Buying Condominium Properties Made Easy using Analytic Hierarchy Process (AHP) Approach through Expert Choice

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Abstract

This paper presents an Analytical Hierarchical Process (AHP) using Expert Choice software to simplify the decision making process of customers in choosing condominium units. With this, the researcher selects pair wise method in the design of the questionnaires. The questionnaires were sent to participants through online messaging applications. Middle-class residential buildings are rapidly emerging on metropolitan areas in the Philippines. Developers have been trying to construct these residential buildings according to the customer's preferences. However, because of internal and external factors, preferences are inevitably changing and oftentimes unpredictable. Consequently, developers need to know the factors that could influence the preferences of potential property buyers. Descriptive-casual type of research was used in gathering the data derived from survey questionnaires which was distributed to 20 prospective property customers/buyers (based in NCR and Region IV-A, Philippines). The technique used in this paper is analytic hierarchy process. Results from this study indicates that customers tend to choose the properties which are 1) close to public facilities and 2) accessible to public transportation. Additional factors such as price, property space and security capabilities can also influence the customer's decision-making process.

Keywords
Condominium, Decision Making, Housing Preferences, Individual Investors, Investment, AHP, Expert Choice System

1. Introduction

The start of recovery of the world from the global financial crisis marks the recovery of all of its industries and sectors. The real estate industry is not exempted from such recovery. However, with the fear of another economic bubble burst, buyers are facing the reality that buying a property or residential estate must be wise and painstaking, because real estate purchase is a complex decision-making process requiring buyers to pass through a number of steps (Levy, Murphy & Lee, 2008).

Condominium markets are becoming known in the world today. In an Asian perspective focusing in Malaysia, condominium units in prime locations are most expensive followed by those in secondary and other outskirt city areas. The target buyers in such areas are mainly expatriates and those earning very high income. Their demand forms a high-end market as compared to that which is affordable by the local people. However, in many ways, the preferences given to condominium properties are similar for all categories of buyers (Iman, Karamudin & Seah, 2008). Such that real estate is a costly product, a buyer will consider a number of factors when purchasing a residential property (Ratchatakulpat, et. al., 2009). These facts thus prodded the researcher to study clients' preferences of residential properties in the case of condominium properties in urban city of the Philippines using conjoint analysis as a marketing research.

The Philippines is experiencing a boom in the real estate market. The growth movers of the industry are funds sent home by Overseas Filipino Workers (OFWs) and the robust Business Process Outsourcing (BPO) industry. The real

estate sector registered growth of 18.8 percent in the third quarter of 2012, making it the country's fastest-growing industry (The Manila Bulletin Online, 2012). With this phenomenal growth, the real estate industry in the Philippines has been promising in the advent of economic growth (Ballesteros, 2000). The real estate industry is one of the industries that offer man's basic need: shelter. Albeit the growing and promising market for its real estate developers, there goes some reasons for existing poor sale performance of condominiums reported by its developers. Agents and buyers alike complain of some properties to have non-strategic location and unreasonably high price despite of the properties being located in very populous cities like Metro Manila (Mei & Hu, 2000). This phenomenon indicates that to build or develop a property devoid of buyer's requirements or needs means to result in marketing doom (Shatkin, 2008).

In purchasing a residential property, a buyer will ponder on several factors considering that real estate is a costly product. Condominium markets are popular nowadays, especially to expatriates and those earning a very high income. The most expensive locations of condominium units are located in prime areas followed by those in secondary and in suburbs sites.

2. Methodology

This paper applied the Analytical Hierarchical Process (AHP) using Expert Choice software. Expert Choice has an advantage to simplify the decision-making process based on many variables. It can provide optimal results in analyzing collected data.

Below is the matrix of selected condominium developers and their features which the researcher used in this study:

Table 1. Matrix of Selected Condominium Developers

Factors	Ayala	DMCI	City Land	FEDERAL LAND
Location	Has projects in almost all prime areas in the Philippines	Has projects in almost all prime areas in the Philippines	Has projects in almost all prime areas in Metro Manila, Philippines. One project in Tagaytay.	Has projects in almost all prime areas in Metro Manila, Philippines.
Security	Security services and 24-hour CCTV	Security services and 24-hour CCTV	Security services and 24-hour CCTV	Security services and 24-hour CCTV
Type	Studio, 2 BR and 3 BR available	Studio, 2 BR and 3 BR available	Studio, 2 BR and 3 BR available	Studio, 2 BR and 3 BR available
Price	Ranges from Php 800 thousand to 30 million	Ranges from Php 2 to 14 million	Ranges from Php 700 thousand to 5 million	Ranges from Php 1.5 to 15 million

The factors selected in this study is supported by the Conjoint analysis in Calixijan and Murcia's (2015) paper on Market Analysis of Condominium Property Buyers in Davao City, Philippines: A Conjoint Analysis.

In this paper Conjoint analysis reveals that location is the most important attribute in influencing client's preference for a condominium property. Interestingly, location is considered the 2nd most important attribute that influences clients" preference for a condominium property investment. Observably, predominant among the clients are those who have monthly the lowest-bracket incomes. While the higher-income households prefer property size. Also, the result was parallel with Quigley (1985) as well as Inoa, Picard and De Palma (2014), who reported that dwelling choices may be influenced by workplace accessibility and environmental quality.

It is suggested for property developers to strengthen security measures as a primary factor in marketing condominiums, in consideration with other factors like locational convenience and access to public transportation (Thamrongsrisook, 2011; Guillory & Moschis, 2008).
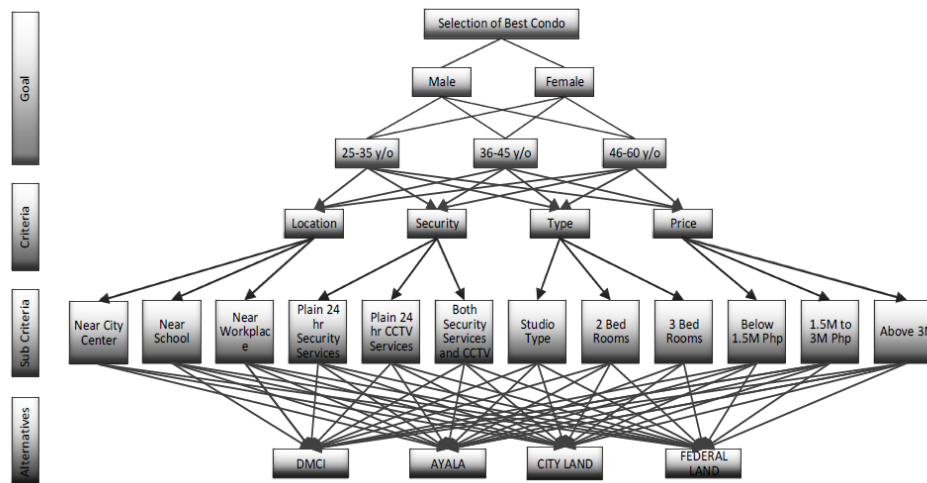
Figure 1. AHP Model for Multi-Criteria Decision Making

Figure 1 shows the 4 layers of the AHP. The first layer shows the main goal. There are 4 main criteria established: 1) Location 2) Security 3) Type and 4) Price. These criteria were given to the respondents for them to decide their preferred condominium features. This helps the researchers in formulating the AHP questionnaire as well as allowing the respondents to draw a uniformed basis in answering the AHP questionnaire. Hence, it will help them to accurately determine the hierarchy of the priorities as seen on the 4th layer or the alternatives in the AHP model.

The pairwise comparisons method (also referred to as 'PC method') is a process of comparing objects in pairs to judge which of them is preferred over another. In PC technique only two elements at a time are analyzed. (Szybowski, Kulakowski, Prusak, 2020)

Because of the model's multi-pronged criteria and sub criteria characteristics, it is difficult to quantify and integrate the participants' preferences. In this context, the researcher used specialized application for analytic hierarchy process which is called *Expert Choice*. In order to conduct pairwise comparison, a questionnaire was formulated and distributed among the 20 respondents. These are all regarded as the domain experts in terms of the marketing and advertising side of the condominium companies. The researchers emphasized that each of these respondents has given their individual judgments and were collated in order to be converted into group or collective decision for each of the listed pairwise comparisons through their geometrical average. In this regard, the scale ranges from one to nine where one signifies that the two elements are equally important. On the flip side, the number nine implies that one element is extremely important over the other in a pairwise matrix. Hence, the scale and the value of importance can be described in Table 1.

Table 2. AHP Scale

Importance	Scale Definition of Importance Scale
9	Extremely Important
8	Very Strongly to Extremely Important
7	Very Strongly Important
6	Strongly to Very Strongly Important
5	Strongly Important
4	Moderately to Strongly Important
3	Moderately Important
2	Equally to Moderately Important
1	Equally Important

As part of this, the pairwise comparison matrix will be established through the calculation of Eigenvalue and Eigenvector. The Eigenvalue and Eigenvector formula can be seen below:

Eigenvalue: $\quad \lambda_{max} = \sum_{j=1}^{n} a_{ij} \dfrac{W_j}{W_i}$ (1)

Eigenvector: $\quad (A - \lambda \max I) X = 0$ (2)

In addition to the above, as this study will be utilizing the pairwise comparison, it is important to assess the consistency of the comparison matrix, hence, it requires the utilization of consistency ratio (CR) (Saaty,1990). The formula for CR can be seen below:

Consistency Ratio: CR= CI / RI (3)

2.1. Expert Choice
Expert Choice (EC) Software is quick-to-learn and easy-to-use product for Collaborative Decision Making to help research insights. It has a graphic based structure and has the ability to apply judgment to objectives and finally achieve the ultimate goal. Decision-makers then make a simple pair-wise comparison judgment throughout the hierarchy priority to arrive at the overall priorities for the alternatives.

2.2. Designing Expert Choice Alternative Questionnaires
Table 3 shows the sample AHP questionnaire for the model's Alternative. Take note that these respondents have provided the criteria used in the AHP model as drawn from their experiential and logical-based reasoning. These established criteria were used in answering the AHP questionnaire.

Table 3. Sample AHP Questionnaire

Indicators	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Indicators
DMCI	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	AYALA
DMCI	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	CITY LAND
DMCI	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	FEDERAL LAND
AYALA	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	CITY LAND
AYALA	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	FEDERAL LAND
CITY LAND	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	FEDERAL LAND

2.3. Designing Expert Choice Criteria Questionnaires
Table 4 shows the sample AHP questionnaire for the model's level 1 criteria. Same method was done to the level 2 criteria. Please refer to Annex for detailed questionnaire made for level 2 criteria.

Table 4. Pairwise Comparison

Indicators	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Indicators
Location	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Security
Location	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Type
Location	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Price
Security	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Type
Security	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Price
Type	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Price

3. Results and Discussion
3.1. Profile of Respondents
The questionnaires are distributed to 25 participants who are all prospective clients/buyers of condominium properties. The researcher will then merge the result using Geometric Mean. $\sqrt{x1 \cdot x2 \cdot x3 \ldots xn} \, n$ *Expert Choice* has special feature of automatically utilizing Geometric Mean to all selected participants.
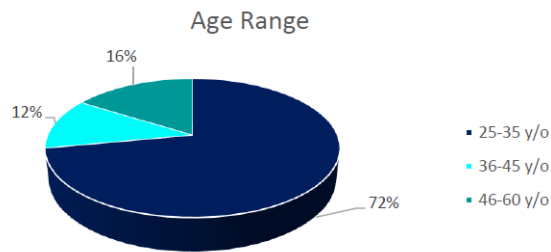
Figure 2. Representation of the Clients in Terms of Age

Most of the clients/potential condominium investors have age ranging from 25-35 years old, representing 72 percent. This was followed by clients aging 46 to 60 years old, which represents 16 percent of the respondents and 36 to 45 years old, which represents 12 percent of the respondents. The figure further indicates that predominantly, the condominium market is typically categorized as early maturity aging markets.
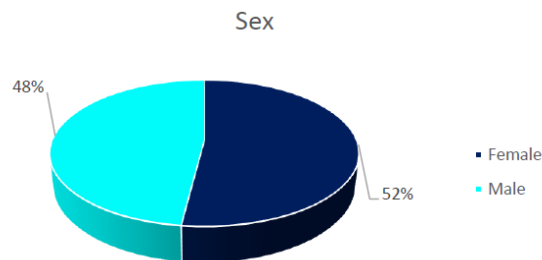

Figure 3. Representation of the Clients in Terms of Sex

Most of the clients are female, which comprises 52 percent of the total respondents. Male clients, on the other hand, constitute 48 percent of the respondents.
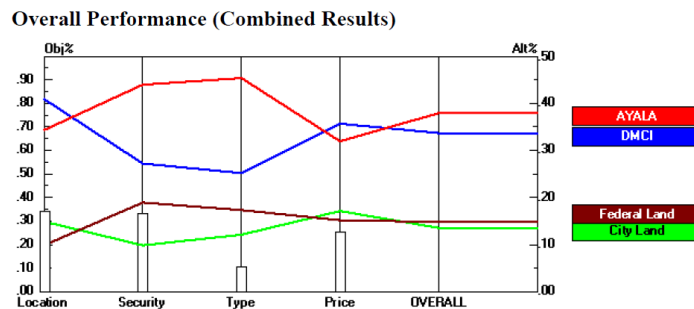
Figure 4. Performance Sensitivity: Selection of Best Condominium

Performance sensitivity demonstrates the combined results in a graphical representation. The graph shows the weights of the objectives as the vertical bars using the left axis. The relative scores of the alternatives as the colored lines are read using the right axis.

Alternative rank order: The results are in favor to Ayala among all the alternatives followed by DMCI on the second spot, Federal Land on its third and City Land as the least among all of the alternatives.

Ayala displayed a sudden spike of increase with the criteria Type and Security, signifying the participant's preferences in relation to their condominium properties. A slight shrinkage in criteria with regards to Location and Price. While DMCI's best attribute is its Location and Price with slight decrease in Security and Type.

Federal Land shows a slightly higher approval in Security and Type compared with City Land. In terms of price as the criteria, City Land and Federal Land are almost equal.

Attribute Relative Importance and Utility of Condominium Property Investments

The relative importance of the four determining attributes of client's preference for a condominium property in prime areas in Philippines is shown in Fig. 3. Importance measures are relative and within the study. If the range of the attribute levels that are tested changes, the relative importance of that attribute is also likely to change.

Figure 5. Level 1 Criteria

Pairwise Comparison reveals that location is the most important attribute in influencing client's preference for a condominium property, having an overall value of **33.4%**. Following location are security measures **32.4%**, condominium price **24.7%,** and type **9.5%**.
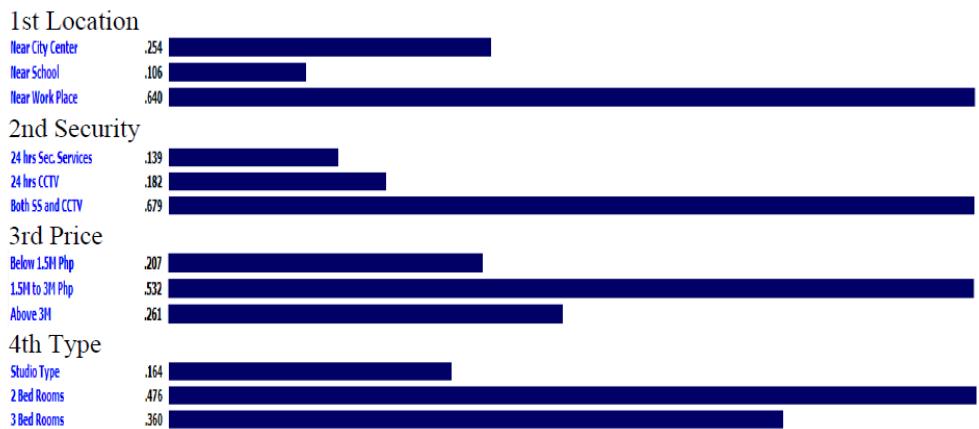

Figure 6. Level 2 Criteria

Furthermore, level 2 criteria show that the most preferred criteria in terms of location is near the work place, and majority of the clients which are young professionals in terms of security preferred a condominium unit with both 24 hrs. security and CCTV services. Followed by price amounting of 1.5 million to 3 million. Finally, a condo with 2 bedrooms obtain the highest vote in terms of type.
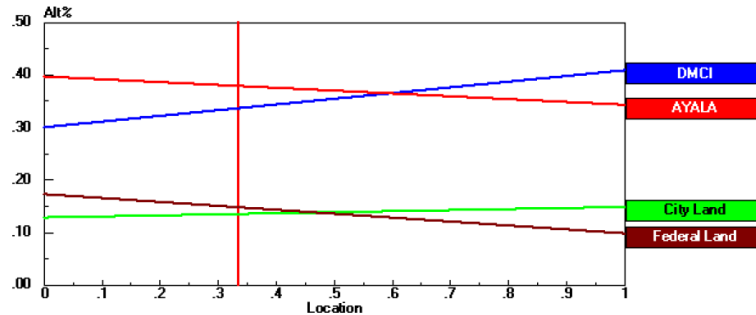
Figure 7. Gradient Sensitivity for Location Node

This figure focuses on the ranking of alternatives corresponding to prime criteria which is *Location*. Gradient sensitivity graph shows the weights of the most preferred criteria demonstrated in Performance sensitivity.

Hence DMCI attain the top spot for Location followed by Ayala. City Land as second to the last and finally, Federal Land.
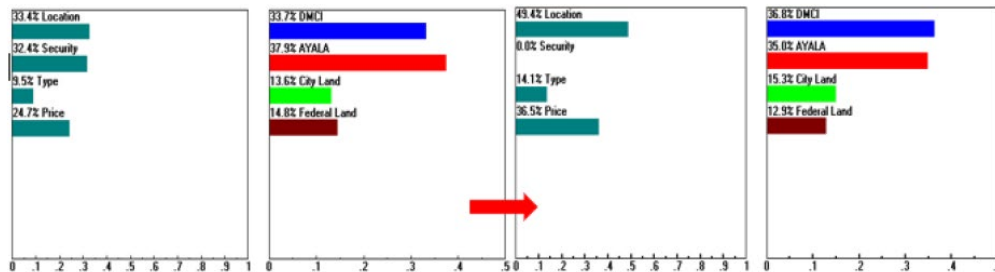

Figure 8. Dynamic Sensitivity for All Nodes

The dynamic graph allows the decision-maker to alter the weights of the alternatives and instantly see the effects on the resulting weights of the alternatives. In this example the researcher experimented to decrease votes from criteria Security. As a result, DMCI has become the leading alternatives among the rest.
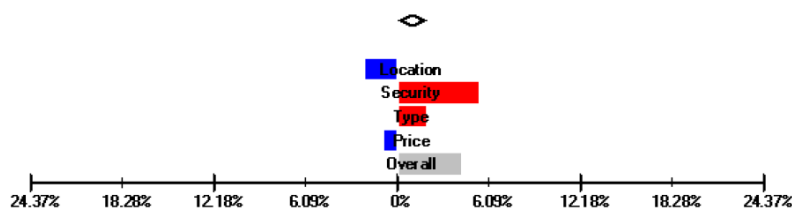

Figure 9. Weighted Head to Head Between DMCI vs Ayala

The head to head graph shows a one-to-one comparison of any pair of alternatives you select. Hence, DMCI is better at supporting location goals, while Ayala is better in terms of Security and Type. Overall, Ayala still remain on top over other developers.
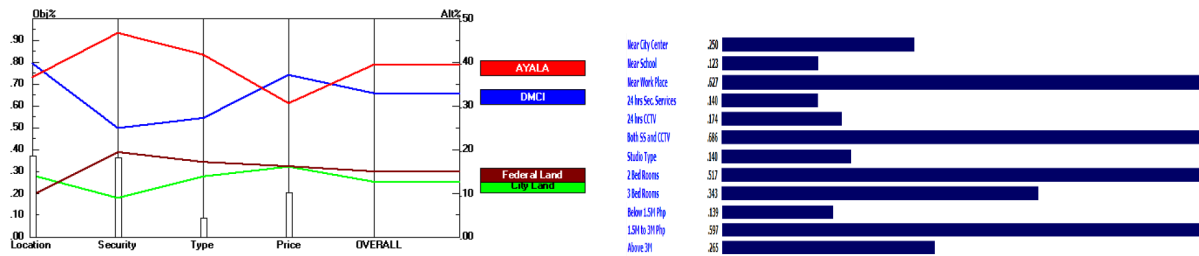
Figure 10. Performance Sensitivity: Female

The results are in favor to Ayala among all the alternatives followed by DMCI on the second spot, Federal Land on its third and City Land as the least among all of the alternatives.

Result is somehow similar to the overall performance but with insignificant change between Ayala and DMCI. There's a bigger space in security between Ayala and DMCI and a smaller space in the criteria of type. This means that more women have more confidence in the security of the best condominium they have selected than the alternate option. A slight increase in the type of condominium for their secondary option than their primary option. More women less preferred to invest above 3 million.

Figure 11. Performance Sensitivity: Male

The results are in favor to Ayala among all the alternatives followed by DMCI on the second spot, City Land on its third and Federal Land as the least among all of the alternatives.

Men are more concerned about the price of the condominium unit than women, an increase was observed on criteria of investing below 1.5 million. Additionally, men are more in favor of 3 bed room type of condominium than women. This explains men's constraint in providing for their families.
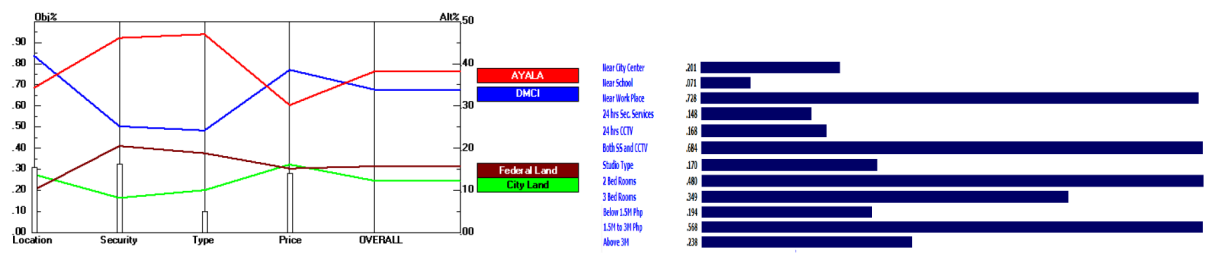

Figure 12. Performance Sensitivity: Age Ranging 25 to 35 Years Old

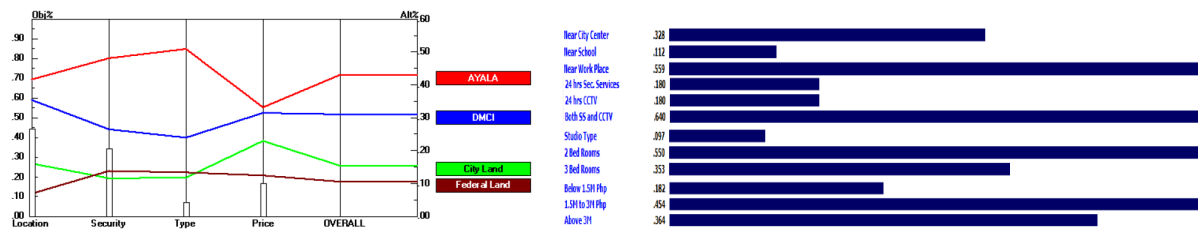**Overall Performance for Age Ranging 36 to 45 Years Old**

Figure 13. Performance Sensitivity: Age Ranging 36 to 45 Years Old

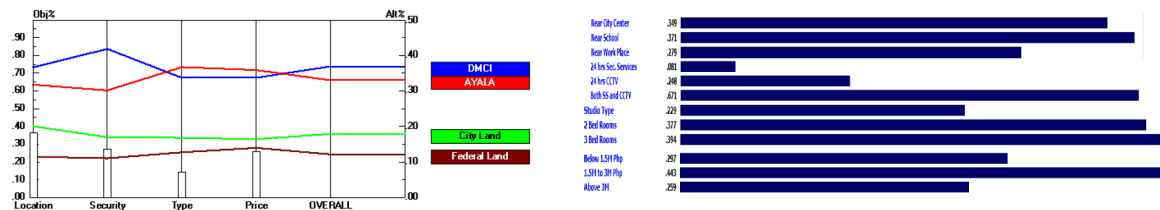**Overall Performance for Age Ranging 46 to 60 Years Old**

Figure 14. Performance Sensitivity: Age Ranging 46 to 60 Years Old

4. Conclusion

Female slightly over top male, with age ranging from 25 to 45 years old. The location of the condominium properties is the most important attribute, while the type and size of the condominium is the least important. Furthermore, despite the fact that Ayala dominated among the other alternative goals, it's the availability of DMCI properties in most of the prime areas in the Philippines that brought them to the second preferred developer. At the same time, Ayala has an advantage in terms of Security and Type over DMCI.

As for the best individual utility model of condominium property, clients preferred a condominium costing between 1.5 to 3 million, near their workplace, secured with a both 24-hour security services and CCTV surveillance, with two bedrooms, and is built by a well-known developer in the Philippines.

This study will provide insight and support to any consumers who are planning to invest in a condominium property in the future. The public may also use the study as a lead in generating their own preferences and options in using the *Expert Choice* system. Furthermore, the study may serve as a reference on how the business enterprises will transcend its marketing power capability by the use of analytics.

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