Aalto University
School of Engineering

Residential infill development

The connection between inhabitants' attitude and areal characteristics

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Background and motivation

- The Helsinki Metropolitan Area is a growing region with rising demand for housing
  - Helsinki gains 7000 inhabitants each year (Statistics Finland)
- The low density of housing bears great potential for infill development
  - Currently 2921 inhabitants/km2 (City of Helsinki Urban Facts 2015)
  - For example UN habitat recommends high density (15000 inhabitants/km2) as a strategy for sustainable neighbourhood planning
- Examples of possible benefits of infill development:
  - better use of existing infrastructure
  - diversification of population and land use, increased vitality and amount of services in the area
  - economic benefits to various parties

Research Project: Research on Resident-Driven Infill Development Possibilities (REPSU)

- The aim of the research project is to study and understand the preconditions for a resident-driven infill development, the main focus being on the needs of residents and housing companies
- Research partners: Aalto University and VTT Technical Research Centre of Finland
- Funded by The Academy of Finland
- Consortium project of the Future of Living and Housing (ASU-LIVE) Research Programme
- Responsible Professor Kauko Viitanen/ Aalto University
- Funding time: 1.9.2011 – 31.8.2015

Research by Real Estate Research Group

- **Sipilä, Tuomo** (doctoral dissertation - ongoing) :
  - Promoting infill development – analysis of three emerging cities: Helsinki, San Diego, and Boston
  - Researching the ways to promote infill development especially from cities viewpoints

- **Puustinen, Tuulia** (doctoral dissertation - ongoing):
  - Infill Development on Collectively Owned Residential Properties:
  - Understanding the Decision-making Process – Case Studies in Helsinki
- Several other journal articles.

Previous study by Arvola & Penanen 2014

Research on Resident-Driven Infill Development Possibilities –Case Study in Urban Areas in Finland (REPSU) -Questionnaire

- Research area:
  - suburban areas with apartment buildings built between the 60s and 80s and located in the Helsinki Metropolitan Area (+ Tammela from Tampere) which have potential or preliminary plans for infill development
- Respondents
  - The questionnaire was sent by mail to 4 455 residents, who lived in the research area (in total 23 suburban areas)
  - N = 1114 (percentage of respondents 25%)
  - Final sample N = 906 (Owner occupied residents=decision making power, rental residents excluded from the sample)
- Timeframe: Jan-Feb 2014

Previous study by Arvola & Penanen 2014

- Attitudes towards infill development:
  - 32 % opposed clearly
  - 44 % opposed clearly or to some extent
  - 19 % had neutral (in between) attitude
  - 35 % were at least to some extent in favour
- General attitude towards infill development was not significantly related to respondents' gender, level of education, attitude towards sustainable development nor previous experience with infill development
- Some statistically small correlations were found with age, level of income, and years spent living in the same neighborhood (older respondents with higher education, living in the same area for longer period of time are more likely to oppose the infill development)
- Generally negative were beliefs about consequences of infill development - residents believe that the neighborhood will not remain similar after infill and they will feel less home
- Elderly respondents who had lived long in the area were over represented in the sample

Aim and research questions of this study

The aim of this study is to understand inhabitants´attitudes towards infill development by analysing the justifications they provided for their attitudes.

Research question 1: What are the reasons why are inhabitants against or in favor of infill development in their neighbourhood?

Research question 2: Do the justifications correspond to the actual areal characteristics?

Study design

Questionnaire:

- qualitative approach, case studies
- Question N5b: “ *Are you in favour or against infill development in your neighborhood?*”-804 answers in Helsinki
- Analysis of answers in different areas, division based on postcode
- Analysis of open-ended question following N5b - explanation, content analysis
- Categorising, searching for trends, comparing to areal characteristics

Data

- **data set from the questionnaire** - especially answers to these questions:

N5a: *Are you in favour or against infill development in your neighborhood? (Mark higher number the more you are in favour. 1-I am against --4- neutral--7- I am in favour),*

N5b: *If there is a specific reason why you oppose or support infill development, you can write it here.*

- **SeutuCD**

Annually published material package provided by Helsinki Region Environmental Services Authority HSY, which includes comprehensive register data from the Helsinki Metropolitan Area (annual cross-sectional data) and map and data for planning. All materials on the SeutuCD are in geographic information format and all data can be transferred to geographic information software for further processing.

- **other open data sources**

Paavo- Open data by postal code area (Statistics Finland), OpenStreetMap

15 areas in Helsinki

1 Ruskeasuo
2 Munkkivuori
3 Konala
4 Pohjois-Haaga
5 Lassila
6 Itä-Pasila
7 Merihaka (Kallio)
8 Maunula
9 Pihlajamäki
10 Pukinmäki
11 Tapulikaupunki (Puistola)
12 Yliskylä (Laajasalo)
13 Kontula
14 Keski - Vuosaari
15 Mellunmäki

Picture: File:Helsinki location map (light).svg

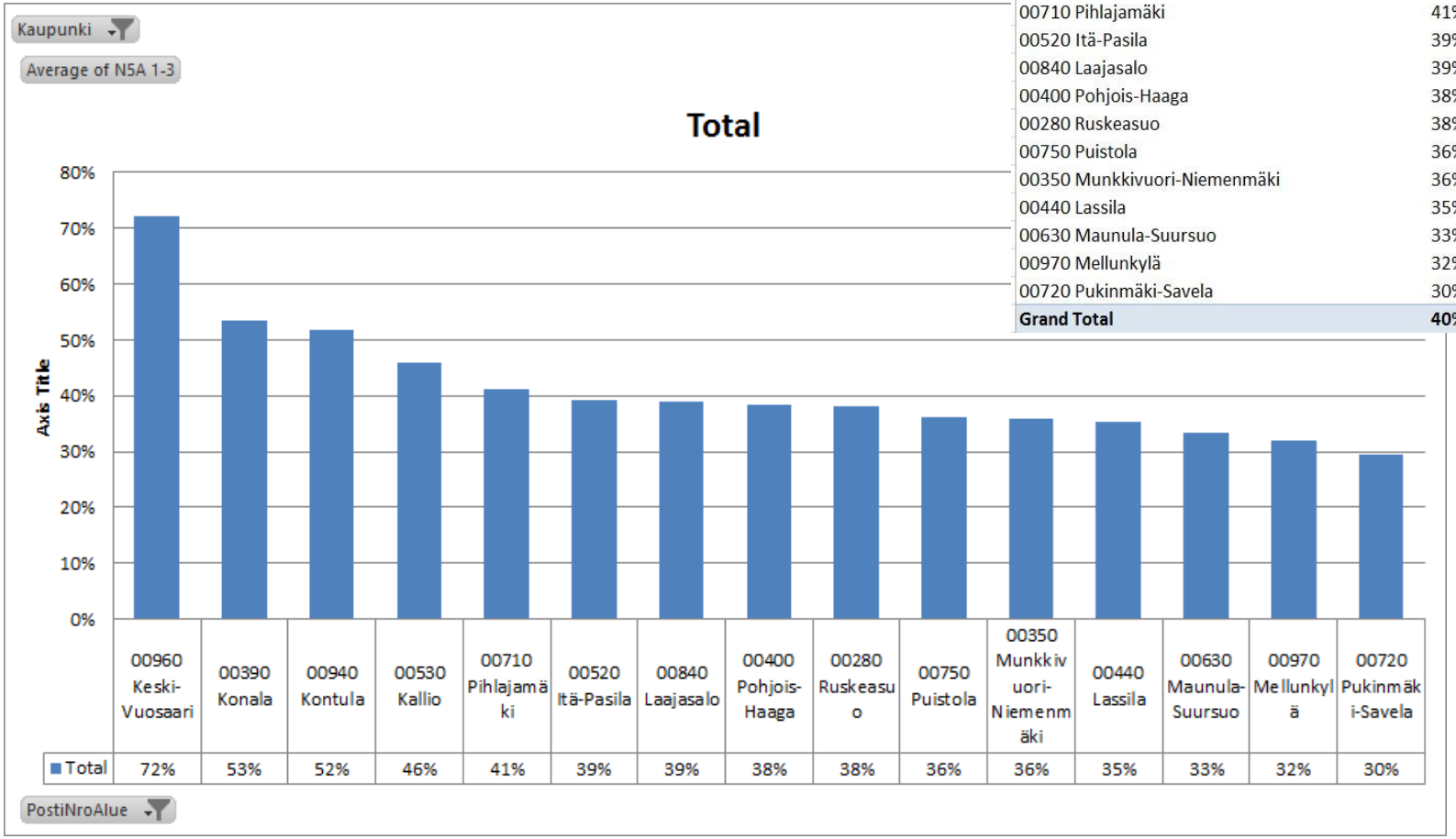
How did the respondents answer to N5a in different areas?

N5a: *Are you in favour or against infill development in your neighborhood? (Mark higher number the more you are in favour. 1-I am against --4- neutral--7- I am in favour),*

Count of N5A	Column Labels						
Row Labels	1	2	3	4	5	6	7
00960 Keski-Vuosaari	41%	15%	20%	2%	12%	7%	2%
00390 Konala	40%	7%	7%	13%	0%	7%	27%
00530 Kallio	29%	12%	7%	8%	17%	10%	17%
00940 Kontula	28%	11%	13%	11%	11%	11%	13%
00400 Pohjois-Haaga	24%	8%	8%	23%	15%	15%	6%
00840 Laajasalo	22%	10%	10%	19%	24%	10%	3%
00750 Puistola	21%	12%	6%	21%	24%	9%	9%
00710 Pihlajamäki	20%	14%	9%	27%	19%	9%	3%
00520 Itä-Pasila	19%	9%	14%	16%	16%	12%	14%
00970 Mellunkylä	16%	7%	10%	22%	16%	16%	12%
00280 Ruskeasuo	14%	10%	14%	14%	10%	29%	10%
00350 Munkkivuori-Niemenmäki	13%	15%	8%	18%	13%	21%	13%
00440 Lassila	10%	16%	10%	19%	19%	10%	13%
00720 Pukinmäki-Savela	7%	12%	12%	27%	19%	14%	10%
00630 Maunula-Suursuo	0%	20%	16%	12%	20%	24%	8%
Grand Total	**20%**	**12%**	**11%**	**18%**	**17%**	**13%**	**10%**

Percentages of respondents opposing infill development (answer alternatives 1 – 3).”

Kaupunki	HELSINKI	
Row Labels	**Average of N5A 1-3**	Ans SUM
00960 Keski-Vuosaari	72%	43
00390 Konala	53%	15
00940 Kontula	52%	54
00530 Kallio	46%	61
00710 Pihlajamäki	41%	97
00520 Itä-Pasila	39%	61
00840 Laajasalo	39%	64
00400 Pohjois-Haaga	38%	81
00280 Ruskeasuo	38%	21
00750 Puistola	36%	36
00350 Munkkivuori-Niemenmäki	36%	39
00440 Lassila	35%	71
00630 Maunula-Suursuo	33%	27
00970 Mellunkylä	32%	72
00720 Pukinmäki-Savela	30%	61
Grand Total	**40%**	



N5b open-ended question

"If there is a specific reason why you oppose or support infill development, you can write it here."

area	sum of answers	open ended questions	
Ruskeasuo	21	10	47,6%
Munkkivuori-Niemenmäki	39	14	35,9%
Konala	15	6	40,0%
Pohjois-Haaga	81	28	34,6%
Lassila	71	22	31,0%
Itä-Pasila	61	26	42,6%
Kallio	61	22	36,1%
Maunula-Suursuo	27	6	22,2%
Pihlajamäki	97	30	30,9%
Pukinmäki-Savela	61	10	16,4%
Puistola	36	10	27,8%
Laajasalo (Yliskylä)	64	22	34,4%
Kontula	54	17	31,5%
Keski-Vuosaari	43	15	34,9%
Mellunkylä (mäki)	72	21	29,2%
total	803	259	32,3%

Every third respondent added an explanation to his/her answer.

7 categories have been made based on the most often mentioned themes:

- Nature (forest, park and recreation)
- Economy (financing reparations, value of the property)
- Density (is there enough space, view..)
- Arch (image of the area, unity of urban planning, feeling)
- Transportation (public, traffic, parking)
- Services (quality and amount of services)
- Implementation (mainly the construction phase)

Each category could have been mentioned in positive or negative way.- this was also taken into account

N5b open-ended question

Example of categorizing:

N5a: 5, N5b: "*If the infill development is not done in place of a park or some other recreational area, then I think it is a very good idea. It is also very important to respect the appearance/outlook of the area."*

-->Nature -neg, arch - neg (respondent is worried, that infill development might take away parks or destroys the image of the area)

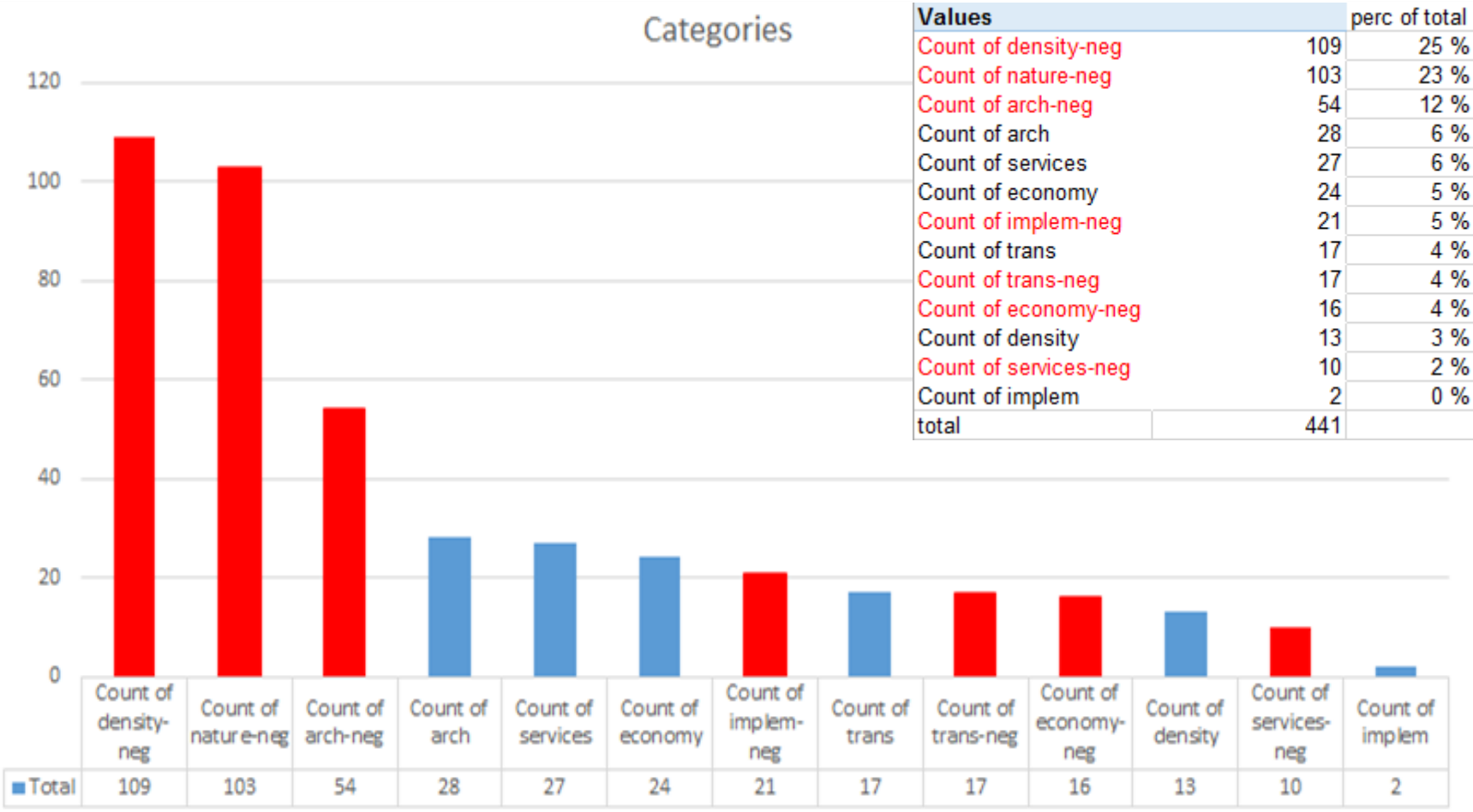
N5a: 7, N5b*: "Dense urban environment is cozy, vibrant and stimulating."*

-->Density-pos, arch-pos (respondent supports densification and thinks infill development will positively influence his neighbourhood)

N5a: 1, N5b: - "*The reason I have moved to this area was the space between houses. Infill development would take the original reason to live here away, I would probably move to some other loosely built area."*

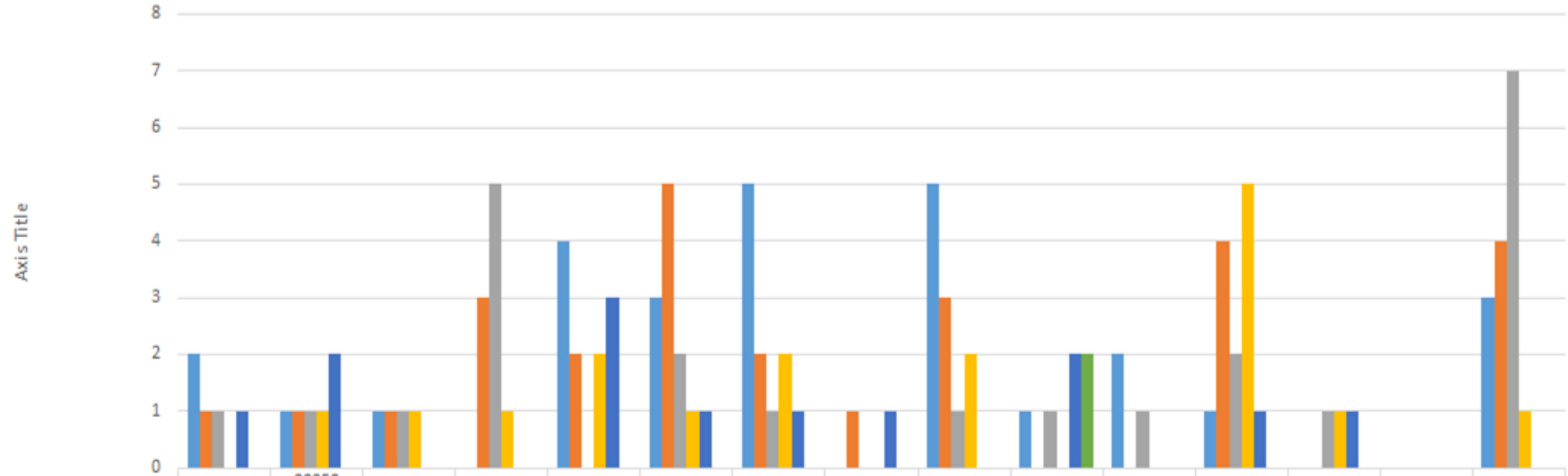
-->Density-neg (respondent doesn't support densification)

Which categories were mentioned the most?



Values		perc of total
Count of density-neg	109	25 %
Count of nature-neg	103	23 %
Count of arch-neg	54	12 %
Count of arch	28	6 %
Count of services	27	6 %
Count of economy	24	5 %
Count of implem-neg	21	5 %
Count of trans	17	4 %
Count of trans-neg	17	4 %
Count of economy-neg	16	4 %
Count of density	13	3 %
Count of services-neg	10	2 %
Count of implem	2	0 %
total	441	

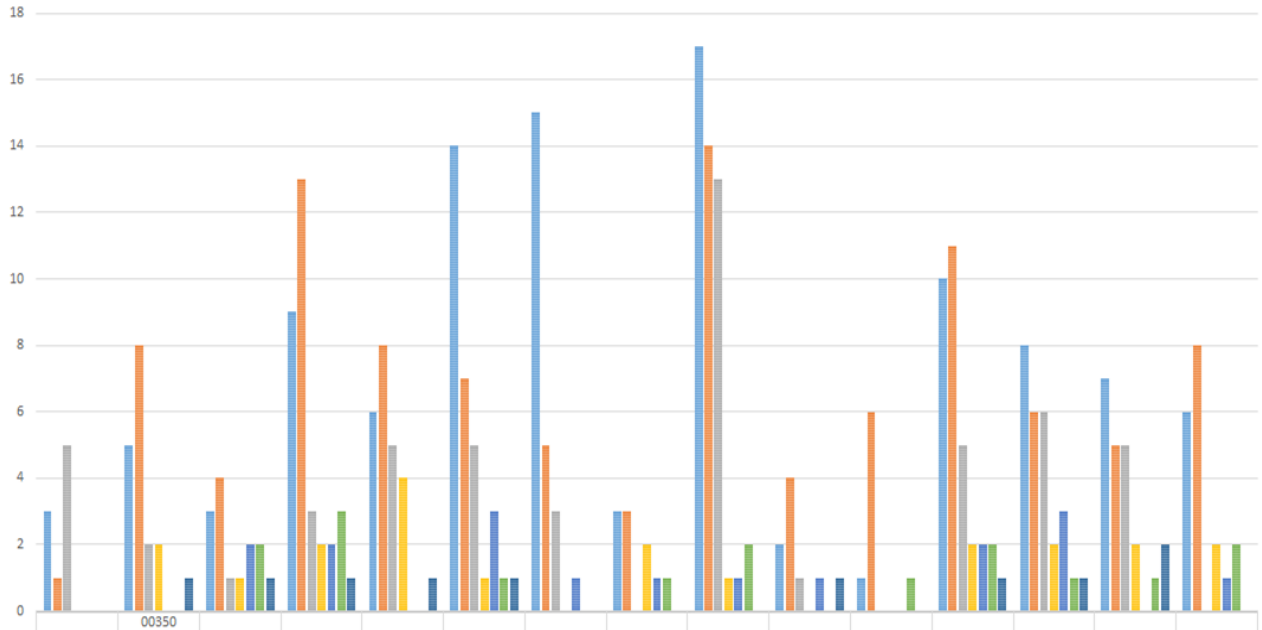
Frequency of categories - positive



	00280 Ruskeasuo	00350 Munkkivuori-Niemenmäki	00390 Konala	00400 Pohjois-Haaga	00440 Lassila	00520 Itä-Pasila	00530 Kallio	00630 Maunula-Suursuo	00710 Pihlajamäki	00720 Pukinmäki-Savela	00750 Puistola	00840 Laajasalo	00940 Kontula	00960 Vuosaari	00970 Mellunkylä
Count of arch	2	1	1		4	3	5		5	1	2	1			3
Count of services	1	1	1	3	2	5	2	1	3			4			4
Count of economy	1	1	1	5		2	1		1	1	1	2	1		7
Count of trans		1	1	1	2	1	2		2			5	1		1
Count of density	1	2			3	1	1	1		2		1	1		
Count of implem										2					

Area

Frequency of categories - negative



	00280 Ruskeasuo	00350 Munkkivuori-Niemenmäki	00390 Konala	00400 Pohjois-Haaga	00440 Lassila	00520 Itä-Pasila	00530 Kallio	00630 Maunula-Suursuo	00710 Pihlajamäki	00720 Pukinmäki-Savela	00750 Puistola	00840 Laajasalo	00940 Kontula	00960 Vuosaari	00970 Mellunkylä
Count of density-neg	3	5	3	9	6	14	15	3	17	2	1	10	8	7	6
Count of nature-neg	1	8	4	13	8	7	5	3	14	4	6	11	6	5	8
Count of arch-neg	5	2	1	3	5	5	3		13	1		5	6	5	
Count of implem-neg		2	1	2	4	1		2	1			2	2	2	2
Count of trans-neg			2	2		3	1	1	1	1		2	3		1
Count of economy-neg			2	3		1		1	2		1	2	1	1	2
Count of services-neg		1	1	1	1	1				1		1	1	2	

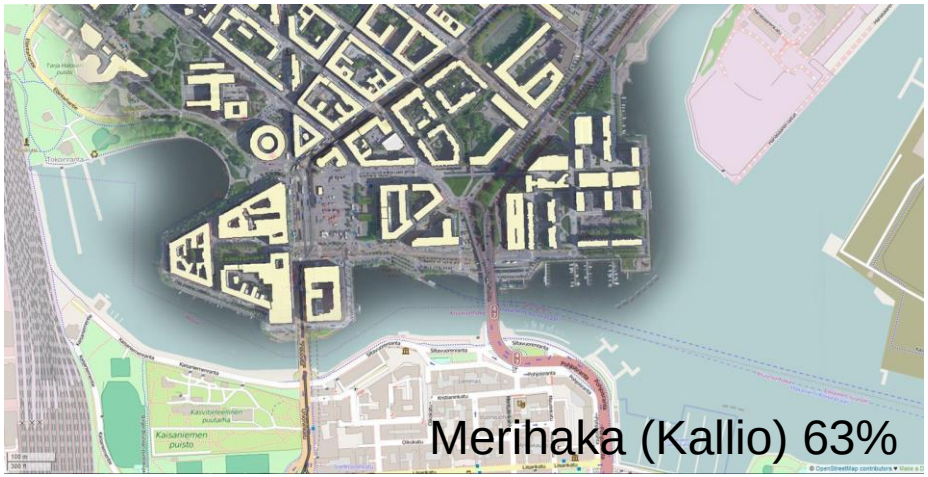
Area

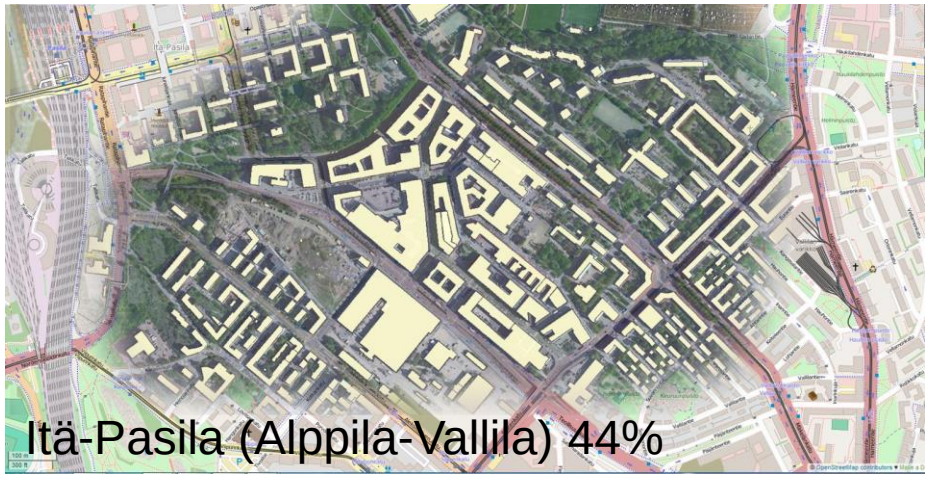
Categories mentioned in negative sense - percentage

area	dens-neg	nature-neg	arch-neg	implem-neg	trans-neg	economy-neg	services-neg
00280 Ruskeasuo	33 %	11 %	56 %	0 %	0 %	0 %	0 %
00350 Munkkivuori-Niemenmäki	28 %	44 %	11 %	11 %	0 %	0 %	6 %
00390 Konala	21 %	29 %	7 %	7 %	14 %	14 %	7 %
00400 Pohjois-Haaga	27 %	39 %	9 %	6 %	6 %	9 %	3 %
00440 Lassila	25 %	33 %	21 %	17 %	0 %	0 %	4 %
00520 Itä-Pasila	44 %	22 %	16 %	3 %	9 %	3 %	3 %
00530 Kallio	63 %	21 %	13 %	0 %	4 %	0 %	0 %
00630 Maunula-Suursuo	30 %	30 %	0 %	20 %	10 %	10 %	0 %
00710 Pihlajamäki	35 %	29 %	27 %	2 %	2 %	4 %	0 %
00720 Pukinmäki-Savela	22 %	44 %	11 %	0 %	11 %	0 %	11 %
00750 Puistola	13 %	75 %	0 %	0 %	0 %	13 %	0 %
00840 Laajasalo	30 %	33 %	15 %	6 %	6 %	6 %	3 %
00940 Kontula	30 %	22 %	22 %	7 %	11 %	4 %	4 %
0096(-Vuosaari	32 %	23 %	23 %	9 %	0 %	5 %	9 %
00970 Mellunkylä	32 %	42 %	0 %	11 %	5 %	11 %	0 %

Chosen for case-study:
Density: Kallio, Itä-Pasila, Pihlajamäki, Vuosaari
Nature: Puistola, Munkkivuori, Mellunkylä, Pohjois-Haaga
Arch: Ruskeasuo, Pihlajamäki

Density - Area (% neg density category mentioned)

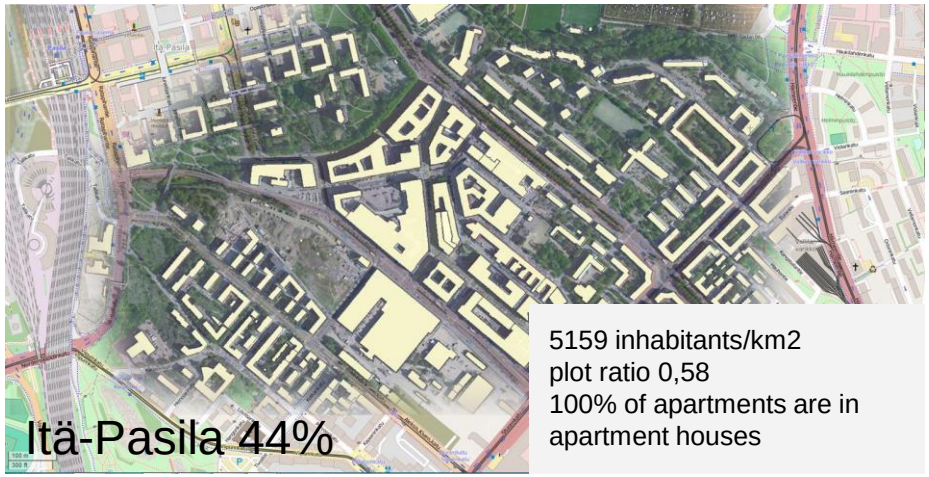




Density - Area (% neg density category mentioned)

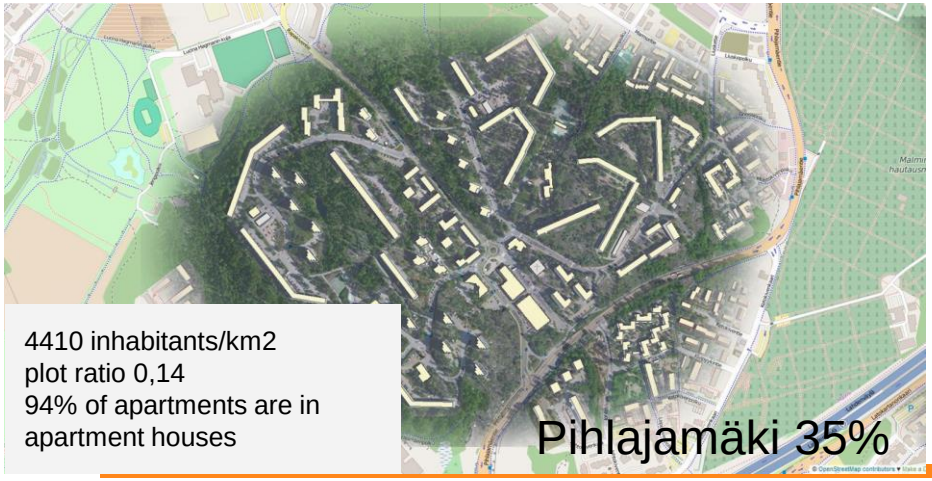
11 553 inhabitants/km2
plot ratio 1,57
100% of apartments are in apartment houses

Merihaka (Kallio) 63%



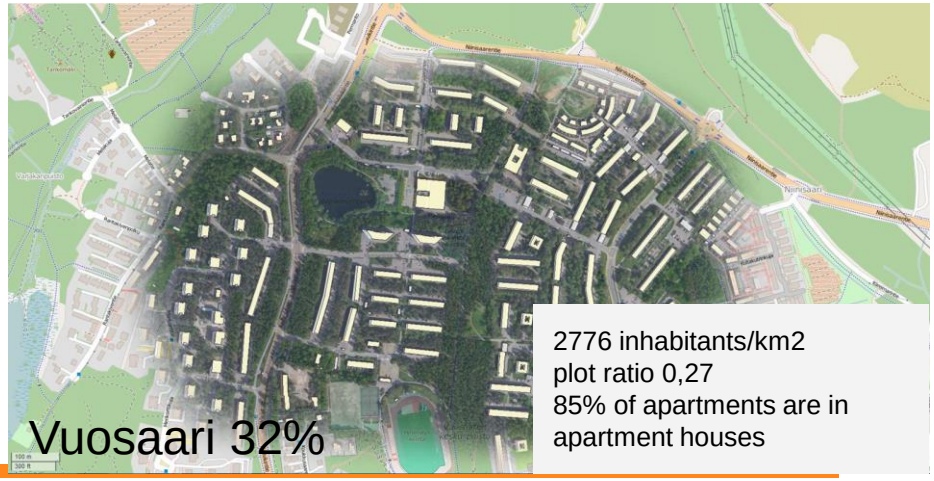
Itä-Pasila 44%

5159 inhabitants/km2
plot ratio 0,58
100% of apartments are in apartment houses



4410 inhabitants/km2
plot ratio 0,14
94% of apartments are in apartment houses

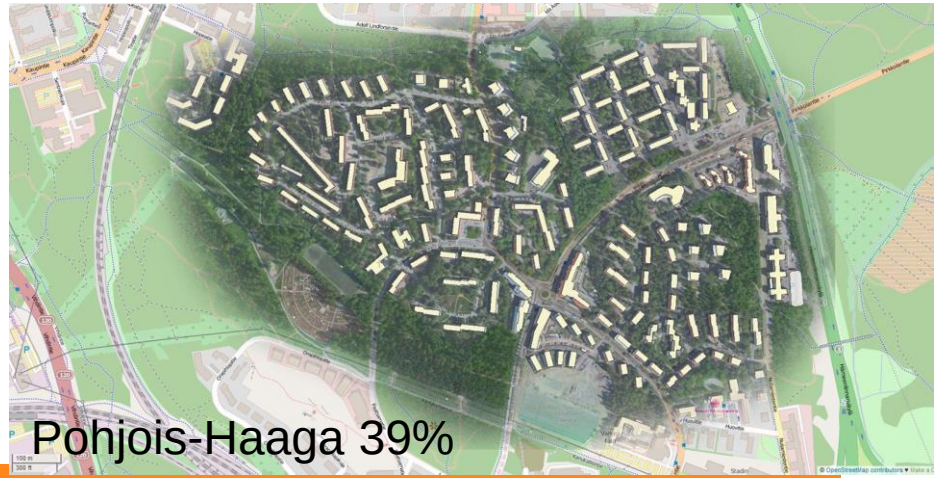
Pihlajamäki 35%



Vuosaari 32%

2776 inhabitants/km2
plot ratio 0,27
85% of apartments are in apartment houses

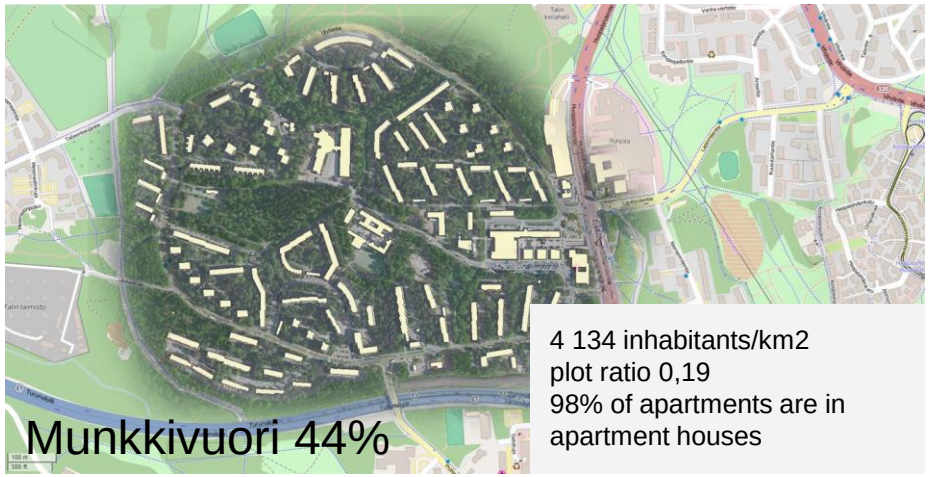
Nature - Area (% neg nature category mentioned)



Nature - Area (% neg nature category mentioned)

3 067 inhabitants/km2
plot ratio 0,11
59% of apartments are in apartment houses

Puistola 63%

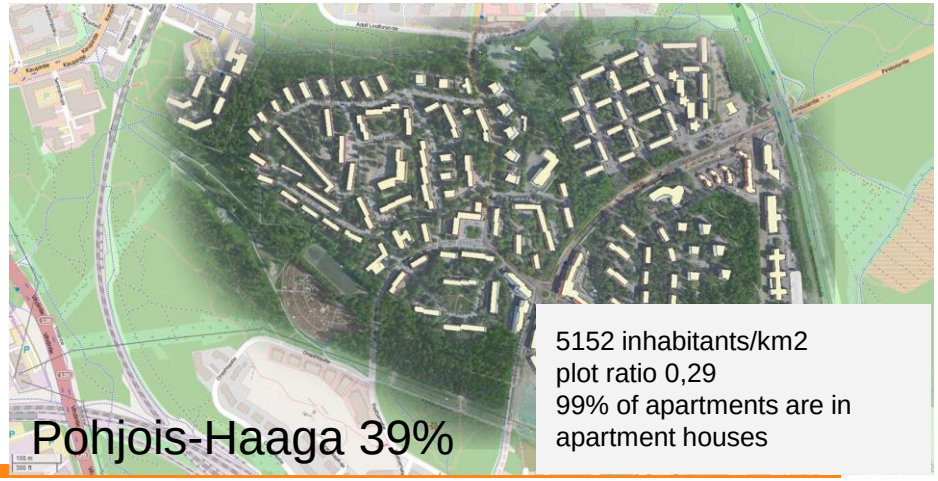


Munkkivuori 44%

4 134 inhabitants/km2
plot ratio 0,19
98% of apartments are in apartment houses

3 040 inhabitants/km2
plot ratio 0,13
85% of apartments are in apartment houses

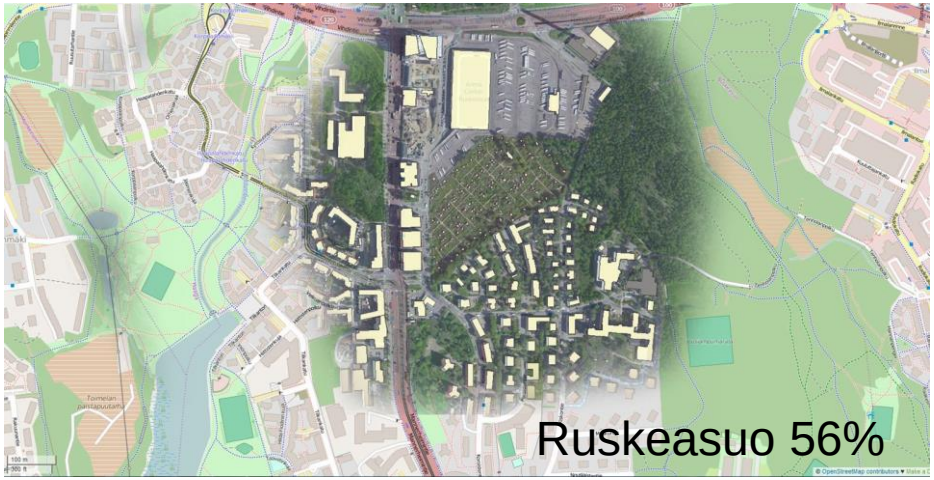
Mellunkylä 42%

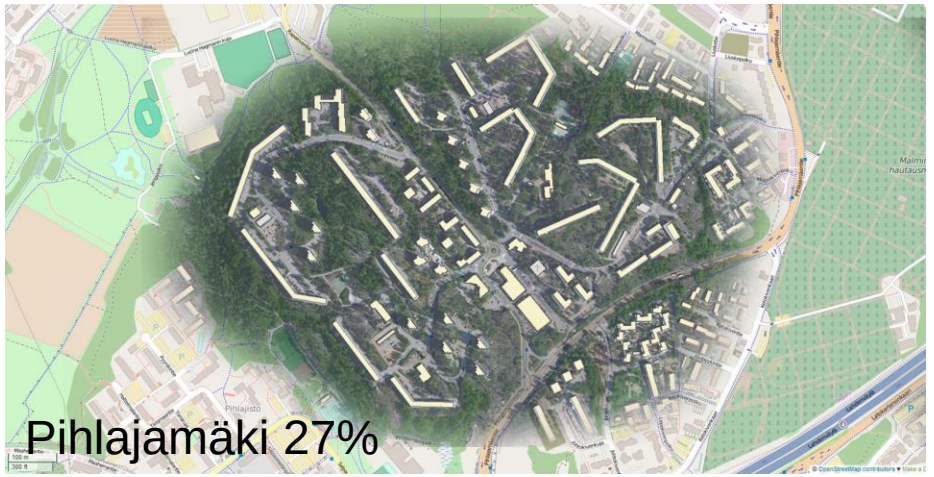


Pohjois-Haaga 39%

5152 inhabitants/km2
plot ratio 0,29
99% of apartments are in apartment houses

Arch - Area (% neg arch category mentioned)+street view





Conclusion

RQ1: Why are inhabitants against or in favor of infill development in their neighbourhood?

Based on the content analysis of answers to the open-ended question, which was answered by approx. ⅓ of all respondent of the questionnaire:

The density related issues were the most commonly used justification for opposing or not supporting fully infill development. (25% of all explanations)

Nature, parks and recreation were mentioned in 23% of all answers, only in negative sense.

Fear that infill development would destroy the unique architecture or influence the atmosphere in the area negatively was also very common - 12% of all answers.

On the other hand, category architecture was mentioned positively in 6% of answers, among improving services (6%) and finance (5%).

Conclusion

RQ2: Do the reasons correspond to the actual areal characteristics?

Yes, in case of density.

In the issue of nature and recreations the correspondence is not that clear. Puistola, the area where the most justifications were considering the nature, is among the most loosely built areas, with the lowest amount of apartments in apartment buildings, eg. most housing is in detached houses compared to other study cases. The area is also in the biggest distance from CBD Helsinki. No coefficient for comparing green areas in different areas has been established yet.

The architecture and neighborhood image worries the most inhabitants from areas, where buildings were built in the same style, with for the area unique urban plan. Residents of Pihlajamäki were also arguing with bad experience with previously done infill.

Further research

- setting a coefficient for ‘nature’, which would describe how much forest, parks and recreational areas is in the area and also private gardens, which cannot be publicly used/ per amount of inhabitants/built environment.
- setting a coefficient for ‘arch’ which could be based on percentage of houses built in same period, utility of an area.

- Among with other variables (such as density, plot-ratio), these additional information could be input back into the original dataset under the areal postcode and regression analysis could be perform in search whether it is possible to predict the respondent’s attitude towards infill development with any of these variables.

The knowledge of the reasons behind negative attitude can be useful in promoting infill development. The positive notions should be promoted more and the inhabitants should be informed what exactly the infill development will be like in their neighbourhood, so maybe some of their fears can be minimalised.

Thank you!