Research on the Demand for Clean Electrical Appliances of the Z Generation based on the KANO Model

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Abstract

"Generation Z" refers to people born between 1995 and 2009, also known as the Internet generation, Internet generation, and collectively refers to a generation that is greatly influenced by technological products such as the Internet, smartphones and tablet computers. Generation Z has a higher acceptance and sensitivity to high-tech products, and also has a series of logics for purchasing smart cleaning appliances. At the same time, they have higher living expenses and their preferences can significantly influence family purchasing decisions. Therefore, the influence of the growth process of Gen Z youth on the consumer market continues to increase and increase. The scope of this survey is located in Sichuan Province, and the Z generation group is the key survey object, and the sample is obtained by a combination of stratified sampling and two-stage sampling. This study establishes the KANO model to measure the satisfaction of the Z generation with the current situation of the clean electrical appliance market, so as to analyze the demand attributes of the Z generation for clean electrical appliances, and study its potential demand, help the clean electrical appliance market to seize the opportunity of this era of revolution, for the Lay the foundation for the development of the entire market in the future.

Keywords

Gen Z; Smart Clean Appliances; KANO Model; Satisfaction.

1. Background

With technological innovation and changes in consumer demand, the sub-categories of cleaning appliances represented by intelligent sweeping robots and steam vacuum cleaners have gradually replaced traditional vacuum cleaners and become business products in the market in recent years. Major brands scrambled to showcase new cleaning electrical products, such as mite removal machines, which rely on technologies such as ultraviolet irradiation to clean dust mites in mattresses, so that those who have special needs and pursue a higher quality of life gain corresponding satisfaction. It all bodes well that these products are changing the way Chinese households are cleaned. At the same time, the product technology of cleaning appliances is also improving in an all-round way with the market demand. The specific performance is that the functions of high-end cleaning appliances such as automatic water replenishment of the body + automatic dust collection of the base + automatic drying and mopping have been improved, and some cleaning robots and ordinary cleaning appliances on the market have been improved. Vacuum cleaners have added functions such as steam sterilization. It is the continuous advancement of technology that makes cleaning appliances more in line with the modern rhythm and is at the forefront of product intelligence.

It is worth noting that my country's clean electrical industry is still in the early stage of development, facing serious product homogeneity in the low-end market, lack of brands and products in the mid-to-high-end market, and many technical problems that have not been broken through, and the system

is prone to failure. , loud noise, missed sweeps and other phenomena, making consumers less reliable in cleaning electrical appliances.

Today's generation Z group has become the main force in purchasing smart cleaning appliances due to their high spending power and the consumption concept of "pleasant". In order to understand its consumer demand, it will help the clean electrical appliance market to seize the opportunity of this era of revolution and lay the foundation for the development of the entire market in the future.

2. Literature Review

Compared with the domestic economy, the foreign economy started earlier, and the scale of the clean electrical appliance market has continued to grow. It has been developing for many years, with a stable growth rate and a relatively mature market. The research on clean electrical appliances by foreign scholars is also relatively mature. Judging from the annual trend chart released by CNKI, the research on clean electrical appliances abroad shows an upward trend[1-3].

The research on clean electrical appliances by Chinese scholars first originated in 2001. Zhu Dongmei wrote in the article "The Final of the Clean Electrical Appliance Market Has Not Started" that at the 2018 AWE exhibition, almost one exhibition hall was filled with clean electrical appliances, which reflected from the side The cleaning appliance market has entered a period of rapid growth. Wu Yongyi mentioned in his article "The Hot Bottleneck of the Clean Electrical Appliance Market Needs a Breakthrough", not only the design and function of the product, but also the most important thing is to come up with excellent quality, high cost performance, perfect after-sales service system, and real "black technology"[4]. "Only can Chinese brands break through and lead the world in the global competition in the clean electrical appliance industry[5].

Judging from the annual trend chart published by CNKI, my country's research on clean electrical appliances is in a broken line. From the theme release map released by CNKI, it can be seen that the research topics of domestic scholars are mainly cleaning appliances, household appliances, research institutes, cleaning appliances, etc. Among them, the research on cleaning appliances mainly focuses on the following categories:

(1) Research on vacuum cleaners, Su Liang introduced a horizontal vacuum cleaner s9 series. The puppy S9 adopts a new type of high-efficiency motor, giving the machine 300W rolling-level suction power, which is equivalent to the triple suction energy of lying suction plus hand-held mite removal instrument. With the innovative air duct structure design, it increases the conduction flow and speed of the gas inside the air duct, effectively ensuring that the surging suction is not attenuated, and has the advantages of long-lasting battery life and unlimited time, so that the cleaning work does not need to be repeated, and the result is more effective with less effort.

(2) Research on air purifiers. Yinan introduced the series of products such as PAPER plasma air humidifier purifier, JUPITER plasma air purifier, plasma air sterilizer, and plasma car-mounted sterilizer launched by Samsung[6].

Samsung plasma air purifier products are equipped with Samsung's unique S-PLasma ion sterilization technology, which kills 99% of deadly viruses such as H1N1, bird flu, SARS, and common germs such as coliform; triple high-efficiency filter design It can effectively filter formaldehyde, benzene, allergens, and unpleasant odors, and even particles as small as 0.1 μm can achieve 99% filtering effect. PAPER series products also have a unique function of humidifying water molecules, which can release 0.1nm water molecules, taking into account every corner of the house and maintaining a healthy humidity of 40% to 60%[7].

(3) Research on robots. Midea's research on cleaning electrical robots is mainly divided into two categories, namely sweeping robots and window cleaning robots. There are three types of sweeping robots: single sweep, single drag, and sweep and drag. The sweeping robot is still an emerging product. With the accumulation of technology and resources in this field, the current detailed problems of the sweeping machine, such as cleaning route planning, intelligent crossing of obstacles, and loud noise,

will be solved faster. In the future, sweeping robots will surely develop from primary intelligence to a higher degree of intelligence.

(4) Research on the mite removal instrument. In Zhu Dongmei's introduction, the mite removal instrument is not only an auxiliary function of the vacuum cleaner, but also can be used as a separate product. At present, many vacuum cleaners are equipped with the function of removing mites, but the sales growth of mites removal instruments in the market is still relatively obvious. The team led by Chen Zhirong introduced the design of the new portable mite removal instrument developed. Utilize the characteristics of small size, low power consumption, strong control function and easy miniaturization of single-chip microcomputer. Moreover, the use of single-chip microcomputers in household appliances can reduce production costs. Therefore, they combined the vacuum cleaner with the removal of mites, and used the single chip technology to reduce the cost. Through experiments, the final effect is completed by using the existing technology, and the expected design goal is achieved[8].

(5) Research on washing machines. Electric floor washing machine is a new type of floor cleaning equipment, which is an environmentally friendly and energy-saving product integrating walking, sweeping, cleaning, drying and other functions. Huang Peixiang analyzed its power system, used the dynamic theory to match the parameters of the drive motor and battery, and provided reference for the design of the power system of the same type of electric floor scrubber in the future, and established the power system of the whole machine in the matlab/simulink environment. The model is simulated, and the simulation results show that the matching results meet the requirements[9].

To sum up, there is a lack of demand surveys for clean electrical appliances in a certain region and population in China, and the current clean electrical appliances have defects in function and innovation. As the generation Z, who is about to become the main force of consumption, its change of thinking affects the development trend of the entire cleaning market, so it is necessary to understand their needs[10]. And as far as the Chengdu area is concerned, manufacturers lack the understanding and cognition of the Z generation, so this research uses the KNAO model to investigate and analyze the satisfaction of the Z generation with clean electrical appliances, and combined with the current market situation, to explore the market pain points and opportunities, so as to help manufacturers of cleaning appliances to improve and innovate their products more efficiently.

3. Survey Objects and Sampling Design

Generation Z groups are widely distributed. Therefore, in order to facilitate the implementation of the survey, the survey site was identified as Sichuan Province, and the group of Generation Z groups in Sichuan Province was taken as the overall survey object. The method of combining stratified sampling and two-stage sampling is adopted. In the first stage, judgment sampling is used to select primary sampling units according to multiple realistic factors such as urban population, geographical location, and per capita consumption level, and 10 cities in Sichuan Province are finally determined to be Generation Z. Sampling survey objects, the second stage is based on a simple random method without repetition to select the Z generation group from each city for the survey. A total of 450 questionnaires were distributed in this survey, the collected data were reviewed, 39 invalid questionnaires were eliminated, and 411 valid questionnaires were screened out, with an effective rate of 91.1%.

4. The Establishment of KANO Model

The KANO model is a useful tool invented by Kano for classifying and prioritizing user needs, and it is a two-dimensional cognitive model. Based on the analysis of the impact of user needs on user satisfaction, it analyzes from the perspective of users' positive and negative bidirectional emotions, so as to investigate the satisfaction of user satisfaction and quality characteristics, and reflect the relationship between product performance and user satisfaction.

According to the definition of KANO model, the quality characteristics of cleaning appliances can be divided into: necessary attribute (M) desired attribute (O) attractive attribute (A) indifference attribute (R) reverse attribute (Q). The first three needs are classified according to performance indicators: basic factors, performance factors and incentive factors. The KANO model studies the relationship between function/service demand and satisfaction as shown in Figure 1:
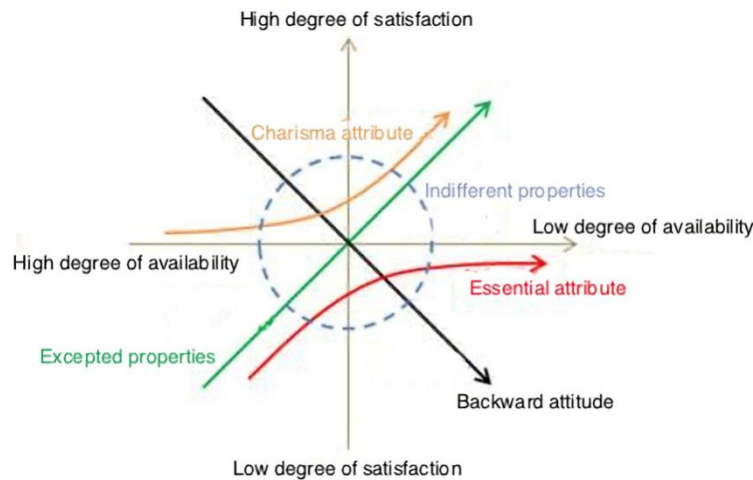

Figure 1. Relationship between KANO Model Function/Service Demand and Satisfaction

Table 1. KANO model evaluation results classification comparison table

Features/Services		Negative Topic				
		Dislike (1 point)	Endure (2 point)	Indifferent (3 point)	Agree (4 point)	Prefer (5 point)
Positive Topic	Dislike (1 point)	Q	R	R	R	R
	Endure (2 point)	M	I	I	I	R
	Indifferent (3 point)	M	I	I	I	R
	Agree (4 point)	M	I	I	I	R
	Prefer (5 point)	O	A	A	A	Q
A: Charm attribute, O: Desired property, M: Required properties, I: Indifference property, R: Reverse property, Q: Suspicious properties						

Among them, the basic demand of the Z generation for clean electrical appliances refers to what the Z generation group believes that clean electrical appliance manufacturers must provide. User satisfaction will drop significantly; while expected demand means that Gen Z's satisfaction with clean electrical appliances is proportional to the quality characteristics. When the demand is met, its satisfaction will be significantly improved. If it is not met, the satisfaction will be greatly reduced. ; Charismatic demand means that a certain function of cleaning appliances exceeds the expectations of Generation Z, and when this demand of Generation Z is met, Generation Z's satisfaction increases significantly; reverse demand means that when cleaning appliances provide a certain The satisfaction of the Z generation group will be reduced when the functional characteristics are different; the indifference type attribute means that the quality characteristics of cleaning appliances have no significant relationship with the satisfaction of the Z generation group.

The classification and comparison table of the evaluation results of the KANO model is shown in Table . According to Table , each demand indicator in this questionnaire includes two questions, and the respondents are asked to ask forward and reverse questions, so as to understand the impact of Generation Z. Satisfaction of cleaning appliances, tap potential demand, and improve and innovate the functions of cleaning appliances.

5. Analysis of Survey Results

5.1 Classification Results of the KANO Model

It can be seen from Table   that the cleaning appliances are easy to operate, the instructions are easy to understand, the characteristics of small footprint and easy storage are the essential attributes of the product; the characteristics of the effective combination of cleaning appliances and modern technology and the function of disinfection and sterilization are the attractive attributes of the product, the appearance design of clean electrical appliances is beautiful, reflecting the characteristics of individuality and intelligence as the expected attributes of the product.

Table 2. Summary of KANO Model Analysis Results

Product Features/Features	A	O	M	I	R	Q	Classification result
Convenient operation	10.00%	22.94%	48.69%	12.24%	0.11%	6.01%	Required properties
The manual is easy to understand	27.70%	41.02%	12.00%	8.02%	3.10%	8.16%	Desired property
Personalized and intelligent appearance design	46.65%	31.78%	13.41%	0.16%	3.22%	4.78%	Charm attribute
Effectively combine with modern technology such as AI	7.78%	33.82%	46.65%	11.66%	4.35%	3.52%	Required properties
Small footprint, easy storage	46.94%	12.83%	32.07%	7.78%	0.00%	0.29%	Charm attribute
Sterilizable	10.00%	22.94%	48.69%	12.24%	0.11%	6.01%	Required properties

5.2 Better-Worse Coefficient Analysis

The Better-Worse coefficient is used to determine how sensitive users are to changes in features/service levels. The calculation formula is: Better (satisfactory influence) = (A+O)/(A+O+M+I), the index is between 0 and 1, the larger the value, the greater the sensitivity and the higher the priority. High; Worse (unsatisfactory influence) = -1 * (O+M)/(A+O+M+I), the indicator is between -1 and 0, the smaller the value, the greater the sensitivity, the priority The higher the level.

After calculation, the Better-Worse coefficients of the above five product functions/features can be obtained as shown in Table 3: Among them, the better coefficient value of "effectively combining with AI and other modern technologies" is the largest, and the worst value is also small, indicating that this product is an attribute The feature priority is very high; followed by "personalized and intelligent design" and "sterilizable", the value of the better coefficient of the product function "sterilizable" is slightly lower than the former, but its worst coefficient The value is also smaller; for the two product attributes of "convenient operation, easy-to-understand instructions" and "small footprint and easy storage", although the better value is low, the worse value is also small.

Table 3. better-worse coefficient plot

Product Features/Features	Better	Worse
Convenient operation and the manual is easy to understand	0.3509	-0.7631
Personalized and intelligent appearance design	0.7744	-0.5975
Effectively combine with modern technology such as AI	0.8525	-0.4912
Small footprint, easy storage	0.4164	-0.8054
Sterilizable	0.6000	-0.4507

5.3 Demand Metrics Prioritization

Based on the KANO model, it can be seen that the necessary requirements are the most indispensable attributes of the Z generation, and then the reverse requirements are excluded, followed by satisfying the expected requirements, then satisfying the charm requirements, and finally satisfying the indifference requirements, that is, providing priority from functions/features over the level, it usually needs to be: M>R>O>A>I. After calculating the satisfaction coefficient and dissatisfaction coefficient of the Z generation on the functional characteristics of cleaning appliances through the Better-Worse coefficient, it can be sorted according to the satisfaction coefficient, and the priority order and degree of satisfaction of the needs of the Z generation can be reasonably determined. If the satisfaction coefficients are similar or the same, priority should be given to the requirements that can reduce the unsatisfactory coefficients by a large margin.

Therefore, we can see that "convenient operation, easy-to-understand instructions" and "small footprint" are the basic features to be satisfied in the process of designing products and are essential requirements; "appearance design reflects individuality and intelligence" is On the basis of the first two characteristics of cleaning appliances, the function that can increase the satisfaction of the Z generation is an expected attribute, and has a higher better value, a lower worst value, and a higher priority; while "effectively combined with modern technologies such as AI" It belongs to the charm attribute, and the better coefficient value is the highest and the worst value is low, so you can give priority to improving this function on the basis of satisfying the above three points; "sterilizable" also belongs to the charm attribute, if technical conditions, cost, etc. allow This function should also be added under certain circumstances to improve the competitiveness of the product in the market.

6. Conclusion and Suggestion

1) Cleaning appliances should have the basic characteristics of convenient operation and easy-to-understand instructions. The functions are ineffective and complicated, which will affect the user's sense of experience and satisfaction. In addition, a high-quality cleaning appliance is relatively Similar products should also have the basic characteristics of small footprint and easy storage, so it is critical to meet the above two essential requirements.

2) The Z generation group pays attention to the appearance design and personalized service of cleaning appliances. In the case of similar product functions, products with beautiful appearance and more intelligent and personalized features are more likely to stand out. Therefore, manufacturers of clean electrical appliances should pay attention to this desired attribute, so as to improve the core competitiveness of the market.

3) The combination of cleaning appliances and modern technologies such as AI and 5G, adding the function of disinfection and sterilization is also an effective way to innovate and improve cleaning appliances. These two attractive attributes belong to the needs that can bring surprises to consumers. If these two service functions are not provided, the satisfaction will not decrease, but if they are provided, the satisfaction of consumers will be greatly increased. This is the potential demand of Gen Z for clean appliances. According to the Better-Worse coefficient, if the product development time

and cost are limited, the service function of effectively combining with modern technologies such as AI should be satisfied first, followed by the function of disinfection and sterilization.

References

[1] Yinan. Clean home appliances to create high-end slow life--Samsung high-end home appliances new product tasting[J]. Household Appliances, 2013, (12):84-85.

[2] Li Yang. Research on the interaction design of smart household cleaning products based on user experience [D]. Xi'an: Xi'an Engineering University, 2019.

[3] Zhao Chuan. Catch the Generation Z[J]. Sales and Marketing (Management Edition), 2021(01):27.

[4] Ma Ke, He Renke, Ma Chaomin. Research on experience design of household intelligent sweeping robot based on voice interaction [J]. Packaging Engineering, 2020, 41(18): 118-124.

[5] Huang Zhenxuan. Midea's New Favorite Cleaning, Rolling, Rolling, Suction and Mopping Integrated Robot, Midea's Intelligent Sweeping Robot VR10F2-TB Experience Evaluation[J]. Consumer Electronics, 2017(09):78-79.

[6] Yang Zheng. Inventory of key words for the development of the vacuum cleaner industry in 2020 [J]. Household Appliances, 2021(02):64-65.

[7] Du Hongyu, Yin Xueqing. Say goodbye to bulky, light-weight and powerful suction! Shunzao Lightweight Handheld Vacuum Cleaner L1 Evaluation [J]. Household Appliances, 2021(02):22-23.

[8] Xie Qiyan, Yang Zhao. Research on the functional requirements of smart scenic spots APP based on A-Kano model--Taking Fangte tourism APP as an example[J]. Tourism Research, 2022,14(03):56-69.

[9] Tang Susu, Wu Xiaohua, Tao Yizhou, et al. A Study on Environmental Education Demands of Residential Pocket Parks Based on Kano Model[J]. Chinese Landscape Architecture, 2022,38(05):104-109.

[10] Zhou Lingyuan, Chen Hongbin, Zhang Yaokun. Research on the Promotion Strategies of Socialized Services in University Libraries--From the Perspective of Social User Demand Analysis Based on Kano Model[J].Library Work and Research,2022(05):19-27.