharing platforms online or offline where people can sell/buy, lend/borrow, donate and swap their products to others. However, there is no platform that specialize in book, tools, furniture and appliances sharing, most of which combine the book sharing with other sharing sectors. The toy library Leksaksbiblioteket run by municipality is the only sharing initiative centering on the toy sharing exclusively. In contrast, there are two companies Thredup and Style Lend limiting their business to clothes sharing.

## 4.5 The filter analysis

The sharing initiatives collected in Smart Map in the areas of neighborhood type C are examined and summarized in the Table 4.2.

Table 4.2 The filter analysis of Smart Map.

The neighborhood areas in cluster C	Name	Shareable items	Sharing modes	Participants	Platforms	Whether satisfy the scope
105 Masthugget	Move about	Vehicles	Lend-borrow	Companies and consumers	Second-hand stores	No
	Styr & Ställ	Vehicles	Lend-borrow	Municipalities and consumers	/	No
	Gothenburg Library	Books	Lend-borrow	Municipalities and consumers	Second-hand stores	No
	Cykelköket Göteborg	Bike and bike tools	Lend-borrow	Association and bike owners	Multifunctional places	Yes
	Ladda mobilen	Electricity	Lend-borrow	Companies and consumers	Second-hand stores	No
	Masthuggets bilkooperativ	Vehicles	Lend-borrow	Association and consumers	Second-hand stores	No
	Plikta utflyktslekplats	Outdoor space	/	Municipalities and consumers	/	No
	Piffel	Equipment and hobbies	Lend-borrow	Companies and consumers	Second-hand stores	No
111 Johanneberg	Move about	Vehicles	Lend-borrow	Companies and consumers	Second-hand stores	No
	Steer & Set	Vehicles	Lend-borrow	Municipalities and consumers	Sites in the city	No
	Bokbytarbås Johanneberg	Books	Swap	Companies and consumers	Second-hand stores	Yes

	Gothenburg's drinking water fountains	Water	/	/	/	No
	Ladda mobilen	Electricity	Lend-borrow	Companies and consumers	Second-hand stores	No
	Green Mobility	Vehicles	Lend-borrow	Companies and consumers	Online markets & Second-hand stores	No

It can be observed from the Table 4.2 that two-thirds of neighborhoods in the neighborhood type C 109 Olivedal, 208 Lunden and 416 Eriksberg have not registered any sharing initiatives. There are several sharing initiatives in other neighborhood areas 105 Masthugget and 111 Johanneberg, nevertheless, only two of them Cykelköket Göteborg and Bokbytarbås Johanneberg fall within the scope of the sharing economy defined in this study.

## 4.6 The proposal of the sharing initiatives

The sharing initiatives suggested to be implemented in the five districts in neighborhood type C are summarized in *Table 4.3*. Most proposed sharing initiatives are retrieved from the sharing economy library directly as there are few sharing initiatives having been implemented according to SmartMap. Furthermore, it should be highlighted that the priority should be given to the clothes sharing as the substantial highest level of consumption in this cluster although very few people show interest in sharing clothes. Besides, equipment and hobbies sharing are also suggested to be taken into consideration as they possess the second largest consumption levels in this cluster and large amounts of households are willing to participate equipment and hobbies sharing. The sharing of tools and vehicles should also be implemented since these categories attract the highest popularity for people to engage the tool and mobility sharing in neighborhood type C although their consumption levels are not distinct compared with clothes and equipment. Lastly, the rest sharing sectors like toys, furniture, appliances and books are also presented, however, these sharing categories are as important as the sharing sectors mentioned above.

Table 4.3 The proposal of the sharing initiatives in the districts of neighborhood type C in Gothenburg.

The sharing sectors	Name	Brief descriptions
Clothes	Street bank	Only a few garment alternatives are offered on Street bank, but it depends on how many people sharing clothes in this platform in the areas.
	Hygglo	Plenty of cloths are available involving both cloths of children and adults.
	Peerby	Numerous garments are offered in Peerby.
	Swopshop	People can donate the cloths, accessories and shoes for women, children and men to the green meeting place organized by Swopshop.
	Thredup	Thredup is the online resale platform providing the garments of women and kids, shoes and accessories etc collected from people.
	Style Lend	It is an online second-hand platform where the fashion fans are able to lend, borrow, swap or give away their cloths of high-quality in New York
	Återbruket	Cloths are offered in the second-hand recycling store in Uppsala.
	Holmens Marknad	Cloths are offered in the second-hand store in Gothenburg.
	Franssons Hörna, Kvibergs Marknad	Cloths might be easily offered and shared in these public places.
Equipment and hobbies	Streetbank	The sports equipment and headphones are offered on Street bank, but it depends on how many people sharing equipment in this platform in the areas.
	Hygglo	More opportunities regarding renting sports and electronic equipment can be seen in Hygglo, involving golf, football smartphones, camera etc.
	Peerby	A wide variety of equipment is offered in Peerby.
	Fritidsbanken	It is a library of sport equipment where people can borrow for free.
	Fretish	It is a P2P rental platform of music instrument.
	Franssons Hörna	Some of the equipment might be easily offered and shared in these public places.
Tools	Street bank	Several types of tools like drills, drain pipes, hooks etc as well as garden tools are available on Street bank, but it depends on how many people sharing tools in this platform in the areas.
	Hygglo	Numerous tools can be borrowed and shared in Hygglo.
	Peerby	Numerous tools are offered in Peerby.

	Återbruket	Tools are offered in the second-hand recycling store in Uppsala.
	Holmens Marknad	Tools are offered in the second-hand store in Gothenburg.
	Franssons Hörna, Kvibergs Marknad	Tools might be easily offered and shared in these public places.
Vehicles	Hygglo	There are large various vehicles like cars, bicycles and boats available in Hygglo.
	Peerby	There are various types of bicycles and boats available in the website, while advertisement of renting cars are rare in Peerby.
	Getaround	It is a peer-to-peer car rental platform that are locally oriented.
	Campana	A wide variety of RV, camper van and caravans can be shared in Campana.
	Återbruket	Bicycles are offered in the second-hand recycling store in Uppsala.
	Holmens Marknad	It is a second-hand store in Gothenburg that take care the entire items of the households.
Toys	Street bank	Only a few types of toys like tricycle are available in Streetbank, but it depends on how many people sharing toys in this platform in the areas.
	Hygglo	Numerous toys are offered in Hygglo.
	Peerby	Numerous toys are offered in Peerby.
	Swopshop	The children's toys can be swapped and bought in the second-hand store named Återbruket Mobilia organized by Swopshop in Malmö.
	BabyQuip	BabyQuip is the largest P2P baby equipment rental services and marketplaces in over 500 cities of Canada and US, offering thousands of baby gear items.
	Återbruket	Toys are offered in the second-hand recycling store in Uppsala.
	Holmens Marknad	Toys are offered in the second-hand store in Gothenburg.
	Leksaksbiblioteket	It is a toy library where people can borrow toys and participate various sharing activities.
Franssons Hörna, Kvibergs Marknad	Toys might be easily offered and shared in these public places.	
Furniture	Streetbank	An amount of furniture like sofa, chair, cardboard are offered on Street bank, but it depends on how many people sharing furniture in this platform in the areas.
	Hygglo	Several tables, chairs, rugs are available in Hygglo.
	Peerby	Peerby only provides some of the furniture including various pans, standing



		tables and chairs.
	Återbruket	Second-hand Furniture is offered in the second-hand recycling store in Uppsala.
	Holmens Marknad	Second-hand Furniture is offered in the second-hand store in Gothenburg.
	Franssons Hörna	Several types of furniture like tables and chair are available in the facebook of Franssons Hörna.
Appliances	Streetbank	The kitchen equipment like blender, pancake maker and cooker are offered on Street bank, but it depends on how many people sharing appliances in this platform in the areas.
	Hygglo	Textile care machine, vacuum cleaner and kitchen utensils are available
	Peerby	Oven, blender, coffee maker, heater and TV can be shared in Peerby
	Holmens Marknad	Some second-hand appliances are offered in the second-hand store in Gothenburg
Books	Street bank	Only a few types of books are available in Streetbank, but it depends on how many people sharing books in this platform in the areas.
	Hygglo	There are limited categories of books in Hygglo, mostly the cooking books and tour guides, while lacking other types like novel, literature.
	Peerby	A variety of books can be shared in Peerby.
	Swopshop	The children's books can be swept and bought in the second-hand store named Återbruket Mobilia organized by Swopshop in Malmö.
	Återbruket	Books are offered in the second-hand recycling store in Uppsala.
	Holmens Marknad	Books are offered in the second-hand store in Gothenburg.
	Franssons Hörna, Kvibergs Marknad	Books might be easily offered and shared in these public places.

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## 5 Discussions

The two research questions were discussed respectively in this chapter.

### 5.1 The investigation of the promising sharing economy areas in Gothenburg

The applications of modifications of SEsam method coupled with the clustering and spatial analysis provide a straightforward way to determine the promising sharing economy areas in Gothenburg. It can be considered as an effective framework that demonstrates the procedures for the city planners and authorities to promote the sharing economy.

Specifically, the household archetypes are applied in this study to establish the desired patterns across the Gothenburg, which is an efficient way as the overwhelming work of the treatment of the immense data of the individual household in the City can be simplified to the significant extent. Besides, the main characteristics of the patterns of the household archetypes can be abstracted and adapted to other geographical areas. Three socio-demographics incomes, whether they have children, household dwelling type are applied to establish the household archetype in this study, but other individual socio-demographics such as age, gender and education level can also be taken into consideration.

Significant differences of the total product consumption patterns in Gothenburg can be observed. Clothes are the products that are most consumed of all the household archetypes in Gothenburg city, far more than the rest of other product types. This might due to the fact that clothes is one of the Fast moving consumer goods (*Kneppelhout, n.d.2021*). Different household archetypes also exhibit various consumption patterns, it is the households that are characterized by the socio-demographics of higher income, with children and living in apartments that contribute to the higher level of the overall product consumption. This is consistent with the study by Kalmykova et al., (2015) where it is stated that higher income contributes to increase the resource consumption. It is reasonable that families with kids tend to consume more products. However, the results also present that high consumption levels are also characterized by households living in apartments, which is on the contrary to that large floor area play a role in consumption in Gothenburg (Kalmykova et al., 2015).

As for the willingness patterns, the number of households providing products lag those using products in the sharing economy generally. As shown in the Figure 4.9 and 4.10 it is the tools, vehicles and equipment/hobbies that have the most potential for public engagement as both providers and users in Gothenburg. The socio-demographics that households are willing to participate in sharing initiatives are closely similar to those in

consumption patterns. However, the dominant household archetypes vary in different sharing sectors when analyzing the relationships between the socio-demographics and sharing sectors further. It is worthy to emphasize that both the using and providing means of participating in the sharing economy are considered and analyzed in the study while most literature only focus on the using patterns. It can be seen from the Figure 4.9 and 4.10 that the household archetype L\_NK\_A is more likely to have access to clothes through the sharing economy while the households characterized by M\_K\_A are more willing to share their clothes. This could be combined with other individual socio-characteristics that have been already investigated, that is, the middle-aged female earning the high level of salary are the targeted consumers obtaining clothes through the sharing economy. The present study also reveals the households represented by the H\_K\_A show the most interest in participating in the tools sharing. As Pick & Schreiner (2020) pointed out that middle-aged men earning high income are most likely to participate in the Vehicle sharing, as for the household archetypes, the households characterized with high incomes, having kids and dwelling in apartments should be targeted.

Similar geographical distributions are observed between the consumption and willingness patterns. The central areas represent both the highest level of product consumption and the willingness of participation, but this region shares the least of the total areas of Gothenburg while the outskirts regions register the lowest level but cover the most areas of the city. The intermediary areas present moderate levels of consumption and willingness patterns to a different extent. Accordingly, the consumption and willingness patterns are spatially related to some extent.

The results of clustering analysis suggest that the neighborhood type C, centrally positioned, is characterized by overall highest consumption and willingness patterns particularly clothes, tools, vehicles, equipment and hobbies. The M\_NK\_A is the predominant household archetype in this cluster, which is consistent with the socio-demographic groups that ACPHA, AWPUHA and AWPPHA present. Besides, it is worthy to emphasize that the average levels of income in only three neighborhood areas can be classified as high-income groups. Hence, it is reasonable that cluster C is regarded as the target region although 80% of the household earn the middle level of income.

## **5.2 The proposal of sharing initiatives in promising areas in Gothenburg**

Sharing economy has gained much momentum over the past decade due to the enormous potential to contribute to the economic and environmental sustainability, attracting the increasing interest from scientific, societal and political. However, the agreement on the definition and scope of the sharing economy still lags, the relative cousins related to sharing economy enhance the complexity. Accordingly, the explicit definition of sharing economy is critical to be proposed in this study.

The establishment of the sharing economy library provided a database of sharing

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initiatives that could be used to be implemented in the local areas. The innovatively proposal of the sharing characteristics suggests an effective way of highlighting the sharing characteristics of sharing initiatives as presented in Table 4.1. Moreover, it is also useful to identify the similarities and differences of the immense sharing strategies implemented. However, the drawbacks of the sharing characteristic framework are that the variations between the sharing sectors could not be seen if one the sharing initiatives provide several forms of sharing and that how the different stakeholders interact with each other and the responsibilities they hold respectively are also not specified. For example, the most popular items that are shared in Hygglo could not be identified.

The smart map is considered as the filter of sharing initiatives as it collects hundreds of the sharing initiatives that have been implemented across Gothenburg. However, it seems that the scope of the sharing initiatives is broader than those of the present study. Besides, the sharing schemes focusing on online markets are not presented on the website. Hence, it is suggested that other means that might mention the sharing initiatives in Gothenburg should be evaluated apart from Smart Map.

Through the integration consideration of the highest levels of consumption and willingness of participation, the sharing schemes of clothes, tools, vehicles, equipment and hobbies should be given the priority in the neighborhood type C. However, other sharing sectors are also suggested to be considered as there are limited sharing initiatives collected in SmartMap. Moreover, it is suggested that the selection of the specific sharing initiatives under the proposed sharing sectors in Table 4.3 should be further evaluated under the local context. For example, the participation of prioritized sharing categories of other studies was presented in an attempt to give inspirations of the Gothenburg planners.

#### Clothes sharing

On the website of Thredup it is indicated that there was a growing trend of the willingness of purchasing second-hand garments as only 45% of women are open to second-hand apparel in 2016 but it increased significantly to 70% in 2019 (ThredUP, n.d. 2021). This indicates that the clothes sharing still exhibits substantial potential for people to engage in despite that the only small amounts of households show the interest in Gothenburg.

#### Tools sharing

The tools sharing has the largest potential of public participation in Gothenburg, which is similar to the study of Böcker & Meelen (2017) in Amsterdam where tools sharing receives the most popularity compared with other sharing sectors.

#### Vehicle sharing

Vehicles are one of the products that most people in Gothenburg show interest in, which indicates the similar trend of vehicles unrevealed by other studies. Mobility sharing has the highest potential of growth and interest in the future as nearly half of the car owners would like to share their vehicles ( Freese & Schönberg , 2014; Wilhelms et al., 2017). Böcker & Meelen (2017) argued that car sharing is one of the most accessible sharing for the residents in Amsterdam, Getaround is the popular P2P car rental platforms. However, the lack of the participation of car owners is the main reason for the lower

participation rate of the sharing economy than projection (Wilhelms et al., 2017). It can also be seen that the number of households would like to rent mobiles is as more than three times when comparing the Table 4.9 and 4.10.

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## **6 Future suggestions**

Despite the achievement of the aim of the report, there are still researches deserving much attention in the future. Three directions are suggested in this chapter.

### **6.1 The evaluation of the criteria of determining the promising sharing areas.**

The criteria to determine the hotspot area, which is patterns of consumption and willingness of participation, is proposed innovatively by this study since there are rare studies analyzing this topic, nonetheless, there are amounts of limitations when it comes to the analysis of the willingness of participation. As can be seen in the Appendix, the numbers of households that present the willingness to engage in sharing initiatives are extremely low which might attribute to the few respondents of two voluntary questions in the survey, which might distort the quality of the participation patterns. It has been stated that the preference and the positive attitude do not necessarily facilitate the translation of action. Furthermore, it is suggested to assess the performances of the criteria scientifically and comprehensively, for instance, more indicators as presented in the Section 3.3 could be considered. The results of clustering analysis are extremely sensitive to the indicators considered, if calculations of other variables would largely lead to a significantly different promising pattern. It is likely that the promising area can be altered in different years as the compositions of the household archetypes and the consumption patterns of all neighborhood areas of Gothenburg might remain unchanged as time proceed.

### **6.2 The other key aspects to secure the successful of the sharing initiatives**

Apart from the consumption and willingness patterns, there are other aspects being suggested to the stakeholders to consider when implementing the sharing initiatives.

Clarifying the different roles that providers, platforms and users also contribute to the participation of the sharing economy. There are five frequent roles suggested by Öberg, (2018) which are the resource provision, the presentation, the matching, the use or access and the evaluation. Despite it is commonly accepted that they all have specific responsibilities respectively in the sharing activities where the providers usually put the products or services forth, the platforms serve as matching the providers and users as much as possible, the users usually access and consume products and then the role evaluation falls mainly on the users in term of assess the quality of the products, the effectiveness of providers and platforms, nonetheless, it is obvious that the different parties play various roles in different sharing settings (Öberg, 2018). In P2P settings, the division of providers and users are not obvious or even complex since the providers can also be renters and the roles of them may partly overlap as they both can evaluate the platforms and each other (Öberg, 2018).

It is worth highlighting that the responsibility of matching that platform often hold is of extreme importance. The user-friendly features and settings of the sharing

intermediaries are also critical to guarantee the experiences of the participants. The securement of the quality of the products available on the website is of the most importance for the renters. Thus, the authentic description of the sharing times is necessary, the refund to the renters in case of receiving unqualified items could also dispel the fears of consumers. It is also essential to secure the convenience and safety of payment and transaction as well as the appropriate way of treatment and maintenance of products (Akin et al., 2021). In addition, the trust between the providers and renter is a key issue in the sharing network, the rating system and the sufficient interactions and feedback between the participants deserve attention by the sharing intermediaries (Wilhelms et al., 2017).

Briefly, it is revealed that the optimal stimulation of participation is affected by the external environment. For example, identifying the appropriate targeted shared items in the specific area or exploring the variety of means of participating in the sharing economy that are most likely to encourage the public engagement are both of high priority. The relationship between the motivations of sharing economy participants and their socio-demographical characteristics are widely investigated by the researchers. Even though some connections have been built, these findings have not been universally accepted as it is observed that the different sharing initiatives receive various degrees of participation, which indicates that the popularity of designed sharing initiatives is context-dependent to a significant extent. Besides, it is gradually acknowledged that in addition to the quality of the shared products that are targeted, the user-friendly settings or services of sharing intermediaries also play a critical role. Furthermore, it is of worthy to note that these variables all intercorrelated with each other, for example, the socio-demographic characteristics not only affect the motivation of involvement of the forms of sharing economy, but the preferences of means to engage. As a result, the services provided by sharing intermediaries to residents would be affected. This is, however, rarely to be examined to date presumably attributed to the high level of complexity.

### **6.3 The environmental analysis of suggested sharing initiatives.**

The environmental performances of the proposed sharing initiatives deserve further investigation. This Section intended to give the overview of the environmental impacts of sharing initiatives through literature review.

#### **Clothes sharing**

The environmental benefits of Thredup, which is one of the sharing initiatives in sharing library was analyzed by Babel et al., (2019). It concluded that clothes sharing could present substantial environmental savings compared with newly manufactured clothes. Over 80 million kg of CO<sub>2</sub> were reduced in the year of 2018 and 22.8 kg CO<sub>2</sub>-eq could be avoided of 1kg if the products could be resold on Thredup. The sorting processes of the clothes share almost 80% of the total carbon emissions, followed by the stages of packaging and vehicles.

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### Equipment and hobbies sharing

Skis is the most popular sport equipment in the district of Hammarby Sjöstad. The environmental potential of sport equipment skis both for children and adults in Hygglo were quantified by Michael et al (2019). Skis sharing contributes roughly 500 kg CO<sub>2</sub>-eq emissions overall, which are considerably lower than that of vehicle sharing, but still higher than that of bicycle and electric tool sharing. From the results from LCA in sharing scenarios, it is unexpected that the vehiclesation stage of the skis sharing accounts for nearly half of the total emission.

### Tool sharing

The environmental implications of electric tools shared in Hygglo were evaluated by Martin et al (2019). The amounts of carbon generated by tool consumption are not significant already, which makes it challenging for tool sharing to exert considerable impact from an environmental perspective. However, it is revealed vehiclesation and production stages are responsible for the largest carbon emissions in their entire life cycle stages when they are shared.

### Vehicle sharing

Cars, vans and bicycles, which are the most popular vehicles provided by Hygglo in Hammarby Sjöstad. The environmental implications of the sharing of these products were evaluated through adopting the LCA approach (Martin et al, 2019). It is evidenced that Vehicle sharing could bring substantial environmental benefits compared with other sharing sectors. Quantitatively, around 22,000 kg CO<sub>2</sub>-eq were emitted to the environment inducing from the conventional consumption of the products while it dropped substantially to only around 5,000 kg CO<sub>2</sub>-eq when they are shared in Hygglo each year. Moreover, it also presented that it is the production phase that generates the most emissions in the entire life cycle of cars. Thus, the sharing or reusing of cars could avoid the large amounts of emissions from production phase effectively.

The sharing economy is expected to play a significant role in reducing the GHGs emissions. Specifically, car sharing seems to have the largest potential in mitigating household carbon footprints compared with other sharing forms. However, it might be towards the other side if they are implemented inappropriately. For example, the vehiclesation, the treatment process and the logistic services of sharing economy play a decisive influence in the environmental performances of household items sharing as they might offset the environmental benefit gained from carbon reduction.



## 7 Conclusions

The modifications of SEsam were used to illustrate the patterns of consumption and willingness of participating in the sharing economy for household archetypes and neighborhood areas in Gothenburg. The consumption patterns present that the clothes occupy the largest consumption in quantities, followed by the equipment and hobbies which is the second largest. The tools, vehicles, equipment and hobbies are the top three categories that people in Gothenburg show the most interest in participating in the sharing economy as both users and providers as observed in willingness patterns. Different household archetypes also exhibit various consumption patterns, it is the households that are characterized by the socio-demographics of higher income, with children and living in apartments that contribute to the higher level of the overall product consumption. Geographically, the similar distributions can be witnessed between the consumption and willingness patterns. The central areas represent both the highest level of product consumption and the willingness of participation while the outskirts regions register the lowest. In contrast, the areas represented by the highest levels share the least of the total areas of Gothenburg whereas the lowest level regions cover the most areas of the city. The intermediary areas present moderate levels of consumption and willingness patterns to a different extent.

After the integral consideration of 23 indicators representing patterns of consumption and willingness of participation, the results of clustering analysis suggest that the neighborhood type C composed of only five centrally positioned neighborhood areas should be regarded as the promising sharing areas as it is characterized by overall highest consumption and willingness patterns compared with the other four clusters.

The establishment of the sharing economy library provided a database of sharing initiatives that could be used to be implemented in the local areas based on the definition of sharing economy defined in this study. The innovatively proposal of the sharing characteristics suggests an effective way to organize and highlight the sharing characteristics of the sharing initiatives. Finally, the proposed sharing initiatives are retrieved from the sharing economy library as there are few sharing initiatives having been collected in SmartMap. Furthermore, it should be highlighted that the priority should be given to the clothes sharing as the substantial highest level of consumption in type C although the degree of willingness of participation in types C is not the highest among the rest areas. The sharing of tools, vehicles, equipment and hobbies are then suggested since all of these categories share the second highest consumption levels and they receive the highest popularity of engaging the sharing economy in neighborhood type C.

To conclude the present study, the procedures of determining the promising sharing areas in Gothenburg city and the proposal of the sharing initiatives in these areas were presented, which can be easily adapted by other geographical areas. However,

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it would be interesting to assess the criteria critically and comprehensively in addition to the consumption and willingness. Besides, other aspects are proposed for stakeholders to consider when implementing the sharing initiatives afterward. Furthermore, the environmental performances of the proposed sharing initiatives are also suggested to be quantified and evaluated.

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# Appendix

Table A.1 The criteria matrix of sharing economy.

The establishment of criteria matrix of sharing economy			
Shareable items	tangible goods	Note	
		indoor items: books, furniture, appliances, clothes, toys and tools, baby gear, musical/sport/garden equipment	✓
		vehicles: cars, motorcycles, boats, bikes	✓
		electronics	✓
		Food, hygiene products, make-ups	x
		House	x
	intangible goods		x
		empty seats in the cars	x
		private space: parking space	x
		public space: library, unused urban land	x
	skills and knowledge: baby sitting and language	x	
Sharing modes	sale-buy	The sharing of the second-hand items	✓
	lend-borrow		✓
	donate		✓
	swap		✓
Participants/owners	consumers		✓
	companies		✓
	municipalities		✓
	organizations		✓
Business settings	two-sides	consumers-consumers	✓
		consumers-second hand store-consumers	✓

		consumers-online markets-consumers	✓
	one-side	companies-consumers	x
		Companies-online markets-consumers	x
		municipalities-consumers	x
		organizations-consumers	x
Sharing platforms	Online market		✓
	Second-hand store		✓
	Multifunctional places		✓
Motivations	commercial purpose		✓
	Social benefits		✓
	environmental benefits		✓
Application scale	local	Whether the providers and uses are in the same district	✓
	municipalities		x
	national		x
	Multinational		x

## The database of sharing initiatives library

Streetbank is one of the largest sharing websites that help people to share and borrow household items from neighbors within the a certain distance of their houses. The users need to sign up and add one item or skill that you want to share or give it away with your neighbors, then all the items post from your neighbors would be unlocked to the new register. People can then lend, borrow, give things to their neighbors for free to reach their full capacity. However, there are local regions where there are not many sharers through Streetbank, thus, making it difficult for those who intent to borrow household goods with their neighbors.

Table A.2 The sharing characteristics of Streetbank.

Characteristic	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
Streetbank		✓	✓	✓		✓				✓			✓	✓			✓		

Hygglo is the largest peer-to-peer online platform in Nordic area where private persons can contact can communicate with each other to lease out or rent a large number of products like tools, boats, electronics, vehicles and sport and leisure equipment. There are over 7000 listings in the year of 2017. The private owners announce their advertise for free and decide the rental price and rental period mostly for



one day or one week, 80% of the rental price could be remained as the online platform still need a little amount of money to be responsible for insurance, payment and verification. Besides, people have access to be informed the rough location of the announcers and the distance between you. The exact addresses of the privies are provided when the booking if the deal is confirmed. The transactions are mostly made in Norway and Sweden, there is still of high potential to apply this in the district level as the distances and locations of the providers are available on the website.

Peerby is an online platform intended for increase the exchange between neighbors among each other in Netherland and Belgium though providing an opportunity to rent or borrow mostly durable consumer household items that people do not use them all the time. All the items available for rent and borrow are in your neighbor area are listed with the location of the providers and the description of the items, the people could communicate with each other on the website of through email, the lenders and borrower then can meet each other to do the business if the user satisfied with the price. There are usually informal agreements between both parties with regard to where and when to collect and return to the items, the load period, the responsibility of damage of the items, the platform itself accounts for the management of the website including updating the check the equality of the advertise, the safety payment.

Similar sharing platform is erento.

Table A.3 The sharing characteristics of Hygglo and Peerby.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places

						c)													
Hyglo	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓			✓		
Peer by	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓			✓		

Swopshop <https://www.swopshop.se/> is a second-hand platform involving both online and offline in Sweden where the fashion fans are able to sell, buy, swap or give away their cloths, shoes and accessories of high-quality and good condition by submitting their garments to the physical stores. Besides, the toys, books and other stuffs of children can also be donated in the Green meeting place located in Malmö. They will then be sold online or in physical stores, Swopshop handles all the relevant processes including shipping, pricing, insurance and washing, which guarantee the perfect sharing experiences for both providers and consumers.

Table A.4 The sharing characteristics of Swopshop.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
Swopshop		✓	✓	✓	✓				✓		✓	✓	✓	✓			✓	✓	

Getground <https://uk.getaround.com/> is the locally intermediary for car rental in UK. All the processes from booking the car, unlocking all the way to returning are need with the smartphone App called Getaround. Users are required to create the account with all the necessary information including name, driving license number, ID. After choosing the ideal cars in the App and being verified the profile, people then could rent the car from the nearest Getaround Car Rental where the owners leave their cars or from the owners directly. After the trip, used could return the car to the centers or to the owners but with the same level of fuels before using it. The price would re-adjust according to the real distances that have been travelled. Finally, the users can claim the damage of the car during the whole process and leave the comments. In addition to securing the safe payment, the insurances and the roadside assistance are also provided for each trip.

Similar P2P car rental websites is Turo <https://turo.com/>

Table A.5 The sharing characteristics of Getaround.

Char acter istic s	Shareable items								Sharing modes				Participants				Platforms		
	Vehi cles	Boo ks	Toys	Tool s	Clot hs	Equi pme nt (spo rt, musi cal, elect roni c)	Furn iture	Appl ianc es	Sale -buy	Len d-bo rrow	Don ate	Swa p	cons ume rs	com pani es	mun icipa lities	Orga nizat ions	Onli ne- mar kets	Seco nd-h and store s	Mult ifun ction al shari ng plac es
Getg roun d	✓									✓			✓	✓			✓		

Campana <https://www.campana.com/> is the online service platform that connect the tenants and landlords to rent and rent out mobile homes (RV, camper van and caravans) with the headquarter in Berlin, Germany. It offers more than 26,000 vehicles with 816 pick-up places crossing 24 countries including various types and capacities. It only charges the confirmed booking, which means there are not fee of signing up and posting the advertisement. Besides, they offer well-rounded services including the easily accessible guidance and the flexible adjustment and control of the rental price and period. As for the renters, all the categories of the vehicles are available with filters, the renters can also get the help of scheduling the travel plans in terms of the rental period and the location to return the vehicles. The FAQ Sections are also available on the website for both parties.

Table A.6 The sharing characteristics of Campana.

Char acter istic s	Shareable items								Sharing modes				Participants				Platforms		
	Vehi cles	Boo ks	Toys	Tool s	Clot hs	Equi pme nt (spo rt, musi cal, elect roni c)	Furn iture	Appl ianc es	Sale -buy	Len d-bo rrow	Don ate	Swa p	cons ume rs	com pani es	mun icipa lities	Orga nizat ions	Onli ne- mar kets	Seco nd-h and store s	Mult ifun ction al shari ng plac es
Cam pand a	✓									✓			✓	✓			✓		

BabyQuip <https://www.babyquip.com/> is the largest P2P baby equipment rental services and marketplaces in over 500 cities of Canada and US, offering thousands of baby gear items. The description and rental price of the items and the address of the providers are available on the website. The renters need to firstly choose the cities and the providers in that area, and then choose the desired baby items, after

confirming the rental period, location and the price, the providers would deliver the items. Product providers in BabyQuip so called “quality providers” are the people who reside in the cities, offering their own items to the needed families. There are clear and straightforward guidance on how to create and manage own rental business with BabyQuip including the posting, adjusting the loan price and period, the cleaning and maintenance of the product. The BabyQuip would charge \$200 as the fee of training and 20% of the rental price of each transaction. It provides the insurance of the items in case of damage and injury. It is important to mention that the target customers are the families that travel with children, however, it is also possible for the resident to rent the baby gears through this service platform in their own cities.

Table A.7 The sharing characteristics of BabyQuip.

Characteristic	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
BabyQuip			✓							✓			✓	✓			✓		

Fretish <https://fretish.com/> is a P2P rental platform of music instrument in US where music lovers could share and rent all the variety of musical instrument. It encourages the musicians to share their personal inventory with others and the artists to rent it first before purchasing.

The renters could search the wanted items with the pricing can detail information as well as the location of the owners available on the website, then they can send the request to the owners directly, after discussing with the providers and receiving the item, they have the opportunity to check if the instrument is working well and has everything that should be included, they could claim the error report to the Fretish if anything is wrong. Or the paying could be transferred to the providers. Return the rental to the owners after using it. The providers can post their musical instrument on Fretish for free, deciding the rental price and period. It is important on note that the offline meeting is encouraged since the providers are responsible for the fee of delivery.

Table A.8 The sharing characteristics of Fretish.

Char acter istic s	Shareable items								Sharing modes				Participants				Platforms		
	Vehi cles	Boo ks	Toys	Tool s	Clot hs	Equi pme nt (spo rt, musi cal, elect roni c)	Furn iture	Appl ianc es	Sale -buy	Len d-bo rrow	Don ate	Swa p	cons ume rs	com pani es	mun icipa lities	Orga nizat ions	Onli ne- mar kets	Seco nd-h and store s	Mult ifun ction al shari ng plac es
Freti sh						✓				✓			✓	✓			✓		

Style Lend <https://www.stylelend.com/> is an online second-hand platform where the fashion fans are able to lend, borrow, swap or give away their cloths of high-quality. Users in the App are required to register and create the member profile to be able to post their advertisement with the description of the shared garment and the price. Style Lend handles all the relevant processes including shipping, pricing, insurance and washing, which guarantee the high-quality of the products and perfect sharing experiences for both providers and consumers. However, one drawback of Style Lend is that only limited fashion brand are accepted.

Similar platform is Vinted <https://www.vinted.com/>

Table A.9 The sharing characteristics of Style Lend.

Characteristic	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
Style Lend					✓					✓	✓	✓	✓		✓			✓	

Thredup <https://www.thredup.com/> is the online resale platform providing the garments of women and kids, shoes and accessories etc. in USA. It receives the garment from people using the identified package, and the payment would be sent to the providers after the inspection and deals. The rejected apparels either be send back to the providers, or donate to charities, only limited amounts of garment would be disposed. The provider and consumers do not communicate directly, the intermediaries tackle with all the management and treatment.

Table A.10 The sharing characteristics of Thredup.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Clothes	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
Thredup					✓				✓				✓	✓			✓		

“Återbruket”(recycling) <https://www.uppsala.se/bygga-och-bo/avfall-och-atervinning/aterbruket-second-hand/> is second-hand business organized by Uppsala municipality in collaboration with the company Uppsala Vatten where sale out the most household items like furniture, bicycles, kitchen utensils, books, tools and even building materials. The supply of the commodities in the shop is from the Uppsala’s recycling center where people can leave their various waste as well as the well-functioning goods if they do not want to possess them. The recycling center will then sort out and clean those goods to send to the shop for selling finally. Additionally, it also offers a place for the holding of the initiatives by labor markets.

Table A.11 The sharing characteristics of Återbruket.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehi	Boo	Toys	Tool	Clot	Equi	Furn	Appl	Sale	Len	Don	Swa	cons	com	mun	Orga	Onli	Seco	Mult



	cles	ks		s	hs	pme nt (spo rt, musi cal, elect roni c)	iture	ianc es	-buy	d-bo rrow	ate	p	ume rs	pani es	icipa lities	nizat ions	ne- mar kets	nd-h and store s	ifun ction al shari ng plac es
Åter bruk et		✓	✓	✓	✓		✓		✓				✓	✓	✓			✓	

“Holmens Marknad” <http://www.holmensmarknad.se/> is one of the special second-hand stores in Gothenburg, Sweden since it takes care of the estates in the entire households if the houses are going to be rent or sold out instead of receiving the donation from private persons. After they receive the inquiry, they would conduct the home visit to empty the homes and make a quote with the owners, the items are moves to the recycling center to be sorted out and cleaned, finally they are presented in the store for sale. This service is distinguished from other second-hand store since it provides a convenient way for families that are going to moving out or have hard time to deal with the massive estates especially the giant items like furniture and appliances in a short time.

Table A.11 The sharing characteristics of Holmens Marknad.

Char acter istic s	Shareable items								Sharing modes				Participants				Platforms		
	Vehi cles	Boo ks	Toys	Tool s	Clot hs	Equi pme nt (spo rt,	Furn iture	Appl ianc es	Sale -buy	Len d-bo rrow	Don ate	Swa p	cons ume rs	com pani es	mun icipa lities	Orga nizat ions	Onli ne- mar kets	Seco nd-h and store s	Mult ifun ction al shari

						musical, electronic)													ng places
Holmen s Mar knad	✓	✓	✓	✓	✓		✓	✓	✓				✓	✓	✓		✓	✓	

Fritidsbanken <https://www.fritidsbanken.se/> are public libraries where renting sport and leisure equipment such as skis, stakes, life jackets and snowboard etc. to the public for free within the two-weeks loan period. They receive the donation from private persons, companies and organizations in the local area *or* items collected and sorted out for Fritidsbanken by local recycling centers. The items are then carefully reviewed by labelling and registering and repaired to quantify then to be rent out. They are usually organized by the local sports associations, the municipalities and the churches. The locations of all the stores are available on the website.

Table A.12 The sharing characteristics of Fritidsbanken.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Clothes	Equipment (sport, musical, elect	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places

						roni c)													
Fritidsbanken						✓				✓			✓		✓			✓	

“Leksaksbiblioteket”(toy library) <https://www.leksaksbiblioteket.se/> offers a place to lending the second-hand toys to people as well as a home to various activities indoors and outdoors. People can borrow two items for one child to the maximum six at one time. The load period is usually four weeks the extension for more four weeks could be made on the website or through email. Instead of borrowing the items on site people can make a reservation of the wanted toys on the website specifying the data of pickup and return. There are loan rules set to improve the efficiency of management. The borrowers need to present the ID card when pick them up, the borrowers also need to pick up and return at the same day specified in the reservation. Besides, users are also encouraged to clean them up before bringing them back to the toy library, tips of cleaning different toys are available on the website. People can join the membership of toy library by paying a small amount of money in addition to borrowing, which unlocks the possibility of the way of participation and contribution to the organization and management of the library, for example, the children’s cloth swapping was launched by members. However, this is currently a project started in 2018 to 2021 funded by General Heritage Fund and Sharing Cities Sweden, organized mainly by the toy library association. They are seeking the support and collaboration with other people or organizations to be of capability of self-sustain.

Table A.13 The sharing characteristics of Leksaksbiblioteket.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical,	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places

						electronic)													es
Leks aksb iblioteket			✓							✓			✓		✓			✓	

"Franssons Hörna"<sup>1</sup> is a coffee shop where also rents indoor spaces for citizens to sell their own items in addition to offering the coffee and pastries, which provides a platform for the residents in the surroundings to sell their things like furniture, paintings, kitchen utensils, carpets, decorative items, collect items etc. just paying a little amount of money for the renting of the places in the shop.

Table A.14 The sharing characteristics of Franssons Hörna.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
Franssons Hörna			✓	✓			✓		✓	✓			✓	✓					✓

“Kvibergs Marknad” <https://kvibergsmarknad.se/> is the largest market owned by the city of Gothenburg where more than 200 sellers and 5000 visitors come together to sell, buy, repair and eat every weekends. It is a large market including the outdoor square between buildings and the indoor spaces renovated from old house stables where sellers and companies provide their old or new items or skills. It can be considered more than a second-hand market but a place where offers immense products, activities and services for people and even visitors to spend their weekends while the sharing activities are just part of it. However, the connection of the sharing initiatives with other activities such as entertainment, culture experience could only improve the spread of share economy, but the wellbeing of people.

Table A.15 The sharing characteristics of Kvibergs Marknad.

Characteristics	Shareable items								Sharing modes				Participants				Platforms		
	Vehicles	Books	Toys	Tools	Cloths	Equipment (sport, musical, electronic)	Furniture	Appliances	Sale-buy	Lend-borrow	Donate	Swap	consumers	companies	municipalities	Organizations	Online-markets	Second-hand stores	Multifunctional sharing places
Kvibergs Marknad		✓	✓	✓	✓		✓		✓				✓	✓	✓				✓

Table A.15. The categories of products in the survey.

Clothes	Furniture	Appliances	Tools	Vehicles	Equipment and hobby	Toys
Sports shoes	Sofa	Fan	Larger tools and implements	New car	Video games / playstation / computer games (not downloaded)	Toys and hobby items
Other personal accessories (jewelry, watch, sunglasses)	Chairs, stools	element	Larger tools not garden tools	Used car	Equipment for sports	/
Accessories (Gloves, gloves, belts, hats, caps, scarves, etc.)	Table	Vacuum cleaner	Small tools and various accessories	Motorcycle, moped, scooter	Sports shoes	/
Baby clothes	bedstead	Sewing and knitting machines	/	Bike	Fishing gear -	/
Children jackets, coats and coats	Garden furniture	Toaster	/	Caravan, trailer	Equipment for camping and outdoor life	/
Children fine clothing e.g. suit and long dress	/	Electric mixer	/	Boat	Grill	/
Kids dresses and skirts	/	Coffee maker	/	TV	Arts and crafts accessories	/

Kids jeans and other pants	/	Waffle iron	/	Video / DVD player	/	/
Children sports and rainwear	/	Sandwich grill	/	Tablet	/	/
Kids blouses, shirts, sweaters and t-shirts	/	Kettle	/	Printer	/	//
Children boots	/	Iron	/	Camera, film camera	/	/
Children low shoes and sandals	/	Food processor	/	CD, DVD, LP	/	/
Children sports	/	Other kitchen appliances (air fryer, ice cream machine, etc)	/	Musical instrument	/	/
Baby items (car seat, pram, etc)	/	/	/	Game consoles	/	/



Table A.16 ACPHA.

Household archetype	Clothes	Furniture	Appliances	Tools	Means of vehicles	Equipment (sports, musical, electronics)	Toys
H_K_A	70.5	1.7	0.6	2.0	1.0	4.2	9.0
H_K_H	61.9	4.4	1.1	0.6	2.6	4.4	2.1
H_NK_A	59.3	2.8	0.6	1.7	1.2	6.4	0.0
H_NK_H	35.3	1.0	1.2	2.0	3.8	2.6	1.6
L_K_A	36.0	1.3	2.0	1.1	2.1	2.2	2.5
L_K_H	37.8	0.5	1.0	0.5	0.0	1.0	1.5
L_NK_A	21.7	2.1	1.0	0.7	1.7	2.9	0.4
L_NK_H	12.1	0.4	0.4	0.0	0.6	0.0	0.0
M_K_A	55.9	3.1	2.1	0.9	2.5	7.3	4.6
M_K_H	51.4	1.9	1.1	1.4	1.3	4.7	4.7
M_NK_A	26.8	2.8	2.9	1.1	3.1	3.9	0.1
M_NK_H	18.0	0.8	0.5	0.2	0.3	0.8	0.3

Table A.17 AWPPHA.

Household archetypes	Clothes	furniture	Appliances	Tools	means of vehicles	equipment /Hobbies	Toys	Books
H_K_A	0.10	0.10	0.00	0.50	0.40	0.40	0.10	0.00
H_K_H	0.00	0.00	0.11	0.22	0.39	0.17	0.00	0.00
H_NK_A	0.10	0.00	0.10	0.10	0.30	0.10	0.00	0.00
H_NK_H	0.07	0.04	0.00	0.19	0.19	0.11	0.00	0.00
L_K_A	0.00	0.08	0.00	0.38	0.23	0.38	0.00	0.00
L_K_H	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00
L_NK_A	0.07	0.02	0.07	0.26	0.20	0.15	0.02	0.01
L_NK_H	0.14	0.00	0.00	0.00	0.14	0.14	0.00	0.00
M_K_A	0.02	0.02	0.00	0.41	0.34	0.23	0.05	0.00
M_K_H	0.03	0.00	0.07	0.30	0.30	0.30	0.07	0.00
M_NK_A	0.02	0.04	0.03	0.30	0.26	0.23	0.01	0.01
M_NK_H	0.00	0.00	0.00	0.19	0.16	0.10	0.00	0.03

Table A.18 AWPUHA

Household archetypes	Clothes	Furniture	Appliances	Tools	Vehicles	Equipment/Hobbies	Toys	Books
H_K_A	0.10	0.00	0.00	0.50	0.20	0.20	0.00	0.00
H_K_H	0.00	0.06	0.06	0.06	0.17	0.17	0.00	0.06
H_NK_A	0.10	0.00	0.00	0.10	0.00	0.00	0.00	0.00
H_NK_H	0.00	0.04	0.04	0.22	0.04	0.19	0.00	0.04
L_K_A	0.00	0.00	0.15	0.23	0.23	0.15	0.08	0.08
L_K_H	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L_NK_A	0.10	0.01	0.05	0.11	0.05	0.11	0.01	0.02
L_NK_H	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M_K_A	0.07	0.07	0.05	0.16	0.16	0.14	0.14	0.00
M_K_H	0.13	0.07	0.00	0.20	0.07	0.10	0.00	0.03
M_NK_A	0.05	0.02	0.03	0.15	0.05	0.10	0.01	0.02
M_NK_H	0.00	0.00	0.00	0.03	0.03	0.03	0.00	0.00

Table A.19. TCP.

Neighborhood areas	Clothes	Furniture	Appliances	Tools	Vehicles	Equipment and hobbies	Toys
101Kungsladugård	143633	11173	6618	4239	9906	15948	5040
102 Sanna	33124	2921	1575	1004	2521	4059	890
103 Majorna	141127	11437	6866	4270	10383	16115	4599
104 Stigberget	95793	7339	4726	2895	6897	10443	3462
105Masthugget	172544	15660	16938	6721	17960	21999	3240
106Änggården	18887	1207	616	480	880	1915	913
107 Haga	56197	4806	5286	2140	5599	6811	1323
108 Annedal	69765	6648	7090	2767	7523	9270	1015
109 Olivedal	177926	16117	15736	5986	16931	25074	5028
110 Krokslätt	176260	14990	8166	5258	12871	20981	5131
111 Johanneberg	144954	14181	14298	5412	15289	20760	2502
112 Landala	67027	5717	3217	2030	5032	7986	1957
113 Guldheden	143606	11776	6864	4319	10497	16568	4552
114	27610	2582	2556	970	2743	3917	657

Lorensberg							
115 Vasastaden	103200	9517	9365	3558	10061	14597	2660
116 Inom Vallgraven	65782	6167	6111	2319	6556	9336	1543
117 Stampen	106543	10035	10745	4211	11402	14024	1667
118 Heden	94857	9007	8973	3403	9617	13499	2051
201 Olskroken	90781	8373	9016	3559	9563	11735	1583
202 Redbergslid	39898	3384	3722	1510	3939	4794	955
203 Bagaregården	50278	4091	2230	1475	3469	5817	1631
204 Kallebäck	52408	4348	2499	1581	3854	6118	1636
205 Skår	53955	3347	2746	1482	2920	5571	2664
206 Överås	35792	2078	1938	1365	2856	3885	1812
207 Kärralund	49473	4342	4201	1658	4514	6750	1478
208 Lunden	176950	15843	16763	6756	17769	22372	3503
209 Härlanda	20575	1438	1384	668	1462	2180	793
210 Kålltorp	111280	9018	5131	3307	7876	12789	3644
211 Torpa	47942	3097	1842	1322	2581	4750	2250
212 Björkekärr	107506	7817	4551	3091	6712	11524	4334
301 Gamlestaden	121391	10078	5812	3643	8930	14111	3680
302 Utby	66894	2932	1692	1653	1959	5484	4506
303 Södra Kortedala	122866	9480	5886	3626	8619	13397	4144
304 Norra Kortedala	81589	5866	3818	2314	5335	8265	2860
305 Västra Bergsjön	85534	6064	4135	2492	5742	8647	3244
306 Östra Bergsjön	86274	5627	4305	2514	5742	8136	3688
402 Kvillebäcken	156007	12425	7173	4475	10719	17313	4596
403 Slätta Damm	54644	4057	2306	1569	3443	5939	2120
404 Kärrdalen	55615	2315	1356	1295	1400	4254	3601
405 Tuve	102381	5996	4080	2394	4816	8258	3323
406 Säve	24288	1031	604	554	615	1829	1497
407 Kärra	125786	7058	4202	3368	5598	11700	7103
408 Rödbo	9680	398	219	207	215	682	571
409 Skogome	32821	2065	1852	1006	1966	3305	1547

410 Brunnsbo	75419	4485	3126	1837	3769	6251	2588
412 Backa	86687	5686	3910	2330	5124	8017	3136
413 Skälltorp	107516	7793	4542	3042	6641	11338	4167
414 Kyrkbyn	106574	7847	4382	3025	6546	11516	4162
415 Rambergstaden	126373	10734	6023	3818	9420	15024	3732
416 Eriksberg	151365	13103	12569	4889	13560	20925	5059
417 Lindholmen	59976	5571	5503	2103	5900	8428	1430
501 Fiskebäck	85632	3951	2567	2061	2666	6981	5174
502 Långedrag	29024	1031	876	1199	1977	2484	1930
503 Hagen	69064	3743	2800	1762	2979	6579	3952
504 Grimmered	45180	1859	1036	1045	1097	3445	2969
505 Södra Skärgården	49391	2142	1177	1040	1185	3477	2690
506 Bratthammar	27241	1119	615	616	638	2037	1746
507 Guldringen	31723	2631	1534	960	2355	3693	985
508 Skattegården	29524	2120	1439	869	2015	3026	1121
509 Kaverös	58586	4912	2825	1774	4368	6881	1778
510 Flatås	44519	3400	2198	1345	3201	4841	1617
511 Högsbohöjd	52902	3650	2417	1542	3385	5368	2247
512 Högsbotorp	100729	8441	4827	3033	7462	11808	3015
513 Tofta	35113	2841	1709	1062	2582	4004	1148
514 Ruddalen	31039	2750	1448	937	2340	3831	832
515 Järnbrott	54506	4132	2326	1577	3511	6024	2057
516 Högsbo	260	25	12	8	21	35	5
517 Frölunda Torg	75909	5885	3658	2252	5374	8303	2574
518 Ängås	42166	2730	1812	1170	2450	4015	1830
519 Önnered	43111	2027	1389	1056	1433	3468	2496
520 Grevegården	41989	2896	2121	1266	2909	4203	1774
521 Näset	67495	2826	1650	1572	1705	5184	4356
522 Kannebäck	37485	2576	1664	1081	2339	3804	1601

523 Askim	116682	6380	3790	2981	4869	10307	6278
524 Hovås	47806	1719	1464	1979	3244	4092	3167
525 Billdal	137066	6600	4840	3571	5098	11606	8283
601 Lövgärdet	79017	5150	3852	2277	5088	7425	3302
602 Rannebergen	52706	3321	2350	1389	2994	4686	1944
603 Gårdstensberg et	84372	5315	4048	2384	5226	7701	3540
604 Angereds Centrum	35057	2193	1586	910	2053	3092	1274
605 Agnesberg	10122	652	408	244	518	890	302
606 Hammarkullen	70705	4147	3355	1866	4241	5871	2903
609 Linnarhult	5357	173	138	69	55	193	141
610 Gunnilse	12567	332	326	163	89	415	383
611 Bergum	44752	1312	1247	641	522	1710	1416
612 Hjällbo	66559	4128	3284	1899	4251	6000	2907
613 Eriksbo	27127	1799	1365	805	1833	2614	1171
701 Norra Biskopsgården	49718	3157	2431	1432	3163	4596	2139
702 Länsmansgård en	58810	4191	2950	1775	4123	6044	2377
703 Svartedalen	45963	3438	2230	1347	3219	4856	1623
704 Hjuvik	80275	3382	2048	1951	2166	6410	5416
705 Nolered	131581	7409	6216	3738	6555	12177	6853
706 Björlanda	98536	4195	2709	2508	2919	8148	6893
707 Arendal	395	18	10	5	7	17	6
708 Södra Biskopsgården	88177	6420	4305	2594	6102	9142	3276
709 Jättesten	72835	4694	2994	1797	3815	6511	2258

Table A.20. TWPU for neighborhood areas of Gothenburg.

Neighborhood areas	Clothes	Furniture	Appliances	Tools	Vehicles	Equipment/Hobby	Toys	Books
101Kungsladugård	298	170	303	1634	1188	1121	109	57

102 Sanna	85	39	85	395	288	253	28	14
103 Majorna	312	186	312	1659	1183	1138	104	52
104 Stigberget	191	134	191	1116	784	797	64	32
105 Masthuggen	111	302	166	1898	1571	1566	55	55
106 Änggården	28	8	32	176	146	116	17	10
107 Haga	33	100	49	616	497	519	16	16
108 Annedal	49	120	73	769	651	623	24	25
109 Olivedal	124	226	153	1771	1552	1290	95	51
110 Krokslätt	426	200	430	2062	1513	1336	148	78
111 Johanneberg	109	210	150	1520	1342	1145	69	50
112 Landala	162	83	162	795	574	524	54	27
113 Guldheden	325	180	326	1682	1211	1135	110	56
114 Lorensberg	20	37	26	281	247	208	14	9
115 Vasastaden	73	135	93	1040	913	763	54	31
116 Inom Vallgraven	48	89	62	670	589	496	33	21
117 Stampen	73	184	109	1174	988	956	36	36
118 Heden	69	131	92	975	858	725	47	31
201 Olskroken	60	158	90	999	833	820	30	30
202 Redbergslid	23	71	34	438	352	368	11	12
203 Bagaregården	114	52	117	570	424	373	43	22
204 Kallebäck	121	65	122	614	444	412	41	21
205 Skår	29	30	47	462	415	344	39	25
206 Överås	39	31	25	268	248	202	21	4
207 Kärralund	34	59	45	486	428	358	28	15
208 Lunden	115	286	175	1909	1605	1553	65	63
209 Härlanda	11	22	19	197	168	159	11	9
210 Kålltorp	248	129	252	1279	935	856	89	46
211 Torpa	72	39	81	480	371	344	38	21
212 Björkekärr	201	107	213	1154	865	802	86	44
301 Gamlestaden	281	159	289	1421	1023	948	94	48
302 Utby	44	12	72	513	457	405	62	30
303 Södra Kortedala	252	184	277	1393	991	966	84	44

304	Norra Kortedala	146	128	172	900	639	631	49	33
305	Västra Bergsjön	148	133	164	959	671	698	49	30
306	Östra Bergsjön	146	143	140	942	661	753	42	21
402	Kvillebäcken	342	235	401	1737	1261	1138	114	67
403	Slätta Damm	106	53	112	590	444	403	45	23
404	Kärrdalen	24	3	48	421	386	322	47	33
405	Tuve	129	235	280	915	672	603	43	54
406	Säve	10	1	20	188	172	140	20	16
407	Kärra	148	73	183	1135	920	853	109	50
408	Rödbo	4	0	7	77	69	55	7	7
409	Skogome	18	26	32	292	256	237	22	14
410	Brunnsbo	98	168	196	696	503	475	33	36
412	Backa	132	160	190	896	636	634	44	36
413	Skälltorp	197	106	207	1164	872	799	83	49
414	Kyrkbyn	204	97	217	1138	865	772	89	48
415	Rambergstade n	304	154	305	1492	1081	983	103	51
416	Eriksberg	102	178	124	1463	1283	1061	86	40
417	Lindholmen	43	79	56	609	536	451	31	19
501	Fiskebäck	39	13	74	671	612	505	70	50
502	Långedrag	39	16	19	167	165	134	19	0
503	Hagen	35	25	58	559	505	417	54	33
504	Grimmered	22	2	41	342	312	260	39	26
505	Södra Skärgården	21	2	37	411	364	282	34	41
506	Bratthammar	12	0	24	208	190	155	23	17
507	Guldringen	73	41	73	374	268	252	24	12
508	Skattegården	52	45	56	334	234	244	17	10
509	Kaverös	138	74	138	692	498	463	46	23
510	Flatås	88	62	88	518	364	371	29	15
511		87	65	91	580	417	427	35	18

Högsbohöjd								
512 Högsbotorp	237	129	241	1185	854	787	79	40
513 Tofta	77	46	77	413	294	283	26	13
514 Ruddalen	81	35	81	367	270	233	28	14
515 Järnbrott	110	54	115	594	446	403	45	23
516 Högsbo	1	0	1	3	2	2	0	0
517 Frölunda Torg	155	107	163	874	621	608	52	28
518 Ängås	60	46	64	451	330	329	26	19
519 Önnared	19	10	36	348	313	264	33	26
520 Grevegården	68	65	68	481	330	368	23	11
521 Näset	30	3	59	511	469	389	58	40
522 Kannebäck	62	43	65	406	296	296	26	14
523 Askim	123	61	154	1062	866	777	92	60
524 Hovås	64	27	33	277	274	225	31	1
525 Billdal	65	46	123	1095	980	873	109	67
601 Lövgärdet	114	130	130	873	601	664	38	26
602 Rannebergen	74	102	115	533	378	380	25	22
603 Gårdstensberg et	116	157	156	894	615	682	39	25
604 Angereds Centrum	73	77	89	321	244	255	17	9
605 Agnesberg	15	21	28	96	71	61	5	6
606 Hammarkullen	143	140	133	670	511	583	29	14
609 Linnarhult	0	15	15	33	27	16	0	5
610 Gunnilse	0	51	51	53	44	27	0	9
611 Bergum	6	176	177	206	166	113	2	29
612 Hjällbo	106	123	113	699	490	568	30	15
613 Eriksbo	43	44	43	303	209	238	14	7
701 Norra Biskopsgården	69	89	86	537	367	415	23	14
702 Länsmansgård en	102	88	102	677	467	508	34	17
703 Svartedalen	98	68	96	514	371	376	30	15



704 Hjuvik	38	6	75	594	549	470	73	40
705 Nolered	66	79	119	1130	992	905	92	61
706 Björlanda	49	16	96	721	663	597	92	39
707 Arendal	0	0	0	4	4	2	0	1
708 Södra Biskopsgården	173	137	178	985	699	726	54	27
709 Jättesten	114	162	213	674	495	438	38	34

Table A.21. TWPP of the neighborhood areas of Gothenburg.

Neighborhood areas	Clothes	Furniture	Appliances	Tools	Vehicles	Equipment/Hobby	Toys	Books
101Kungsladugård	460	60	388	747	481	657	121	176
102 Sanna	127	14	93	175	104	164	25	39
103 Majorna	468	52	424	766	506	684	134	186
104 Stigberget	286	32	300	529	370	459	102	134
105Masthugget	277	111	327	1017	518	659	136	191
106Änggården	53	14	20	74	37	60	6	12
107 Haga	82	33	119	334	187	217	52	68
108 Annedal	121	49	118	407	189	264	47	71
109 Olivedal	321	167	197	867	408	590	182	102
110 Krokslätt	648	77	471	911	544	841	130	204
111 Johanneberg	278	128	169	766	316	507	106	100
112 Landala	244	27	193	358	222	329	56	83
113 Guldheden	490	56	415	766	492	690	126	181
114 Lorensberg	51	25	31	139	62	94	25	17
115 Vasastaden	189	96	116	513	234	347	99	62
116 Inom Vallgraven	122	60	74	333	148	223	59	41
117 Stampen	182	73	186	624	297	404	75	111
118 Heden	178	86	108	486	211	325	80	61
201 Olskroken	150	60	166	534	264	346	68	98
202 Redbergslid	57	23	85	236	134	154	37	48
203	178	24	123	252	149	228	34	55

Bagaregården								
204 Kallebäck	183	21	150	279	176	253	45	66
205 Skår	95	48	26	211	98	135	23	27
206 Överås	53	38	29	179	60	125	17	26
207 Kärralund	91	46	51	239	109	160	44	29
208 Lunden	296	120	296	1006	489	650	120	180
209 Härlanda	34	15	24	99	50	63	10	17
210 Källtorp	382	48	298	577	358	519	88	133
211 Torpa	130	28	89	221	134	177	28	48
212 Björkekärr	331	55	245	529	324	450	75	118
301 Gamlestaden	422	47	350	643	408	585	104	151
302 Utby	136	59	26	242	116	151	9	40
303 Södra Kortedala	378	42	358	645	435	571	116	158
304 Norra Kortedala	219	24	228	411	289	358	77	102
305 Västra Bergsjön	222	25	258	454	331	387	92	117
306 Östra Bergsjön	189	21	280	473	368	385	109	130
402 Kvillebäcken	513	57	409	766	481	704	119	176
403 Slätta Damm	173	28	123	267	160	230	36	59
404 Kärrdalen	96	48	3	182	84	109	1	25
405 Tuve	194	22	190	371	263	330	63	84
406 Säve	40	20	1	78	36	47	0	10
407 Kärra	311	90	165	538	302	396	54	108
408 Rödbo	14	7	0	29	15	18	0	4
409 Skogome	58	27	27	147	69	91	11	25
410 Brunnsbo	147	16	157	295	214	258	54	70
412 Backa	198	22	224	404	295	347	79	101
413 Skälltorp	321	52	243	521	325	447	75	116
414 Kyrkbyn	337	57	225	509	299	438	65	109
415 Rambergstade n	458	52	360	671	415	616	104	155
416 Eriksberg	270	146	159	713	347	487	162	82
417 Lindholmen	111	55	67	301	133	202	52	37

501 Fiskebäck	147	73	10	290	132	176	7	39
502 Långedrag	38	34	16	147	36	104	2	24
503 Hagen	121	63	23	252	120	159	26	32
504 Grimmered	81	39	4	148	69	89	1	21
505 Södra Skärgården	72	33	6	148	79	99	2	19
506 Bratthammar	47	23	1	87	40	53	0	12
507 Guldringen	110	12	94	171	110	155	29	41
508 Skattegården	78	9	91	159	116	135	32	41
509 Kaverös	207	23	171	314	200	286	51	74
510 Flatås	132	15	140	246	173	213	48	62
511 Högsbohöjd	140	21	145	277	193	229	51	69
512 Högsbotorp	356	40	290	535	337	489	86	125
513 Tofta	116	13	106	191	126	170	33	46
514 Ruddalen	122	14	83	161	93	152	22	35
515 Järnbrott	178	28	125	268	160	234	36	59
516 Högsbo	1	0	1	1	1	1	0	0
517 Frölunda Torg	233	26	225	404	275	357	73	99
518 Ängås	100	17	102	207	145	169	37	50
519 Önnered	71	35	11	151	73	93	5	22
520 Grevegården	102	11	141	239	183	197	53	65
521 Näset	118	58	2	220	100	131	1	30
522 Kannebäck	101	16	96	192	130	159	33	46
523 Askim	261	77	137	474	274	351	46	92
524 Hovås	65	55	26	243	58	170	1	40
525 Billdal	239	116	56	517	248	311	24	82
601 Lövgärdet	171	19	246	423	329	348	95	114
602 Rannebergen	111	12	133	240	178	204	48	60
603 Gårdstensberg et	175	19	254	435	338	357	98	117

604 Angereds Centrum	78	9	88	154	111	132	31	40
605 Agnesberg	23	3	19	38	26	35	6	8
606 Hammarkullen	130	14	202	339	267	274	79	94
609 Linnarhult	0	0	0	5	5	5	0	0
610 Gunnilse	0	0	0	9	9	9	0	0
611 Bergum	9	1	11	47	42	44	4	5
612 Hjällbo	133	15	211	354	280	286	84	98
613 Eriksbo	61	7	90	152	118	124	35	42
701 Norra Biskopsgården	104	12	156	265	208	216	61	72
702 Länsmansgården	153	17	193	332	247	278	71	88
703 Svartedalen	133	15	138	243	169	212	47	61
704 Hjuvik	149	74	6	274	120	160	3	40
705 Nolered	225	105	90	547	268	337	38	91
706 Björlanda	191	94	21	358	159	205	9	56
707 Arendal	0	0	0	1	1	1	0	0
708 Södra Biskopsgården	243	27	270	472	337	405	94	121
709 Jättesten	171	19	145	281	186	256	44	63

Table A.22 The neighborhood composition of the four clusters.

Neighborhood type A	Neighborhood type B	Neighborhood type C	Neighborhood type D
101 Kungsladugård	102 Sanna	105 Masthugget	104 Stigberget
103 Majorna	106 Änggården	109 Olivedal	108 Annedal
110 Krokslätt	107 Haga	111 Johanneberg	112 Landala
113 Guldheden	114 Lorensberg	208 Lunden	115 Vasastaden
210 Kålltorp	202 Redbergslid	416 Eriksberg	116 Inom Vallgraven
301 Gamlestaden	203 Bagaregården		117 Stampen
303 Södra Kortedala	204 Kallebäck		118 Heden
402 Kvillebäcken	205 Skår		201 Olskroken
415 Rambergsstaden	206 Överås		212 Björkekärr
	207 Kärralund		304 Norra Kortedala
	209 Härlanda		305 Västra Bergsjön
	211 Torpa		306 Östra Bergsjön
	302 Utby		405 Tuve
	403 Slätta Damm		407 Kärra
	404 Kärrdalen		410 Brunnsbo
	406 Säve		412 Backa
	408 Rödbo		413 Skälltorp
	409 Skogome		414 Kyrkbyn
	417 Lindholmen		509 Kaverös
	501 Fiskebäck		512 Högsbotorp
	502 Långedrag		517 Frölunda Torg
	503 Hagen		523 Askim
	504 Grimmered		525 Bildal
	505 Södra Skärgården		601 Lövgärdet
	506 Bratthammar		603 Gårdstensberget
	507 Guldringen		606 Hammarkullen

	508 Skattegården		612 Hjällbo
	510 Flatås		702 Länsmansgården
	511 Högsbohöjd		705 Nolered
	513 Tofta		706 Björlanda
	514 Ruddalen		708 Södra Biskopsgården
	515 Järnbrott		709 Jättesten
	516 Högsbo		
	518 Ängås		
	519 Önnered		
	520 Grevegården		
	521 Näset		
	522 Kannebäck		
	524 Hovås		
	602 Rannebergen		
	604 Angereds Centrum		
	605 Agnesberg		
	609 Linnarhult		
	610 Gunnilse		
	611 Bergum		
	613 Eriksbo		
	701 Norra Biskopsgården		
	703 Svartedalen		
	704 Hjuvik		
	707 Arendal		

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