

# New Energy Opinion Leaders' Lifestyles and Media Usage

Applying data mining decision tree analysis for UNIDO-  
ICHET website users

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# Abstract

- The innovators, opinion leaders play vital roles in promoting the acceptance of innovation.
- Lifestyle analysis could help researchers divide consumers into different lifestyle groups to understand and predict consumer behaviors.
- Data mining analysis can be used to extract knowledge structures represented in models or patterns from information or raw data.

- **Purpose**: Investigate how new energy innovators' lifestyles affect their new energy product adoption and media usage
- **Method**: Use data mining decision tree analysis to find the best target groups of new energy innovators.
- **Survey**: Cooperated with UNIDO-ICHET:
  - *launched from Aug 2005 to Oct 2006.*
  - *collected information from 2,040 new energy innovators.*

# Introduction

- Data mining:
  - *extracting hidden predictive information and patterns from large volumes of data*
  - *using decision trees, association rule mining, clustering, etc...*

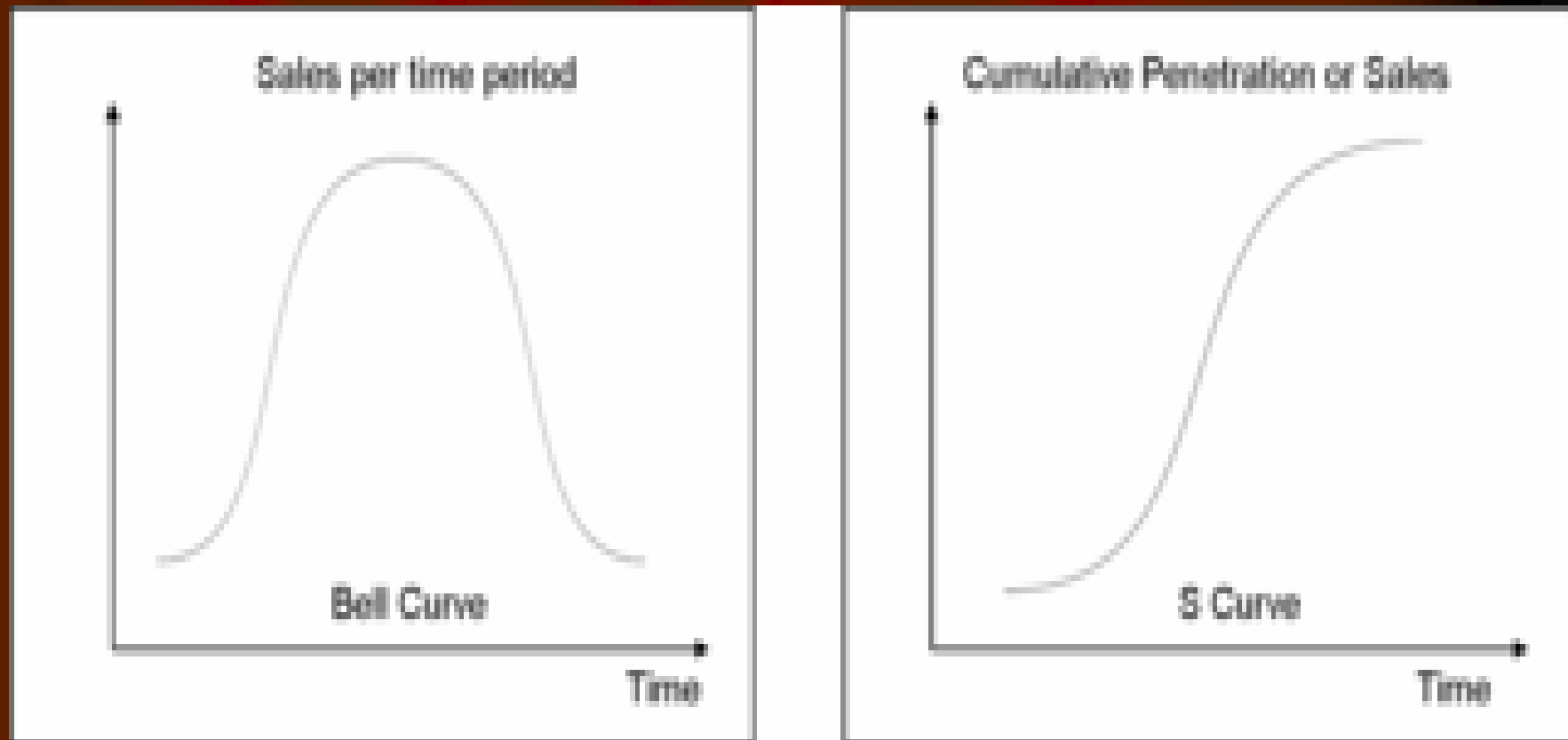
- Used factor analysis, cluster analysis, and data mining decision trees to:
  - *investigate new energy opinion leaders' lifestyles and media usage*
  - *uncover their lifestyles,*
  - *predict who are more interested in new energy related media issues.*

# Literature Review

## Global Warming & New Energy

- High cost of fossil fuels: more people adopt new energy technologies.
- The innovators and opinion leaders as promoters of new technology.
- Innovators:
  - *take more risk,*
  - *expose relevant information about the innovation,*
  - *are often opinion leaders,*
  - *affect others in society*

# Diffusion of Innovation



# Diffusion of Innovation—Bell curve

- **Diffusion of innovations theory** was formalized by Everett Rogers in a 1962 book called *Diffusion of Innovations*.
- Rogers stated that adopters of any new innovation or idea could be categorized as innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%), based on a bell curve.
  - *innovators* - venturesome, educated, multiple info sources, greater propensity toward taking risk
  - *early adopters* - social leaders, popular, educated
  - *early majority* - deliberate, many informal social contacts
  - *late majority* - skeptical, traditional, lower socio-economic status
  - *laggards* - neighbors and friends are main info sources, fear of debt

## Diffusion of Innovation—S curve

- Rogers also showed these innovations would spread through society in an S curve, as the early adopters select the technology first, followed by the majority, until a technology or innovation is common.

# Lifestyle Research

- Lifestyle: the way of living in the world, representing one's activities, interests, and opinions.
- Consumer lifestyle analysis: paints a multi-dimensional portrait of a consumer that represents a sub-segment for a certain product.

# Survey Design and Procedure

- Locate and contact potential innovators in new energy fields
- Cooperate with UNIDO-ICHET and obtained interviewees' e-mail addresses
- Design the questionnaire in 2005 and 2006
- Set a web link from UNIDO-ICHET to the questionnaire web page.
- Collect the data for this survey from August 2005 to October 2006. There were 2040 valid responses from interviewees to this poll.

# Study Results

## A. Sample Analysis

- 75.5% male / 24.5% female
- Full-time workers
- Well-educated
- Interested in “energy crisis” information in the media and “new energy” development in the media,
- Notice environmental protection-related information and campaigns about energy saving or new energy adoption,
- Support the research and development of new energy technology.
- Ages 30 to 59.
- 47.1% from the Americas.

## B. Factor Analysis and Cluster Analysis

- Principal Factor Analysis was used
- Four factors were extracted from lifestyle variables (AIO questions) according to the factor analysis
  - eigenvalues > 1,
  - factor loading > .06,
  - the cumulative percentage of variance explained by the factors is > 60%,
  - B=12028,
  - $p < .001$ ,
  - KMO = .818

### Table 3: Principal Factor Analysis

Factor name	Eigenvalue	Percentage of variance explained (%)	Cumulative percentage of variance explained by the factors (%)
Family orientation	4.683	31.218	31.218
Outgoing and health care orientation	1.801	12.006	43.224
Optimistic and self-confident	1.738	11.586	54.810
Modern and fashion elements	1.180	7.864	62.674

## Table 4: Four clusters' differences on lifestyle factors

Factor		Family orientation	Outgoing and health care	Optimistic and self-confident	Modern and fashion elements
Mean					
Cluster					
Cluster 1 (N=668)		5.2620	4.8346	4.7886	1.7687
Cluster 2 (N=633)		5.2468	5.1568	4.9776	4.2180
Cluster 3 (N=422)		5.1345	5.3406	4.1564	2.6517
Cluster 4 (N=321)		3.2952	4.6394	4.2860	2.1090
F value		920.491	103.847	182.274	890.510
P value		0.000*	0.000*	0.000*	0.000*
Scheffe's Test	( 1 , 2)	X	*	*	*
	( 1 , 3)	*	*	*	*
	( 1 , 4)	*	*	*	*
	( 2 , 3)	*	*	*	*
	( 2 , 4)	*	*	*	*
	( 3 , 4)	*	*	X	*

## Lifestyle groups: “Family-Oriented Professionals”

1. Interested in family life/activities but not much attention to fashion and modern elements.
2. 81.4% are male (higher percentage than other groups)
3. Most are 30 to 49 years old, from the Americas, and have a higher income.
4. Has the highest interest in new energy products. Most are also the opinion leaders and notice environmental protection-related information.

# Lifestyle groups: “Young Modern”

1. Most are:
  - interested in fashion elements
  - family-oriented
  - 74.6% male / 25.4% female
  - 21 to 40 years old
  - Asian
  - lower incomes
2. Interest in new energy products is only lower than the “family-oriented professionals group.”
3. Highest innovation level.
  - highest internet usage
  - more dependent on the internet

# Lifestyle groups: “Outdoorsmen”

1. Interests:
  - *social activities*
  - *health-related issues*
  - **not** *fashion elements*
  - **not** *family-oriented*
  - *more outgoing*
2. 69.9% male / 30.1% female.
3. 21 to 40 years old,
4. from the Americas (42.7%)
5. lower income
6. Only a moderate interest in new energy products
7. Higher attendance in new energy or environmental protection organizations.

# Lifestyle groups: “Egocentric Youth”

## 1. Most are:

- **not** family-oriented
- little attention to social interaction / healthcare issues.
- 72.6% male / 27.4% female.
- 30 to 40 years old
- many from the Americas

## 2. Lowest in:

- interest in new energy products
- attendance at new energy-related organizations.
- Innovation
- least attentive to new energy and environmental protection-related issues.

## Data Mining Decision Tree analysis

- Three questions' scores → one variable:  
“interested in new energy-related media issues.”
- A C & R Tree model was applied to analyze the data to identify variables that could best predict the level of “interest in new energy-related media issues.”

- Variables most predictive:
  - *level of interest in media advertisement and campaigns concerning energy issues,*
  - *residing in Asia or Europe,*
  - *belonging to the “young modern group” or the “family-oriented professionals group,”*
  - *primary source for information: newspapers and broadcast.*
- Prediction accuracy: 71%

# Data Mining Decision Tree analysis

- three questions' scores → one new variable:  
“energy-related advertisements and campaigns”
- Variables to best predict attentiveness to energy-related advertisements and campaigns:
  - Kyoto Protocol: level of understanding
  - browsing of new energy-related websites
  - media usage for information about technology development:
    - internet
    - radio
    - television
- Prediction accuracy: 77%

# Conclusion

## **New Energy Innovators' Lifestyle Groups:**

- The “family-oriented professionals group” have the highest interest in new energy products.
- The “young modern group,” tend to be younger, from Asia, and well educated. They are also highly interested in new energy products, related information or issues in the media. They spend a long time online and are more highly dependent on the internet.

# Conclusion

- The “outdoorsman group” shows interest in new energy-related activities or information but are not as enthusiastic as the two groups described above.
- The “egocentric youth group” has the lowest interest about new energy products, new energy campaigns or information in media and attending new energy-related or environmental protection organizations.

# Conclusion

## Data Mining Decision Tree Analysis:

- Those highly interested in new energy-related media issues:
  - highly interested in media advertisement and campaigns concerning energy issues,
  - resides in Asia or Europe,
  - belongs to:
    - the “young modern group” or
    - the “family-oriented professionals group”
  - primary source for information:
    - newspapers and
    - broadcast

# Conclusion

- Those most attentive to energy-related advertisements and campaigns:
  - highly understands the significance of the Kyoto Protocol
  - browses new energy-related websites,
  - media usage for information:
    - Internet,
    - radio,
    - television

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