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Hierarchical Decision Model for Housing Decision in the Portland Metropolitan Area

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ABSTRACT

The Portland Metropolitan Area is one of the fastest growing in the Nation. A good percentage of in-migrants to Oregon end up in this area. This study aimed at creating a model to help individuals decide which city on the Oregon site of the Portland metro they should purchase housing.

Decision criteria was elicited from experts using a modified form of Delphi method, an HDM model was created and experts were asked to evaluate these criteria by making pair-wise comparisons. Once the HDM model was computed, the means were analyzed and it was determined that the city of Beaverton was the best location to purchase a home in the Portland Metro Area.

Future work on this should extend the model I included, more criteria like socio-cultural ones and the scope should be expanded to include the other cities in the Metro area on the Washington State side of the divide.

CONTENTS

1.0 INTRODUCTION

In recent years, the state of Oregon has been experiencing an upward trend in in-migration. Approx. 250,000 moved to Oregon between 2000 and 2010 [1] and by 2018, Oregon ranked as the second highest percentage of newcomers in the United States (63.8%) based on data released from United Van Lines moving company [2]. Data from another moving company; Atlas Van Lines, ranks Oregon the 6th state with the highest in-migration based on data released [3].

Portland is the largest city in the State of Oregon, with an estimated population of 648,740 as of 2018, it accounts for approximately 15.5% the population of the Oregon [4]. Portland is under the Multnomah County and the central city of the Portland Metropolitan Area; a metropolitan area consisting of five counties in the State of Oregon and two in Washington State. Of the increasing rate of in-migration to the state of Oregon, we are seeing the Portland metro area receiving a good chunk of this inflow. The region grew by 13.6 percent in the years between 2000 and 2010, making it the second fastest growing in the state after central Oregon. [1]

Studies have attributed this influx of people to Oregon and consequently the Portland metro area to accessibility to natural amenities, economic opportunities, comprehensive public transit and overall high quality of life [1], based on the study, this holds through especially for young, college educated individuals. The economic justification for in-migration is evidenced by the emergence of the Silicon Forest, a cluster of high-tech companies located in the Portland metro area, particularly in the cities of Beaverton and Hillsboro. This *valley*, consists of companies like Intel, ASML, Tektronix, InFocus, Planar, Pixelworks, Hewlett Packard Co, Xerox and Epson who

specialize in chip manufacturing, test and precision equipment, electronic displays and printers respectively. Worthy of mentions is also the presence of the global campus for Nike Inc in the same region. These companies are some of the largest employers of labor attracting talent from across the nation and the world. Expectedly so, Washington county was reported to be one of the counties that experience explosive population growth (115.5%) between 1980 and 2010. This in-migration to the region has affected both the housing and rental markets in the region as newcomers find ways to settle in. The simple law of supply and demand will dictate that this in-migration will consequently lead to an increase in demand for housing, true, but not in the way one might think.

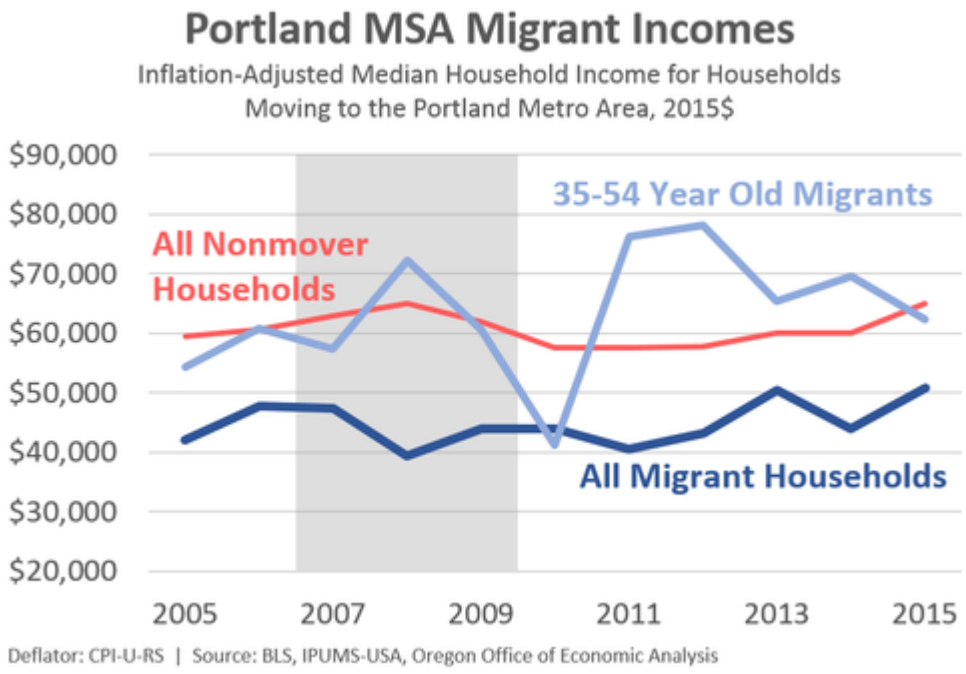

Fig 1 Median Household income for households moving to Portland Metro in 2015

It has been shown that newcomers to the Portland metro are more likely to rent apartments rather than buy homes [5], likely due to the fact that in-migrants have lower income than existing

residents (see Fig 1) and most of them are young educated graduates, just starting off with their careers [1].

However, there are still a good number of newcomers to the region and current residents who want to make that transition to home ownership. This study aims at providing a model to help prospective home buyers identify a good location in the Portland metro to purchase a home, considering factors identified by real estate professionals, current and prospective homeowners.

2.0 METHODOLOGY

The problem of determining where to purchase a home was treated a multi-criteria decision (MCD) problem. The following steps were followed:

1. Decision problem definition

Initially, in-migration and housing issues in the Portland metro was viewed in broad strokes, and after review of literature, the decision problem was identified to drive the design of the model.

2. Model Selection

The next step was to define a suitable decision model. After reviewing literature, it was determined that the Hierarchical Decision Model was the best to use for this MCD problem. The HDM is a variation of the Analytical Hierarchical Process (AHP) [6], it allows for the problem to be broken to its base pieces (criteria) and allows weights/values to be assigned to each piece for comparison. With this, priorities can easily be determined depending on the weights and this provides the decision maker a basis for making a decision. Structurally, it has a hierarchical structure with the decision at the top and the layers of the criteria beneath. [7] This method was suitable for this study as it was able to accommodate all the identified decision criteria into a single model for evaluation.

3. Determine Criteria

In this step, the decision-making criteria for house purchases was elicited from real estate professionals, current and prospective homeowners. These criteria were elicited by interviews

with the experts and going through an iterative process where identified criteria were re-reviewed with each expert comparing it against responses from other experts. This was in a sense a modified Delphi method. This approach was particularly suitable as experts were able to narrow down their criteria in very few rounds until there was good agreement on what these criteria should be across board. At the end of the process, eight (8) decision criteria were identified and were split into three categories.

4. Build HDM

From the previous step, categories and subtypes were developed and consequently fed into the HDM tool to develop and finalize the model. The HDM tools used was developed by Dunda Kocaoglu and is in use in the department of Engineering and Technology, Portland State University.

5. Expert Judgement Quantification

Experts were provided link to the HDM tool and were asked to perform pairwise comparison, evaluating the categories and criteria.

6. Analysis of results

2.1 Model Development

For this study, four cities in the Portland metro area were taken into consideration as possible outcomes and incorporated into the model. These four cities are some of largest in the Oregon side of the metro area and were selected for simplicity. The cities are, Gresham, Portland, Beaverton and Hillsboro.

The criteria were classified into three categories:

1. **Financial**

This category covered all financial implications/consideration when one intends to purchase a home in any of the region in the Portland Metro Area.

2. **Environmental**

This covers all consideration of safety and security concerns. It also incorporates the availability of recreational facilities like parks and trails.

3. **Infrastructure**

This takes into consideration availability of good transport system, road networks and availability of medical facilities and quality of school district.

We see that these categorizations are very consistent with literature from the point of view of in-migration to the Portland metro. [1] Study showed that many young college educated

individuals migrated to Portland partly because of the natural amenities, with the excellent public transportation system been an incentive.

These categories were split into the categories defined by the experts and their definitions can be found in table 1 below.

Once defined, these criteria were loaded into the HDM tool and finalized. The links to the tool was sent to the experts and each expert had to evaluate each pair of node under a parent node. The evaluations were done by assigning weights on scale of 1 to 99 for each node. There was a total of total 58 pair wise comparison to be completed for all the criteria.

Perspective Categories	Sub-Category	Explanation
Financial	**Price**	The cost of the house
	Homeowners Association Fees	Not having to pay an HOA fee
	Taxes	The cost of property tax
Environment	**Recreation**	Availability of nature parks, trails and recreational activity
	Security	Crime rate in the neighborhood
Infrastructure	**School District**	Quality of the school district

	Ease of Transportation	Availability of good public transportation systems and road network
	School District	Availability of good quality medical facilities

Table 1. Definition of Sub-Criteria

Figure 2 shows the pairwise comparison for the "Financial" node as filled by one of the experts.

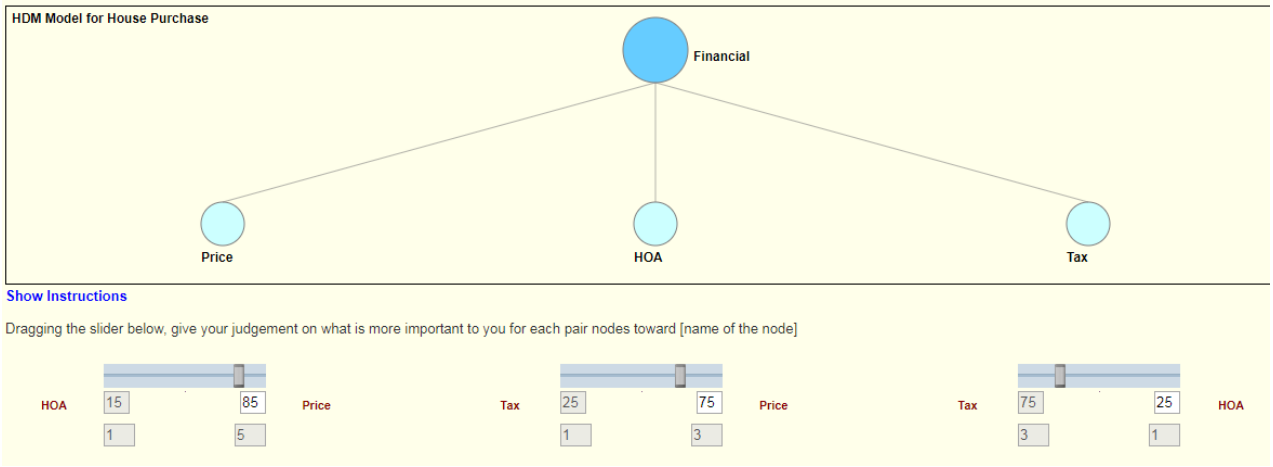

Fig 3. Pairwise comparison for Financial Category

In this example, the expert indicates price consideration is three times more important property tax, tax consideration is three time more important that HOA fees consideration and the price of the property almost 6 times more important than HOA fees consideration. By investigating the values closely, we see a transitivity of the expert's weight for all three comparisons. The presentation of the entire model by the HDM tool is shown in Fig 3 below.

Once the experts evaluation was completed, the tool provided an analysis of the results, showing the mean, minimum and maximum values, standard deviation for each outcome. It also provided the inconsistencies and overall disagreements and per [6], values greater than 10% needed to be mitigated.

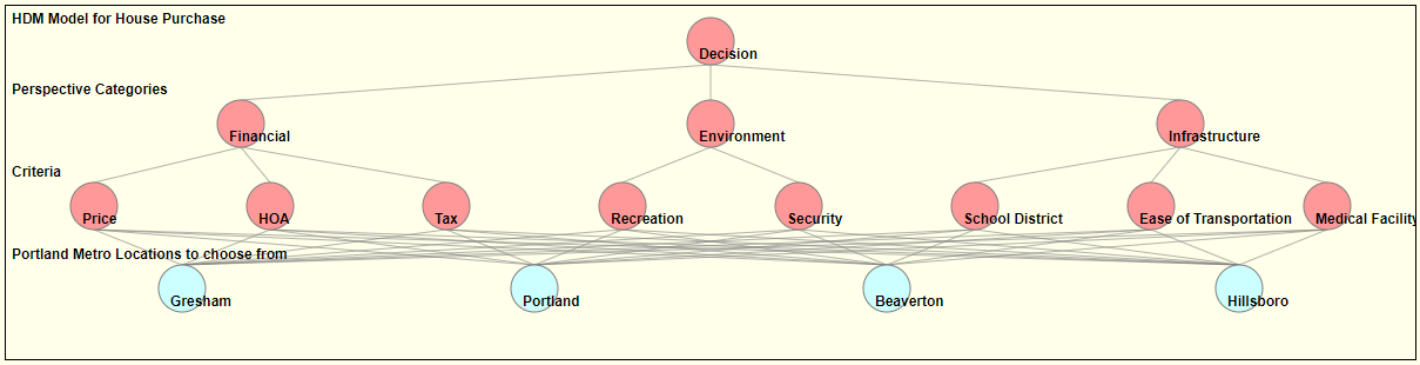

Fig 3. HDM Model for decision problem using the ETM HDM Tool

3.0 DATA AND DATA SOURCE(S)

Data was elicited from 10 experts, of the ten experts, three were involved in the modified Delphi exercise to determine the decision criteria while nine were involved in evaluating the model. Three of the experts come from the real estate profession and practice within the Portland Metro; three others are multiple homeowners or have owned one or more homes in the region. Of the remaining four, three are first time homeowners and one is a prospective homeowner in the region. Details of these experts and whether or not their results were accepted are provided in table 2.

Expert 6 showed a high level of inconsistencies when evaluating the criteria on level 3 of the HDM (see fig 3). This affected the overall inconsistency value for this expert (>1), the expert was unable resubmit the evaluation and the results were consequently deleted from the model.

Expert	Background	Comments
Expert 1	Project Management and HR professional, Real Estate Enthusiast, prospective house buyer in the Portland Metro	Results accepted
Expert 2	RF Engineer, multiple homeowner in metro area.	Result accepted
Expert 3	Project Management Professional and multiple homeowner in the metro area	Result accepted
Expert 4	Manufacturing Plant Manager and multiple homeowner in the metro area	Result accepted
Expert 5	Software Engineer, homeowner in the metro area	Result accepted
Expert 6	Project Management Professional and homeowner in the metro area	Result rejected. Inconsistency of 0.12 (>1). Was not able to resubmit.
Expert 7	Real Estate Professional	Result accepted
Expert 8	Real Estate Professional and Property Manager	Result accepted
Expert 9	Real Estate Professional and Property Manager	Did not submit HDM evaluation but participated in

		modified Delphi to elicit decision making criteria
Expert 10	Software Engineer, homeowner in the metro area	Result accepted

Table 2 Profile of Experts

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.00	0.00	0.01	0.01	0.01	0.25	0.01	0.01
Portland	0.01	0.01	0.05	0.05	0.05	0.25	0.05	0.05
Beaverton	0.39	0.40	0.40	0.42	0.42	0.25	0.41	0.42
Hillsboro	0.60	0.59	0.53	0.52	0.52	0.25	0.53	0.52
Inconsistency	0.04	0.06	0.24	0.23	0.23	0.00	0.23	0.23

The final result:

Level-1	Decision
Gresham	0.04
Portland	0.07
Beaverton	0.39
Hillsboro	0.50
Inconsistency	0.12

Figure 3. Inconsistency with Expert 6

4.0 ANALYSIS AND KEY FINDINGS

The results (see table 3) show that all the experts were below the 10% inconsistency level; however the disagreement was rather high. Analysis of the mean shows that the City of Beaverton is the preferred location to purchase a home based on these respondents. This makes some sense especially when you consider that Beaverton is at the heart of the silicon forest.

Table 3 Overall Results

Decision	Gresham	Portland	Beaverton	Hillsboro	Inconsistency
Expert 1	0.15	0.19	0.35	0.31	0.01
Expert 2	0.15	0.2	0.35	0.3	0
Expert9	0.17	0.22	0.29	0.32	0.02
Expert 3	0.52	0.15	0.14	0.19	0.04
Expert 4	0.31	0.22	0.24	0.24	0.01
Expert 8	0.11	0.21	0.35	0.33	0.01
Expert 5	0.12	0.63	0.12	0.13	0.02
Expert 7	0.07	0.08	0.67	0.18	0.09
Expert 10	0.26	0.26	0.27	0.21	0
Mean	**0.21**	**0.24**	**0.31**	**0.25**	
Minimum	**0.07**	**0.08**	**0.12**	**0.13**	
Maximum	**0.52**	**0.63**	**0.67**	**0.33**	
Std. Deviation	**0.13**	**0.15**	**0.15**	**0.07**	
Disagreement					**0.105**

The Beaverton city scored the highest mean value all criteria except property tax, this is supportive of young families looking who have children or are planning to and will want them to be enrolled in good schools. Full results from the model can be seen in the appendices.

	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.24	0.195556	0.198889	0.156666667	0.2755556	0.176666667	0.25	0.198888889
Portland	0.207777778	0.235556	0.238889	0.265555556	0.2088889	0.253333333	**0.331111111**	**0.297777778**
Beaverton	**0.287777778**	**0.288889**	0.252222	**0.325555556**	**0.2988889**	**0.346666667**	0.2	0.273333333
Hillsboro	0.261111111	0.276667	**0.306667**	0.251111111	0.22	0.224444444	0.22	0.233333333

Table 4 Mean Values

5.0 FUTURE RESEARCH

The study was in many ways limited, as it did not consider other cities in the Portland metro area outside the state of Oregon. In addition, the model can also be expanded to incorporate more criteria if a wider audience of experts are reached. Socio cultural factors can also invaluable and cause the model to tells a different story. It was mentioned by one of the experts that individuals of certain religious bias would only purchase houses where the doors are facing a particular direction.

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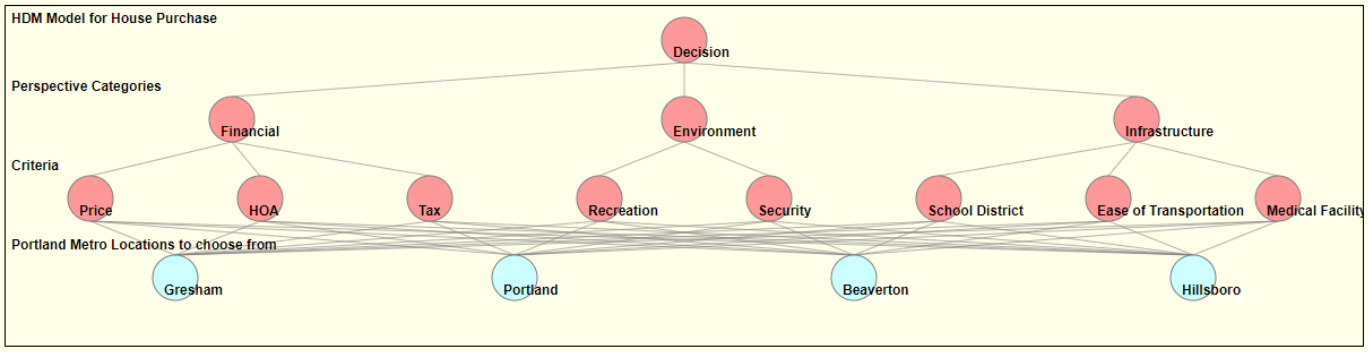
APPENDICES

HDM Model



Decision	Gresham	Portland	Beaverton	Hillsboro	Inconsistency
Abimbola Adediji	0.15	0.19	0.35	0.31	0.01
Adedeji Adediji	0.15	0.2	0.35	0.3	0
Brooke Baxter	0.17	0.22	0.29	0.32	0.02
Jeramie Brown	0.52	0.15	0.14	0.19	0.04
Jesse Fritz	0.31	0.22	0.24	0.24	0.01
Kandace Stanavige	0.11	0.21	0.35	0.33	0.01
Kehinde Moninuola	0.12	0.63	0.12	0.13	0.02
Nkemka Abia-Okon	0.07	0.08	0.67	0.18	0.09
Olufola Moninuola	0.26	0.26	0.27	0.21	0
Mean	**0.21**	**0.24**	**0.31**	**0.25**	
Minimum	**0.07**	**0.08**	**0.12**	**0.13**	
Maximum	**0.52**	**0.63**	**0.67**	**0.33**	
Std. Deviation	**0.13**	**0.15**	**0.15**	**0.07**	
Disagreement					**0.105**

The statistical F-test for evaluating the null hypothesis (Ho: ric = 0) is obtained by dividing between-subjects variability with residual variability:

Source of Variation	Sum of Square	Deg. of freedom	Mean Square	F-test value
Between Subjects:	0.05	3	.016	**.66**
Between Conditions:	0.00	8	0.000	
Residual:	0.60	24	0.025	
Total:	**0.64**	35		
Critical F-value with degrees of freedom 3 & 24 at 0.01 level:				**4.72**
Critical F-value with degrees of freedom 3 & 24 at 0.025 level:				**3.72**
Critical F-value with degrees of freedom 3 & 24 at 0.05 level:				**3.01**
Critical F-value with degrees of freedom 3 & 24 at 0.1 level:				**2.33**

Expert Results

Level-1	Decision
Financial	0.32
Environment	0.50
Infrastructure	0.18
Inconsistency	0.04

Level-2	Financial	Environment	Infrastructure
Price	0.33	0.00	0.00
HOA	0.33	0.00	0.00
Tax	0.33	0.00	0.00
Recreation	0.00	0.28	0.00
Security	0.00	0.72	0.00
School District	0.00	0.00	0.67
Ease of Transportation	0.00	0.00	0.12
Medical Facility	0.00	0.00	0.21
Inconsistency	0.00	0.00	0.00

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.14	0.18	0.16	0.16	0.13	0.16	0.18	0.18
Portland	0.18	0.22	0.20	0.23	0.16	0.17	0.24	0.24
Beaverton	0.34	0.29	0.32	0.41	0.36	0.36	0.26	0.31
Hillsboro	0.34	0.30	0.31	0.20	0.36	0.30	0.32	0.27
Inconsistency	0.01	0.00	0.01	0.03	0.02	0.01	0.00	0.01

The final result:

Level-1	Decision
Gresham	0.15
Portland	0.19
Beaverton	0.35
Hillsboro	0.31
Inconsistency	0.01

Level-1	Decision
Financial	0.29
Environment	0.33
Infrastructure	0.38
Inconsistency	0.00

Level-2	Financial	Environment	Infrastructure
Price	0.37	0.00	0.00
HOA	0.21	0.00	0.00
Tax	0.42	0.00	0.00
Recreation	0.00	0.30	0.00
Security	0.00	0.70	0.00
School District	0.00	0.00	0.41
Ease of Transportation	0.00	0.00	0.18
Medical Facility	0.00	0.00	0.41
Inconsistency	0.02	0.00	0.00

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.05	0.09	0.15	0.13	0.13	0.15	0.22	0.25
Portland	0.12	0.15	0.15	0.29	0.15	0.21	0.33	0.25
Beaverton	0.41	0.39	0.35	0.29	0.40	0.42	0.22	0.25
Hillsboro	0.41	0.36	0.35	0.29	0.33	0.22	0.22	0.25
Inconsistency	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00

The final result:

Level-1	Decision
Gresham	0.15
Portland	0.20
Beaverton	0.35
Hillsboro	0.30
Inconsistency	0.00

Level-1	Decision
Financial	0.47
Environment	0.26
Infrastructure	0.27
Inconsistency	0.02

Level-2	Financial	Environment	Infrastructure
Price	0.38	0.00	0.00
HOA	0.26	0.00	0.00
Tax	0.37	0.00	0.00
Recreation	0.00	0.60	0.00
Security	0.00	0.40	0.00
School District	0.00	0.00	0.67
Ease of Transportation	0.00	0.00	0.17
Medical Facility	0.00	0.00	0.17
Inconsistency	0.00	0.00	0.00

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.10	0.08	0.10	0.04	0.49	0.25	0.34	0.25
Portland	0.17	0.20	0.10	0.32	0.24	0.25	0.39	0.25
Beaverton	0.30	0.36	0.40	0.32	0.12	0.25	0.14	0.25
Hillsboro	0.43	0.36	0.40	0.32	0.15	0.25	0.14	0.25
Inconsistency	0.04	0.11	0.00	0.00	0.02	0.00	0.00	0.00

The final result:

Level-1	Decision
Gresham	0.17
Portland	0.22
Beaverton	0.29
Hillsboro	0.32
Inconsistency	0.02

Level-1	Decision
Financial	0.23
Environment	0.49
Infrastructure	0.28
Inconsistency	0.01

Level-2	Financial	Environment	Infrastructure
Price	0.63	0.00	0.00
HOA	0.17	0.00	0.00
Tax	0.20	0.00	0.00
Recreation	0.00	0.50	0.00
Security	0.00	0.50	0.00
School District	0.00	0.00	0.46
Ease of Transportation	0.00	0.00	0.32
Medical Facility	0.00	0.00	0.22
Inconsistency	0.11	0.00	0.00

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.96	0.25	0.25	0.25	0.84	0.25	0.48	0.25
Portland	0.01	0.25	0.25	0.25	0.03	0.25	0.12	0.25
Beaverton	0.01	0.25	0.25	0.25	0.01	0.25	0.07	0.25
Hillsboro	0.02	0.25	0.25	0.25	0.11	0.25	0.33	0.25
Inconsistency	0.01	0.00	0.00	0.00	0.11	0.00	0.27	0.00

The final result:

Level-1	Decision
Gresham	0.52
Portland	0.15
Beaverton	0.14
Hillsboro	0.19
Inconsistency	0.04

Level-1	Decision
Financial	0.45
Environment	0.30
Infrastructure	0.25
Inconsistency	0.00

Level-2	Financial	Environment	Infrastructure
Price	0.33	0.00	0.00
HOA	0.33	0.00	0.00
Tax	0.33	0.00	0.00
Recreation	0.00	0.40	0.00
Security	0.00	0.60	0.00
School District	0.00	0.00	0.25
Ease of Transportation	0.00	0.00	0.43
Medical Facility	0.00	0.00	0.33
Inconsistency	0.00	0.00	0.00

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.40	0.23	0.30	0.29	0.30	0.24	0.36	0.30
Portland	0.15	0.27	0.20	0.14	0.25	0.18	0.26	0.30
Beaverton	0.19	0.23	0.20	0.24	0.27	0.36	0.22	0.27
Hillsboro	0.26	0.27	0.30	0.33	0.18	0.22	0.16	0.14
Inconsistency	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00

The final result:

Level-1	Decision
Gresham	0.31
Portland	0.22
Beaverton	0.24
Hillsboro	0.24
Inconsistency	0.01

Level-1	Decision
Financial	0.47
Environment	0.36
Infrastructure	0.18
Inconsistency	0.00

Level-2	Financial	Environment	Infrastructure
Price	0.65	0.00	0.00
HOA	0.10	0.00	0.00
Tax	0.25	0.00	0.00
Recreation	0.00	0.40	0.00
Security	0.00	0.60	0.00
School District	0.00	0.00	0.44
Ease of Transportation	0.00	0.00	0.40
Medical Facility	0.00	0.00	0.16
Inconsistency	0.01	0.00	0.00

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.08	0.08	0.08	0.08	0.19	0.12	0.10	0.09
Portland	0.22	0.22	0.22	0.22	0.16	0.13	0.43	0.17
Beaverton	0.37	0.37	0.33	0.37	0.35	0.38	0.24	0.41
Hillsboro	0.33	0.33	0.37	0.33	0.31	0.38	0.23	0.33
Inconsistency	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.01

The final result:

Level-1	Decision
Gresham	0.11
Portland	0.21
Beaverton	0.35
Hillsboro	0.33
Inconsistency	0.01

Level-1	Decision
Financial	0.06
Environment	0.75
Infrastructure	0.19
Inconsistency	0.01

Level-2	Financial	Environment	Infrastructure
Price	0.67	0.00	0.00
HOA	0.00	0.00	0.00
Tax	0.32	0.00	0.00
Recreation	0.00	0.05	0.00
Security	0.00	0.95	0.00
School District	0.00	0.00	0.85
Ease of Transportation	0.00	0.00	0.04
Medical Facility	0.00	0.00	0.12
Inconsistency	0.04	0.00	0.01

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.13	0.33	0.12	0.13	0.12	0.11	0.11	0.10
Portland	0.62	0.29	0.62	0.61	0.63	0.67	0.66	0.65
Beaverton	0.14	0.19	0.12	0.13	0.12	0.11	0.12	0.11
Hillsboro	0.11	0.19	0.14	0.13	0.13	0.12	0.12	0.14
Inconsistency	0.02	0.10	0.01	0.00	0.00	0.00	0.00	0.02

The final result:

Level-1	Decision
Gresham	0.12
Portland	0.63
Beaverton	0.12
Hillsboro	0.13
Inconsistency	0.02

Level-1	Decision
Financial	0.12
Environment	0.61
Infrastructure	0.27
Inconsistency	0.02

Level-2	Financial	Environment	Infrastructure
Price	0.33	0.00	0.00
HOA	0.33	0.00	0.00
Tax	0.33	0.00	0.00
Recreation	0.00	0.01	0.00
Security	0.00	0.99	0.00
School District	0.00	0.00	0.76
Ease of Transportation	0.00	0.00	0.22
Medical Facility	0.00	0.00	0.02
Inconsistency	0.00	0.00	0.19

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.03	0.25	0.36	0.06	0.03	0.04	0.21	0.14
Portland	0.13	0.25	0.14	0.06	0.03	0.12	0.30	0.32
Beaverton	0.56	0.25	0.03	0.65	0.78	0.69	0.28	0.36
Hillsboro	0.27	0.25	0.46	0.23	0.16	0.14	0.21	0.19
Inconsistency	0.28	0.00	0.30	0.17	0.09	0.04	0.00	0.00

The final result:

Level-1	Decision
Gresham	0.07
Portland	0.08
Beaverton	0.67
Hillsboro	0.18
Inconsistency	0.09

Level-1	Decision
Financial	0.25
Environment	0.40
Infrastructure	0.35
Inconsistency	0.00

Level-2	Financial	Environment	Infrastructure
Price	0.43	0.00	0.00
HOA	0.25	0.00	0.00
Tax	0.33	0.00	0.00
Recreation	0.00	0.20	0.00
Security	0.00	0.80	0.00
School District	0.00	0.00	0.48
Ease of Transportation	0.00	0.00	0.21
Medical Facility	0.00	0.00	0.31
Inconsistency	0.00	0.00	0.00

Level-3	Price	HOA	Tax	Recreation	Security	School District	Ease of Transportation	Medical Facility
Gresham	0.27	0.27	0.27	0.27	0.25	0.27	0.25	0.23
Portland	0.27	0.27	0.27	0.27	0.23	0.30	0.25	0.25
Beaverton	0.27	0.27	0.27	0.27	0.28	0.30	0.25	0.25
Hillsboro	0.18	0.18	0.18	0.18	0.25	0.14	0.25	0.28
Inconsistency	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The final result:

Level-1	Decision
Gresham	0.26
Portland	0.26
Beaverton	0.27
Hillsboro	0.21
Inconsistency	0.00