# A Quantitative Study on Consumers' Perceived Value of Emerging Industrial Policies

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**Abstract.** Emerging industry policy texts are highly unstructured and difficult to quantify and there is a lack of quantitative research on consumers' perceived value of emerging industry policies. This paper proposes a quantitative tool construction method for consumers' perceived value of emerging industrial policies. The proposed method is used to obtain the consumer's perceived value quantification tool for the new energy vehicle industry policy, and the feasibility of the method is verified by using the new energy vehicle industry policy and consumer review data from 2015 to 2020; using the annual policy perception value quantification The correlation between the total value and the sales of new energy vehicles with a lag of one year verifies the validity of the perceived value quantification tool obtained by this construction method.

**Keywords:** policy perceived value quantification; consumer perspective; prospect theory; emerging industry; new energy vehicle

## 1    Introduction

The products of emerging industries are not in harmony with the market environment at that time, and few consumers actively buy them, which requires strong support and guidance from industrial policies. The premise of studying the mechanism of the development of emerging industries is to quantify emerging industry policies.

Emerging industry policy texts have the characteristics of large quantity, high degree of unstructured and continuous iterative updating. Consumers' perceived value has the characteristics of non-equidistant to reduce losses or increase profits. The equidistant 5-point scale of quantification tools is not suitable for non-equidistant consumer-perceived value quantification and consume a lot of manpower and time.

In this regard, this paper proposes a method for constructing a quantitative tool for consumer perceived value. The method includes two parts: the identification of policy attributes based on content analysis and the calculation of consumers' perceived value of policy attributes based on prospect theory. Content analysis has the advantages of objectivity, data adaptability and availability, and focus on research objects [1]. Prospect theory uses value function and decision weight function to calculate people's subjective perceived value of decision-making schemes under uncertain conditions [2].

This paper mainly has the following three contributions. (1) Lay the foundation for the tool construction method for studying the mechanism of consumer perceived value on the development of emerging industries. (2) The construction method has the characteristics of semi-automatic and dynamic iteration, which can comprehensively identify policy attributes and is reusable. (3) Enriches the application fields of these theories and methods, and uses consumer reviews to calculate decision weights, which improves the applicability of prospect theory.

## 2       Method Building

The construction method of consumer perceived value quantification tool includes the process of policy attribute identification, the calculation process of consumer perceived value, and the verification process of the validity of the quantitative tool.

### 2.1     Policy attribute identification process based on content analysis

This section introduces the semi-automatic recognition process of policy attributes by building a policy attribute identification dictionary (Fig.1). It is found that the policy expression and wording of each key attribute can be followed in a regular manner, and a certain range of keywords can be obtained; a dictionary of policy attributes can be obtained by collecting all keywords. The construction of the category system dictionary, word segmentation, and matching categories all rely on computer technology.
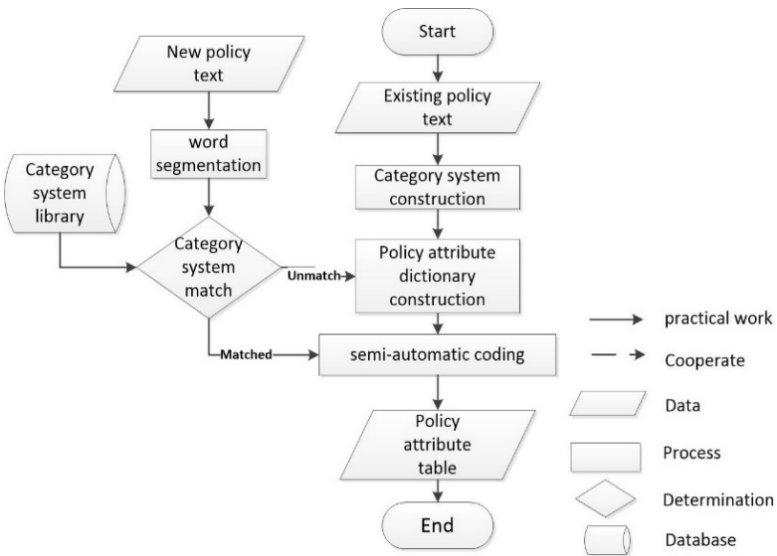


**Fig. 1.** Semi-automatic recognition process of policy attributes (Photo credit: Original)

## 2.2    Calculation Process of Consumer Perceived Value Based on Prospect Theory

After obtaining the policy attribute table, based on prospect theory, the consumer perceived value is calculated.

The first step is to select the reference point and calculate the loss reduction and profit increase. Calculate consumer loss reduction and gain increase based on a reference point $\Delta x_{i,j}$, which is the gains or losses of emerging industry products relative to traditional industry products. $\Delta x_{i,j} \geqslant 0$ for gains, while $\Delta x_{i,j} < 0$ for losses.

The second step is the calculation of consumer perceived value. Based on prospect theory [2], consumer perceived value ($V$)is calculated as shown in formula (1).

$$V = \sum_i \omega(j)V(\Delta x_{i,j}) \tag{1}$$

Weight function $\omega(j)$ reflects the importance of attributes of the policy as perceived by consumers. Consumer online reviews obtain consumers' attention to policy attribute $\omega_j$. With the help of the keyword frequency corresponding to the policy attribute $N_j$, Calculate the attention $\omega_j$ of topic j by formula (2),which can be used to measure the weight function $\omega(j)$.

$$\omega_j = \frac{N_j}{\sum N_j} (j \in N^*) \tag{2}$$

According to the literature [3], the value function is shown in formula (3).

$$V(\Delta x_{i,j}) = \begin{cases} (\Delta x_i)^\alpha, \Delta x_i \geq 0; \\ -\lambda(\Delta x_i)^\beta, \Delta x_i < 0. \end{cases} \tag{3}$$

$\alpha,\beta$ （$\alpha \geq 0$，$\beta \leq 1$）are the risk attitude. The loss aversion coefficient $\lambda > 1$ represents the loss sensitivity of consumers in purchasing decisions. Kahneman and Tversky [3] determine the values of the three parameters as $\alpha = \beta = 0.88$ , $\lambda = 2.25$. This paper follows the values of these three parameters.

## 3    Validation of the construction method of consumer perceived value quantification tools

This paper takes new energy electric vehicles as an example to verify the proposed construction method of consumer perceived value quantification tools. Obtain relevant policies from China Association of Automobile Manufacturers by using python. The keyword is "new energy vehicles", category is "industry policy-industrial policy" and time span is from April 28, 2009 to December 31, 2020. Finally, 108 policies that fit the research topic were filtered out.

### 3.1    Identification of new energy vehicle policy attributes based on content analysis

The first-level categories are divided into "loss-reducing" and "revenue-increasing" categories by means of prospect theory. The three-level category divides the safety hazards into battery safety and vehicle safety; the technical standard requirements are divided into charging requirements, access standards, cruising range and battery standards; the convenience of use is divided into charging infrastructure and traffic management; value preservation policies are mainly Refers to policies related to battery recycling. The cost of use is subdivided into policies related to subsidies and tax exemptions. The consensus rate in the precoding stage is 0.826. After passing the test, they enter the formal coding.

### 3.2    Calculation Method of Consumer Perceived Value of New Energy Vehicle Policy Based on Prospect Theory

Through the weights obtained by the statistics of the word frequency of the three-level category keywords corresponding to the reviews each year, the consumer-perceived value of all policies to be quantified is calculated separately by following the steps in Section 2.2.

### 3.3    Effectiveness test of quantitative tools for consumer perceived value of new energy vehicle policies

The validation process of policy quantification tools includes hypothesis testing of the relationship between consumers' perceived value of emerging industry policies and product sales. Kim et al. [4] confirmed that consumers' perceived value has an important impact on product adoption, and is the main factor determining their willingness to adopt. Therefore, this paper proposes the hypothesis:

H1: Consumer perceived value has a significant positive impact on product sales.

The consumer-perceived value of the policy is divided and summed by year, and Table 1 is the consumer-perceived value and annual sales of new energy electric vehicles from 2015 to 2020.

Table 1. Consumer perceived value (A) and annual sales (B) (Photo credit: Original)

| Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|
| A | 1.922 | 2.304 | 2.267 | 2.165 | 2.902 | 2.510 |
| B | 13.2 | 40.9 | 46.8 | 76.0 | 73.2 | 111.5 |

Tsai et al. [5] confirmed that the policy effect has a time lag in the research on the policy effect. There is a correlation between consumers' perceived value (A) and annual sales (B) with a lag of one period, $p=0.047<0.05$, indicating that there is a significant correlation between consumer-perceived value and the sales of new energy electric vehicles with a lag of one year, and the correlation coefficient is 0.868. Therefore, it is assumed that H1 holds.

## 4    Conclusion

This paper proposes a construction method of consumer perceived value quantification tool. This method can semi-automatically and dynamically iterate to obtain a more comprehensive policy attribute and a policy attribute table; Based on the calculation results of consumers' perceived value, we can analyze the policies that have the greatest impact on consumers' purchasing decisions. Based on the new energy vehicle industry policy data and consumer review data from 2015 to 2020, the feasibility of this construction method is verified; at the same time, it is verified that consumer perceived value has a significant positive impact on product sales, which provides support for the forecast for subsequent new energy vehicle sales.

## REFERENCES

1. Tang Z J, Cui J F, Tang X W, et al. A Demand Feature Mining Method of Short Life Cycle Experiential Product by Integrating Content Analysis and Association Analysis. Chinese Journal of Management Science, 2019,27(11):166-175.
2. Ferreira J R R. Decision-Making under Risk: Conditions Affecting the Risk Preferences of Politicians in Digitalization[J]. International Journal of Environmental Research and Public Health, 2022, 19(5), 3036.
3. Kahneman D, Tversky A. Prospect Theory: An analysis of Decision Making under Risk[J]. Econometric,1979(2).
4. Kim S, Bae J, Jeon H. Continuous Intention on Accommodation Apps: Integrated Value-Based Adoption and Expectation–Confirmation Model Analysis[J]. Sustainability, 2019, 11(6).
5. Tsai W P. Social Structure Of "Coopetition" Within a Multiunit Organization: Coordination, Competition, and Intraorganizational Knowledge Sharing[J]. Organization Science, 2002, 13(2):179-190.