



# **An Empirical Study On Willingness To Pay of the Electricity in Taiwan**

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# Motivation

Motivation: What factors will influence the willingness to pay of the electricity

For the questionnaire:

- One question → One Variable → **Too many variables**
- The **importance ratio** of variables unknown
- The **relationship** between the variables unknown

On This Study:

- Hope to find **few factors** to explain the result of Questionnaire to reduce the cost of survey
- Find out the **relationships** of factors

# The Questionnaire

- 1200 qualified respondents in the study of willingness to pay in Taiwan.
- 41 items (variable) in 5-point Likert-type scales analyzed
- 41 observed variables are too many => Explain one by one
- Smaller number of unobserved variables => Factors => Linear Regression

No.	Item	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1	I understand the issue of Taiwan's nuclear energy security and various types of power generation waste disposal	1	2	3	4	5
2	I understand what renewable energy I can use	1	2	3	4	5
3	The price of Taiwan's energy is relatively cheap	1	2	3	4	5
41	I'll post energy articles in Blog, FB or Line.	1	2	3	4	5

# The analyzing Flow

No.	Method	Purpose	Criteria	Result
1	Cronbach's alpha	<ol style="list-style-type: none"> <li>Internal Consistency</li> <li>Cronbach's alpha if item deleted</li> </ol>	> 0.7	Delete 0 items
2-1	Bartlett's test of sphericity	If the data are suitable to apply Factor Analysis	< 5%	
2-2	The KMO Measure of Sampling Adequacy	<ol style="list-style-type: none"> <li>If the data are suitable to apply Factor Analysis</li> <li>Delete the items with small communality value</li> </ol>	<ol style="list-style-type: none"> <li>&gt; 0.5</li> <li>&lt; 0.5</li> </ol>	Delete 6 items
3	Factor Analysis	<ol style="list-style-type: none"> <li>Extract the factors</li> <li>Rotated Component Matrix</li> </ol>	<ol style="list-style-type: none"> <li>Eigenvalue &gt;1 ; Varimax Rotation</li> <li>Correlation &gt; 0.5</li> </ol>	<ol style="list-style-type: none"> <li>Delete 0 items</li> <li>6 latent factors</li> </ol>
4	Linear Regression	Find out the relationship of latent factors	P value < 5%	G4 <= G1 & G2



# The analyzing processes (1/3)

- Reliability Test:

Cronbach's alpha is a measure to assess **the reliability, or internal consistency**

- The Cronbach's Alpha is 0.938 in our questionnaire.

The value of "Cronbach's alpha if item deleted" of each item is smaller than 0.938. => All the items are kept.

# The analyzing processes (2/3)

- *Bartlett's test of sphericity*

Small values (**less than 0.05**) of the significance level indicate that a factor analysis may be useful with the data.

- **The KMO Measure of Sampling Adequacy:**

**The proportion of variance in the variables that might be caused by underlying factors. (higher than 0.50)**

*Items can be deleted:*

(1) *The value of KMO: 0.944*

(2) *Communality value of Item No. 18:  $0.449 < 0.5$  ← The item can be deleted.*



# The analyzing processes (3/3)

- Factor Analysis: The eigenvalue  $>1$ , Varimax Rotation  
Getting 6 factors (components) and cumulative of extraction sums of square loading is 66.42%.
- Linear Regression:  
G4 as the dependent factor and the rest as independent factors

Content (Item No.)	Dimension Name/ Characteristics	Variables
27, 28, 29, 30, 37, 38, 39, 40, 41	The perception of renewable energy	G1 (Renewable)
10, 13, 14, 15, 16, 17, 26	Perception of the risk of ecological environment	G2 (Ecological)
6, 19, 20, 21, 23, 24, 34, 35,	The risk of nuclear energy	G3 (Nuclear)
7, 8, 9, 11, 12	The behavior of electricity consumption	G4 (Consumption)
31, 32, 33	Public trust to government	G5 (Trust)
3, 4, 5	Understanding to energy issues	G6 (Understanding)



# The Empirical Result

$$\text{G4} = 0.293 + 0.506 \text{G1} + 0.330 \text{G2} + 0.050 \text{G3} + 0.019 \text{G5} + 0.062 \text{G6}$$

(0.000)      (0.000)      (0.004)      (**0.341**)      (0.008)

(G5, not significant ; G3 & G6 small influence)

**G4:** The behavior of electricity Consumption

(ex. I know exactly how much the electricity is paid each time)

**G1:** The perception of renewable energy

(ex. I have already purchased and used alternative energy)

**G2:** Perception of the risk of ecological environment

(ex. I know carbon emissions will accelerate the climate warming)

**G3:** The risk of nuclear energy

(ex. I trust the safety of nuclear power generation)

**G5:** Public trust to government

(ex. I think Taiwan has full use and good planning of energy)

**G6:** Understanding to energy issues

(ex. The price of Taiwan's energy is relatively cheap)



# Conclusion

- Describe the result easily by lower number of factors:  
Extract 6 latent factors from 35 items. 5 latent factors to compose the factor “The behavior of electricity consumption”.
- Understanding the relationship of latent factors:  
Besides the policy formulation, the finding could be the reference of questionnaire design in the future
- Result:  
The promotion of **The perception of renewable energy** and **Perception of the risk of ecological environment** will influence **The behavior of electricity Consumption**



Thank you for your attention!