

# DO HOUSEHOLDS IN DEVELOPING COUNTRY CHOOSE ENERGY EFFICIENT AIR CONDITIONER?: EVIDENCE FROM THE PHILIPPINES

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## Overview

Developing countries in Asia have experienced a rapid economic growth and the Philippines is one of such countries. Concomitant with economic growth is the rising electricity consumption. However, the country also faces supply investment constrains making electricity prices one of the highest in Southeast Asia (Ravago et al., 2019). From the perspective of energy security as well as global warming, energy saving is one of the strongly recommended actions. However, further efforts are needed.

According to the latest energy consumption survey in the Phillipines, the third largest end-use electricity by households is space cooling and air conditioning (Department of Energy, Philippines, 2011). Currently, air conditioners (hereafter AC) are used by around 20% of Metro Manila's population of 13 million and less than 10% of the Philippines' population of 107 million. The percentages of AC owners is expected to increase in the future due to economic growth. Hence, one of the effective energy-saving behaviours that households can take is choosing energy efficient AC. How do we incentivise households to choose energy efficient AC? To answer this question, we will conduct face-to-face survey in Metro Manila, the capital city of Philippines. The survey includes choice experiment questions on AC alternatives, hence, the basic preferences and willingness-to-pay (WTP) for each attributes of AC can be estimated. The survey will also reveal what information encourages consumers to choose energy efficient AC. In order to develop the survey instrument, we conducted preliminary surveys, which is especially important for choosing attributes and its levels on choice experiment questions. This abstract focuses on introducing the results from the preliminary surveys conducted in February and March 2019 and discusses the potential policy recommendations.

## Methods

We conducted the preliminary surveys including market research, focus group discussion (hereafter FGD) and Pre-Test in February and March 2019 (see Table 1). From the results of our market research and FGD, we developed our survey instrument for Pre-Test. The questionnaire consisted of six parts. In the first part, there are eight-choice experiment questions on AC. The second part consists of questions on ownership and usage of different appliances. The third part asks respondents their household utilities such as average electricity bills and consumption. Fourth asks respondents on their recognition and interests on environment and energy issues. Fifth, respondents are asked about their awareness and trust on energy efficiency logos. And lastly, are questions about their demographic information.

The objective of using choice experiments is to investigate people's preferences across a set of alternatives expressed as a bundle of attributes. Respondents are asked to choose their most preferred AC over the alternatives. We will examine whether and how such attribute(s) significantly affect decision-making for AC by applying a random parameter logit model which can relax restrictions of homogeneity of preferences and independence of irrelevant alternatives that are assumed by the conditional logit model.

**Table 1: Summary of Survey**

Date conducted	The type of survey	Purpose/Respondents
25 February, 2019	Market research in four electrical appliance stores in Manila	- Collecting the information on popular models of AC, its price range, and energy labels
26 February, 2019	FGD in Manila	- Twelve participants - Six participants each for two groups; one group for AC owners and another for AC non-owners - Through spontaneous and free flowing exchange, use of electricity, awareness on energy, and important factors for purchasing AC were extracted
1 March, 2019	Pre-test 1 in Manila	- To check the validity of questionnaire for the field survey - Five participants for AC-owners
25 May, 2019 (expected)	Pre-test 2 in Manila	- To finalise the questionnaire for the field survey
1 June, 2019 (expected)	The field survey	- 500 residents in Manila

## Preliminary Results

From our FGD, we found that the awareness to electricity rate was very high. It can be associated with the fact that electricity rate in the Philippines is the second highest in Asia (comparable to Japan). Among our respondents, electricity takes up the largest portion of the consumers' monthly budget for utilities. Hence, the energy-saving feature was the second important factor on purchasing decisions for respondents who are AC-owners and the most important factor for AC non-owners. Discussions also revealed that they were concerned with quality, which was often related to the country of manufacturer. The popular brands they mentioned were companies from the Philippines, Japan, Korea and US. Respondents also mentioned that functions were also important such as quite/silent feature and anti-bacterial functions.

Reflecting our market research and FGD, we set five attributes including *Purchase Price*, *Air Conditioner Type*, *Country of Manufacturer*, *Additional Function*, and *Energy Efficiency* (Table 2). In order to examine what type of information on energy saving feature can be effective for purchasing decisions of AC, we have five types of information; *Energy Efficiency Ratio (EER)*, *Energy Efficiency Star*, *Estimated Cost per Hour (PhP)*, *Estimated Energy Consumption per Hour (kWh)*, and *Energy Efficient AC Certification*. *EER* is the information on the energy label known as "energy guide" issued by the government (Department of Energy, Philippines, 2019) and this label should be on all ACs in the market. Other four information are hypothetical ones that are not shown in "energy guide." After the Pre-Test, the moderator asked each respondent whether they agreed with that attributes on choice experiment questions were important factors for decision-making on AC. All participants agreed with them, however, participants who faced choice experiment with *EER* and *Energy Efficiency Star* mentioned that these two measures were difficult to understand.

In the field survey, we will divide sample into two groups with different information on *Energy Efficiency* on choice experiment questions. By comparing preferences to *EER* and another information, we try to reveal the most effective information which will lead to a choice for energy efficiency AC.

**Table 2 : Attributes and Levels for Pre-Test**

Attribute	Level			
	<i>Price</i>	PhP 15,000	PhP 25,000	PhP 35,000
<i>AC Type</i>	Split type with Inverter	Split type without Inverter	Window type with Inverter	Window type without Inverter
<i>Additional Function</i>	None	Noise Reduction	Air Purification	Self-cleaning
<i>Country of Manufacturer</i>	Philippines	Japan	Korea	US
<i>Energy Efficiency</i>	One of "Energy Efficiency Ratio", "Energy Efficiency Star", "Estimated Cost per Hour", "Estimated Energy Consumption per Hour", and "Energy Efficient AC Certification" was applied. Their levels are omitted here due to a space limitation.			

## Conclusions

We conducted a sequence of preliminary surveys to design the questionnaire for the field survey which aims to examine preferences for AC. Attributes and levels were set as Table 2, however, we found some attributes should be modified for the field survey. Firstly, levels of *AC type* should be revised because split type AC often cannot be installed at some types of houses such as condominiums and apartments. Our respondents considered information on monetary unit as easier and effective information when presented in *Energy Efficiency*. On the other hand, FGD and Pre-Test revealed that the current information on the energy guide, *EER*, introduced by the government was considered as difficult information. Hence, this would not lead to a purchase.

To sum up, we found that people indeed want to purchase AC with high efficiency because electricity rate in the Philippines is extremely high. However, the current information label with *EER* is not easy enough for people to understand and would not encourage consumers to choose the energy efficiency AC. This result will be further validated in the analysis of the field survey.

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