DALARNA
UNIVERSITY

Lab – 4 Report

By

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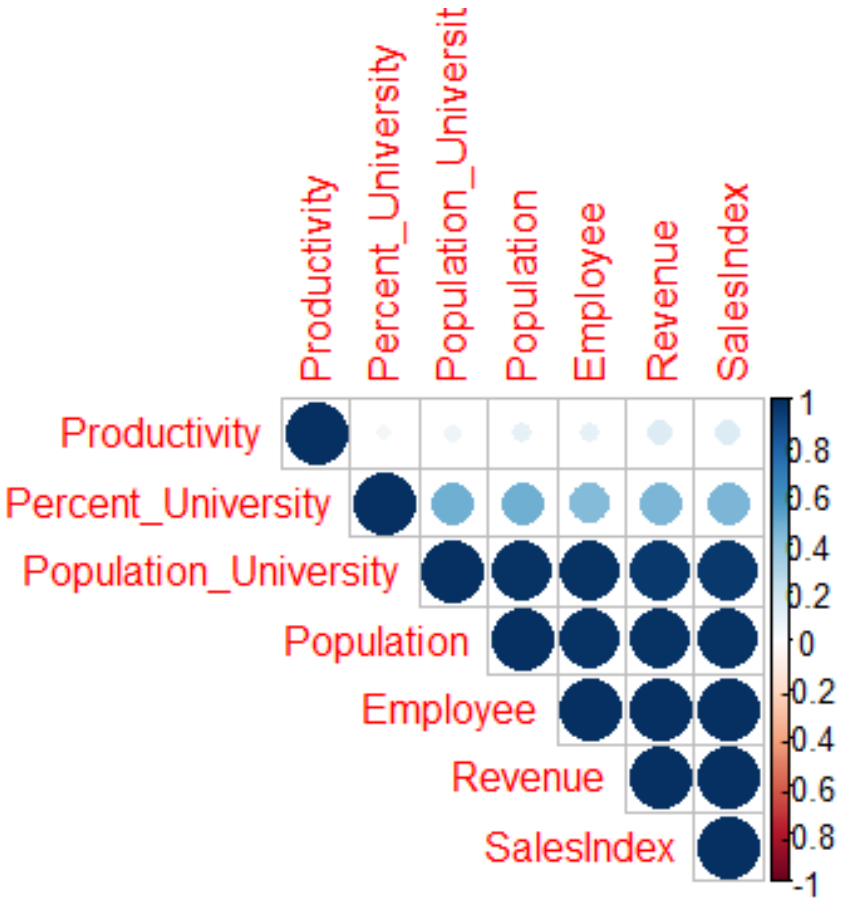
Prediction of Cities suitable for new Ikea Establishment in Sweden

Solution: In order to predict the cities that are suitable for establish Ikea we followed the following procedure:

Step 1: Check the correlation among various factors.



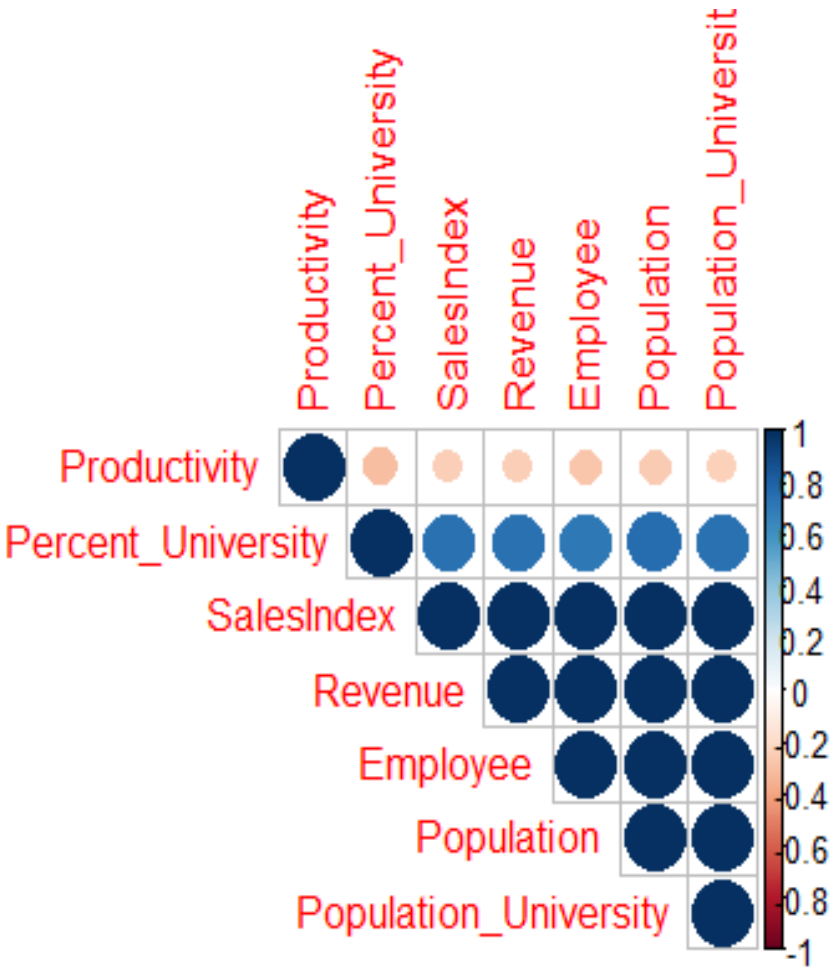
We found that Population_University, Population, Employee, Revenue, Sales Index we are all highly correlated. So, we can use one factor to predict the other, hence we can just choose 1 factor, but However to be more accurate we choose **Population** and **Revenue** as the main predicting factors.

Step 2: Check the correlation among the factors just with cities having Ikea.

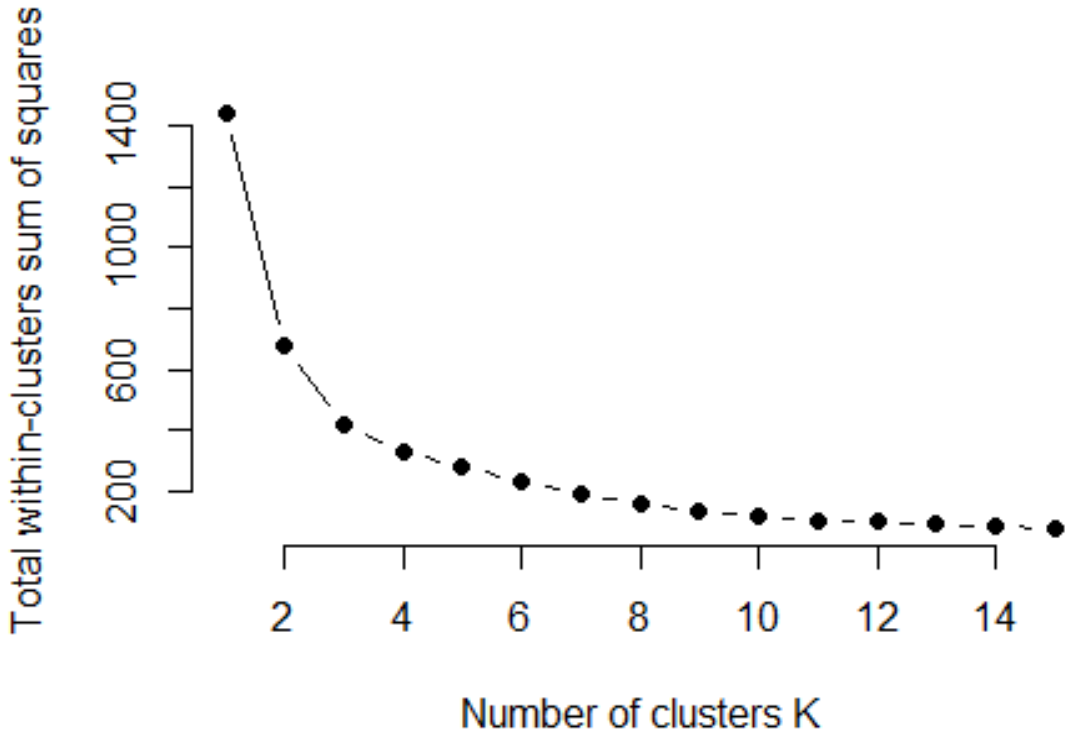
We found the cities having Ikea also has same kind of correlation. Hence, we were confirmed to use **Population** and **Revenue** as the predictors.

- Average Population: **175696.3**
- Average Revenue: **7178.5**
- Minimum Population**: >50,000**
- Minimum Revenue: **> 2000**

Note: Exception for two cites **Haparanda** and **Älmhult**.



Step 3: Choosing Right number of cluster for K-mean clustering.

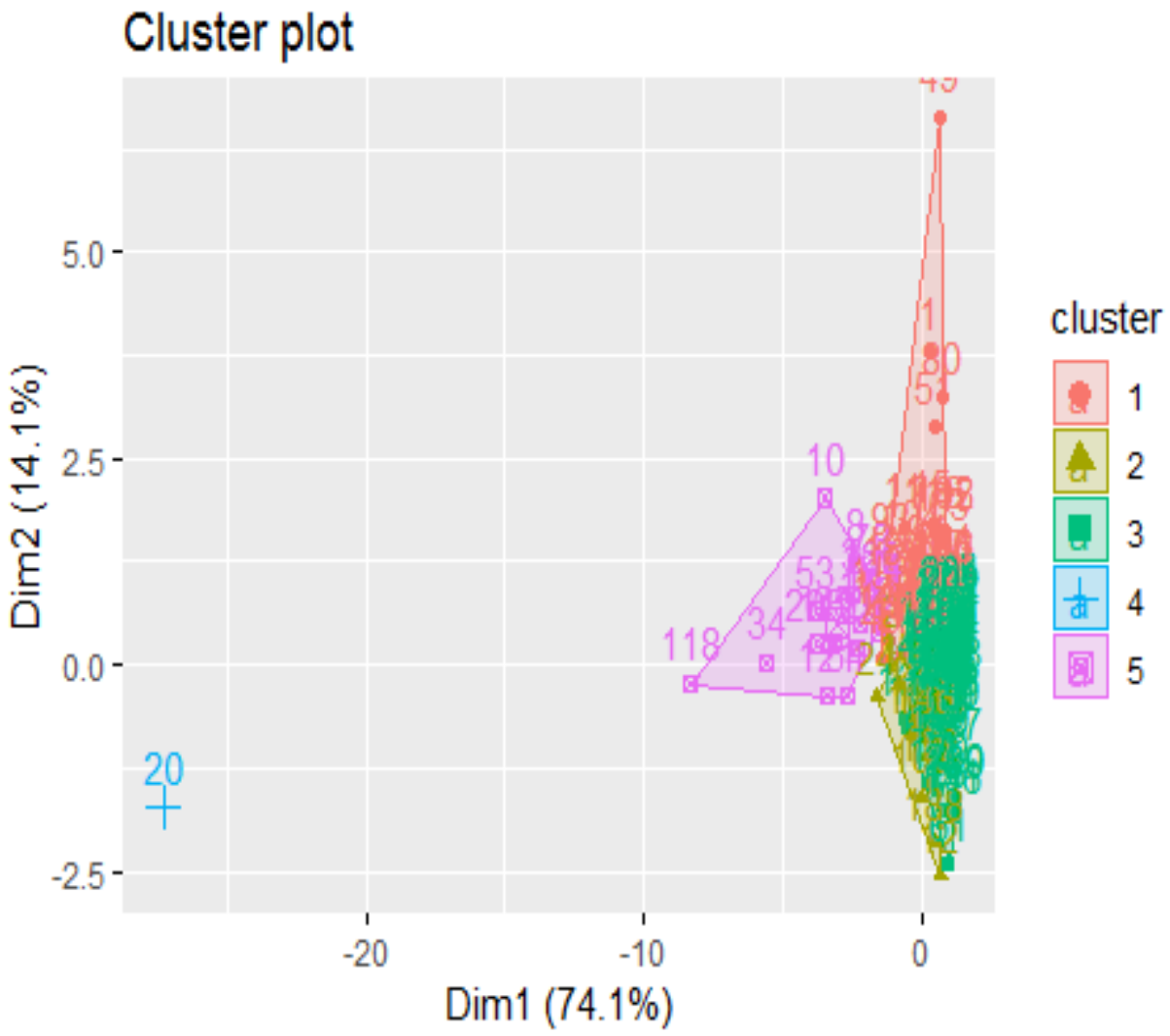


Based on observing the slope we could have chosen the number of clusters from 4 and above. But to have an optimal number of clusters we chose **5** clusters.

Step 4: Making Cluster based on K-means Algorithm

As we can see from the below clustering graph

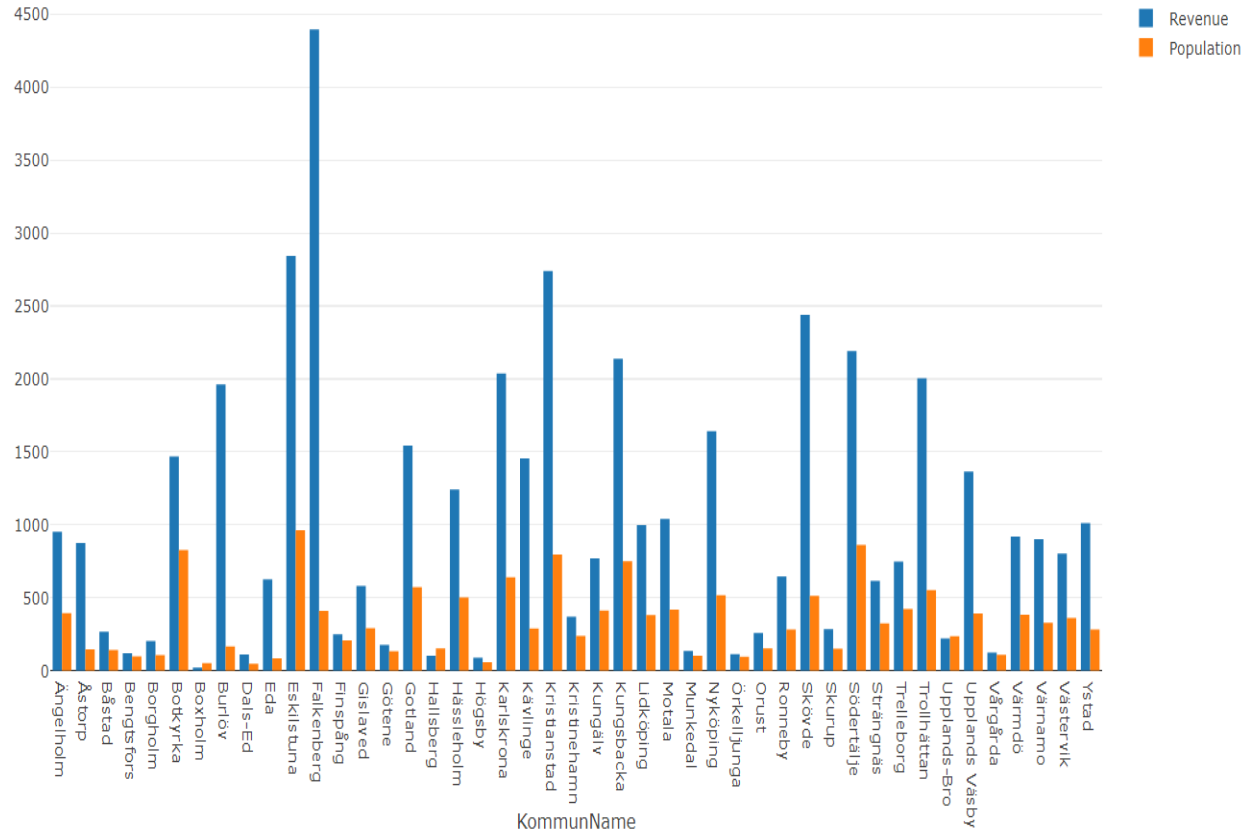
- **Cluster 4** i.e. the outlier is Stockholm. Which has highest values in terms of all parameters. However, since it already has Ikea, we chose not to consider this cluster for further analysis.
- We consider **cluster 1,2,3** and **5** for our further analysis.



Step 5: Analysing clusters

We analysed each and every cluster and to find the cities that falls in each cluster. We consider **Population** and **Revenue** for the selection of the city from each city by considering highest ones in each cluster.

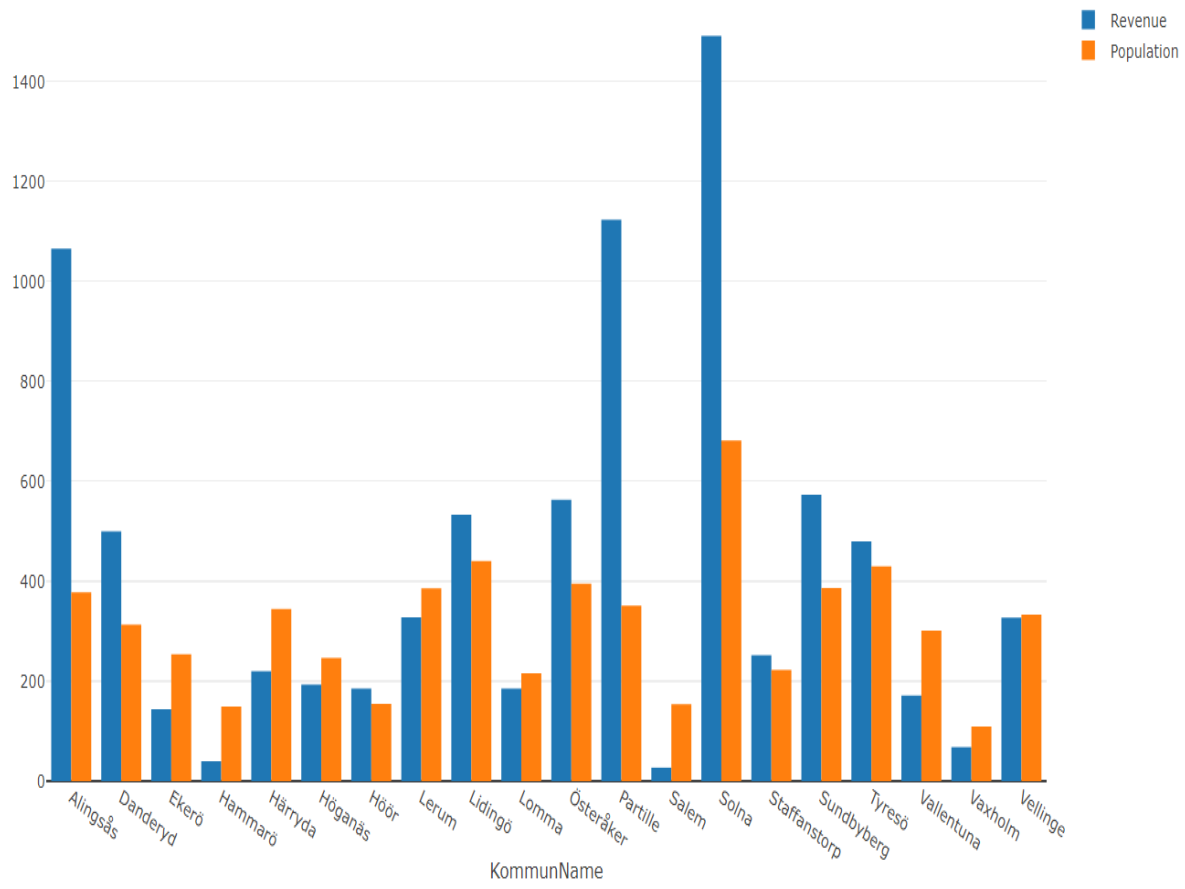
Cluster 1:



From this cluster we chose the following cities

1. **Falkenberg.**
2. **Eskilstuna.**
3. **Kristianstad.**
4. **Skövde.**
5. **Södertälje.**
6. **Kungsbacka.**
7. **Karlskrona.**
8. **Burlöv.**

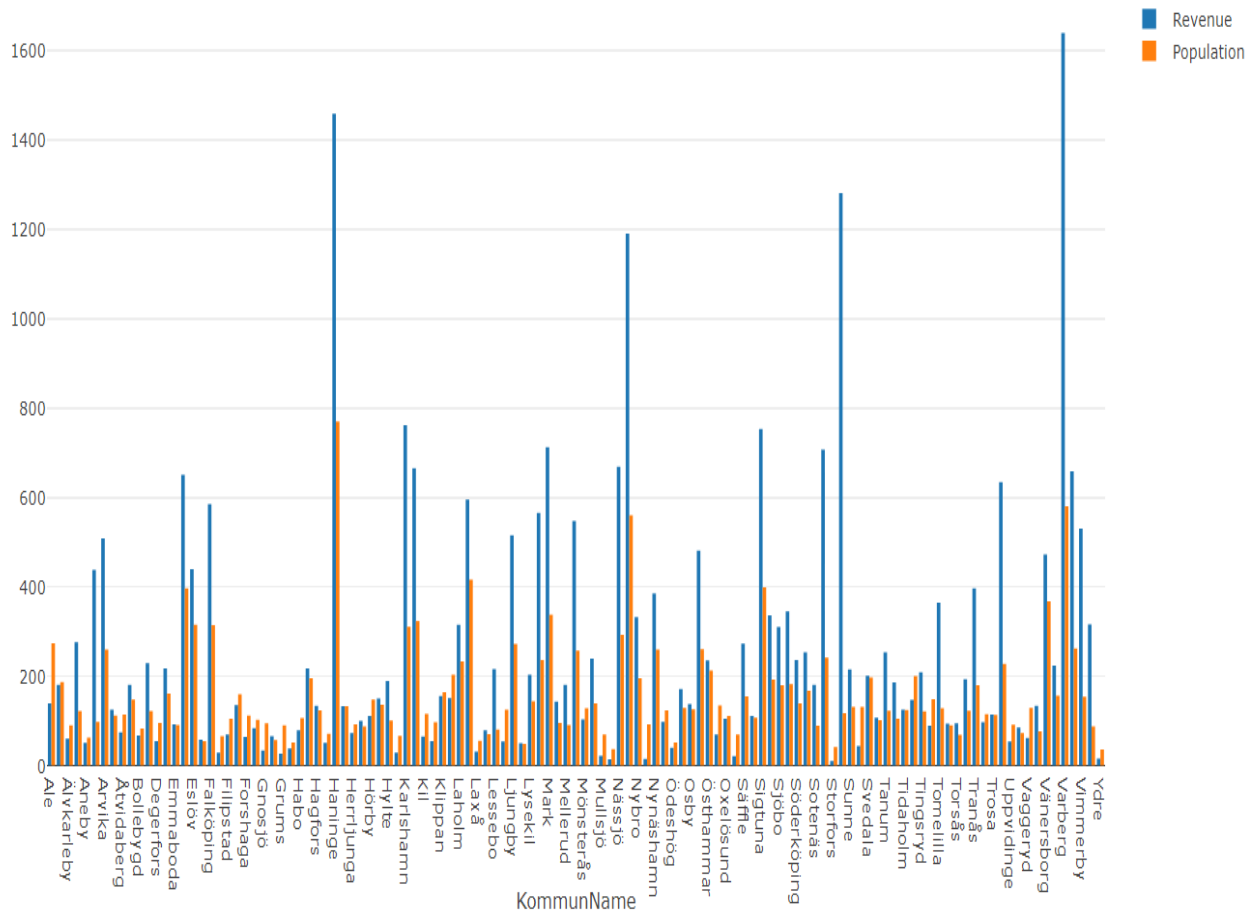
Cluster 2:



From this cluster we chose the following cities

1. **Solna.**
2. **Partille.**
3. **Alingsås.**

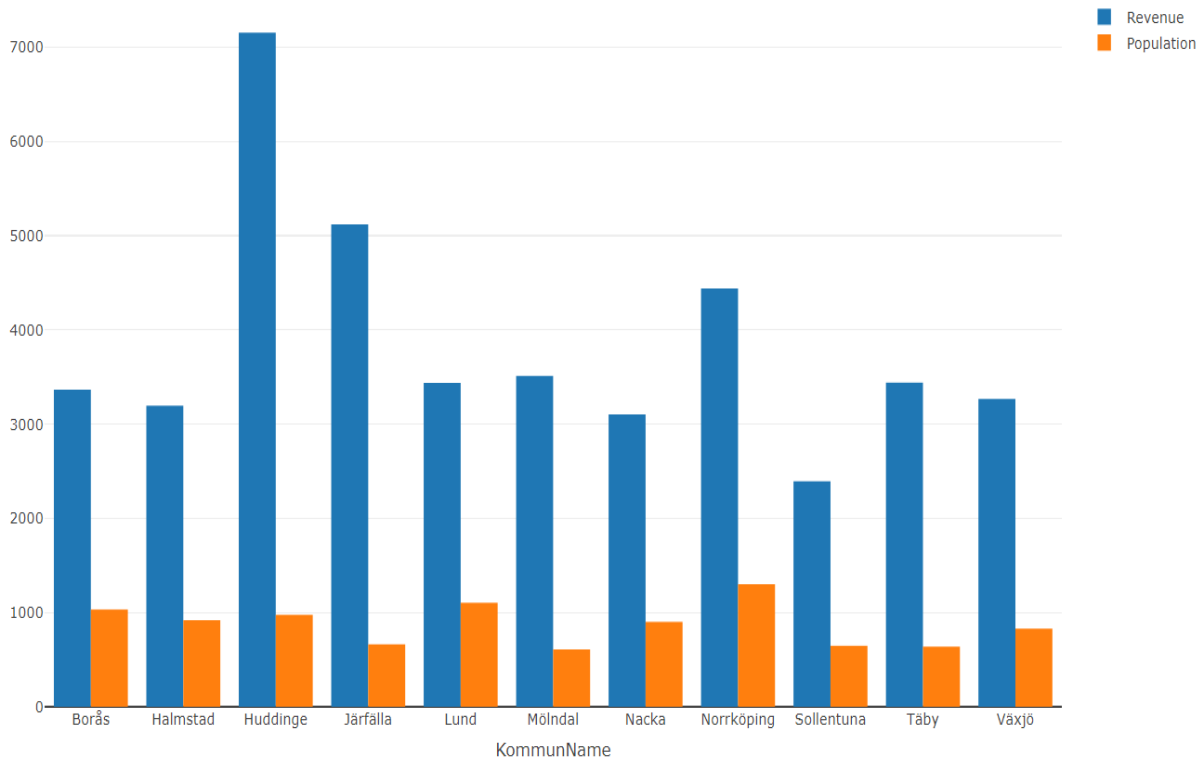
Cluster 3:



From this cluster we chose the following cities

1. **Varberg.**
2. **Haninge.**
3. **Strömstad.**
4. **Norrtälje.**

Cluster 5:



From this cluster we chose the following cities

1. **Huddinge**
2. **Järfälla.**
3. **Norrköping.**
4. **Mölndal.**
5. **Lund.**
6. **Borås.**
7. **Växjö.**
8. **Täby.**
9. **Halmstad.**
10. **Nacka.**

Consider the below Table

City		Population	Revenue	Cluster
1	Falkenberg	41008	4395	1
2	Eskilstuna	96311	2844	1
3	Kristianstad	79543	2739	1
4	Skövde	51402	2438	1
5	Södertälje	86246	2191	1
6	Kungsbacka	75025	2139	1
7	Karlskrona	64032	2037	1
8	Burlöv	16701	1962	1
9	Solna	68144	1491	2
10	Partille	35084	1123	2
11	Alingsås	37796	1065	2
12	Varberg	58084	1639	3
13	Haninge	77054	1459	3
14	Strömstad	11808	1281	3
15	Norrtälje	56080	1191	3
16	Huddinge	97453	7153	5
17	Järfälla	66211	5119	5
18	Norrköping	130050	4438	5
19	Mölndal	60973	3512	5
20	Lund	110488	3438	5
21	Borås	103294	3365	5
22	Växjö	83005	3268	5
23	Täby	63789	3441	5
24	Halmstad	91800	3196	5
25	Nacka	90108	3104	5

Conclusion:

So, if consider based on the **population and Revenue**, we can establish Ikea in the following cities in the same order as given

- Population: **>75000**
- Revenue: **>2000**

1. **Norrköping**
2. **Lund**
3. **Borås**
4. **Huddinge**
5. **Eskilstuna**
6. **Halmstad**
7. **Nacka**
8. **Södertälje**
9. **Växjö**
10. **Kristianstad**
11. **Haninge**
12. **Kungsbacka**

Cluster 5 being the best option to be chosen.

However, **Huddinge**, **Haninge**, **Nacka** and **Södertälje** are all closer to Stockholm but, due to high population its better to establish in these cities as well.

Map: Below


Haninge, **Nacka**
and **Södertälje**
N
Leksand
Gävle
Sandviken
Älvkarleby
Torsby
Vansbro
Gagnef
Borlänge
Hofors
Säter
Hedemora
Ludvika
Avesta
Hagfors
Smedjebacken
Norberg
Sunne
Fagersta
Sala
Uppsala
Norrtälje
Eda
Filipstad
Hällefors
Skinnskatteberg
Arvika
Forshaga
Lindesberg
Enköping
Kil
Köping
Grums
Karlstad
Storfors
Nora
Årjäng
Karlskoga
Arboga
Eskilstuna
Säffle
Hammarö
Örebro
Kristinehamn
Lekeberg
Bengtsfors
Degerfors
Kumla
Strömstad
Dals-Ed
Åmål
Hallsberg
Vingåker
Flen
Gnesta
Södertälje
Katrineholm
Gullspång
Laxå
Tanum
Askersund
Nyköping
Trosa
Mellerud
Mariestad
Finspång
Färgelanda
Töreboda
Oxelösund
Munkedal
Motala
Götene
Karlsborg
Norrköping
Vänersborg
Lidköping
Skövde
Tibro
Sotenäs
Uddevalla
Söderköping
Lysekil
Grästorp
Skara
Vadstena
Linköping
Trollhättan
Vara
Mjölby
Hjo
Orust
Lilla Edet
Essunga
Falköping
Tidaholm
Ödeshög
Boxholm
Åtvidaberg
Valdemarsvik
Tjörn
Alingsås
Herrljunga
Stenungsund
Ale
Vårgårda
Habo
Tranås
Kinda
Kungälv
Mullsjö
Lerum
Ulricehamn
Aneby
Ydre
Västervik
Öckerö
Göteborg
Partille
Bollebygd
Jönköping
Vimmerby
Mölndal
Härryda
Borås
Kungsbacka
Tranemo
Nässjö
Eksjö
Mark
Vaggeryd
Svenljunga
Gnosjö
Vetlanda
Hultsfred
Oskarshamn
Sävsjö
Varberg
Gislaved
Värnamo
Högsby
Mönsterås
Hylte
Falkenberg
Uppvidinge
Växjö
Gotland
Borgholm
Halmstad
Ljungby
Alvesta
Lessebo
Nybro
Kalmar
Laholm
Markaryd
Älmhult
Tingsryd
Emmaboda
Mörbylånga
Båstad
Osby
Torsås
Ängelholm
Örkelljunga
Olofström
Ronneby
Karlskrona
Höganäs
Perstorp
Östra Göinge
Hässleholm
Karlshamn
Klippan
Bromölla
Helsingborg
Bjuv
Sölvesborg
Svalöv
Höör
Kristianstad
Landskrona
Eslöv
Hörby
Lomma
Staffanstorp
Burlöv
Lund
Sjöbo
Malmö
Tomelilla
Vellinge
Svedala
Ystad
Simrishamn
Trelleborg
Skurup