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Examining the Demand-Pull Factors of Household Electricity Consumption in Delhi

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Abstract

The paper explores the determinants of household electricity demand by investigating the stock of electrical appliances owned by households in Delhi. Through regression analysis, the study aims to identify the key factors influencing the accumulation of durable energy-using appliances within households. A questionnaire-based survey was conducted among 395 households in Delhi, selected through stratified random sampling. The survey collected data on socio-demographic variables, lifestyle choices, and electricity usage habits to gain insights into the factors driving appliance ownership patterns. The regression results reveal several significant findings. Firstly, household income emerges as a critical determinant of the stock of electrical appliances, indicating that higher income levels are associated with a greater accumulation of appliances. This underscores the role of economic prosperity in facilitating the adoption of energy-using technologies within households. Furthermore, family size and house size also demonstrate a positive correlation with the stock of electrical appliances, suggesting that larger households and homes with more space tend to have a greater number of appliances. This finding underscores the importance of household composition and housing characteristics in shaping appliance ownership patterns. Interestingly, the place of residence also emerges as a significant factor influencing appliance ownership, highlighting potential differences in appliance penetration between urban and rural areas or across different localities within Delhi. Surprisingly, the education level of the household head does not appear to exert a significant influence on the stock of electrical appliances. This finding suggests that factors other than education, such as income and household size, play a more prominent role in determining appliance ownership patterns. The study contributes to our understanding of household electricity demand by elucidating the factors driving appliance ownership. By identifying key determinants such as income, family size, house size, and place of residence, policymakers and stakeholders can develop targeted interventions aimed at promoting energy-efficient appliance adoption and fostering sustainable electricity consumption practices. Moreover, the findings underscore the importance of considering socio-economic and demographic factors in designing effective energy policies and initiatives tailored to the diverse needs of households.

Keywords: Household Electricity Demand, Appliance Ownership, Socio-Demographic Factors

JEL Codes: D12, Q41, R21

1. INTRODUCTION

The advent of publicly available electrical power in the 1870s marked a transformative moment in human history, coinciding with the invention of the practical incandescent light bulb. Electricity swiftly became recognized for its versatility and convenience, as it could be easily transported and accessed with the simple flick of a switch (Tang et al., 2020; McCullough, 2020; Batcha et al., 2021). Its applications spanned a vast array of sectors, including transportation, heating, lighting, communications, refrigeration, and air conditioning, among others. One of the most significant impacts of electricity is its direct effect on household welfare, playing a pivotal role in enhancing the quality of life for individuals and families. From powering essential appliances to facilitating modern conveniences, electricity has become indispensable in daily life. Furthermore, its influence extends beyond mere convenience, with electricity playing a crucial role in education and healthcare. Access to electricity enables students to study after dark, facilitates access to information through electronic devices, and supports medical facilities by powering life-saving equipment (Sperry et al., 2023; Ray and Chakraborty, 2022; Nduhuura et al., 2021; Ginoya et al., 2021). As nations undergo processes of modernization and development, the demand for electricity experiences exponential growth. This surge in demand reflects the increasing reliance on electrical power across various sectors of the economy and society. Consequently, governments and policymakers are tasked with ensuring adequate infrastructure and supply to meet the evolving needs of populations.

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In Delhi, as in many other regions, the domestic sector stands out as the largest consumer segment of electricity. However, it's important to note that electricity consumption in households doesn't occur in isolation; rather, it's intricately linked to the utilization of various durable appliances and the services they provide (Sovacool et al., 2022). Within the residential sector, electricity serves a multitude of purposes, with lighting being one of the primary uses (Pode, 2020; Kumar, 2020; Jia et al., 2019). Additionally, households rely on electricity to power a wide range of domestic appliances, including refrigerators, air-conditioners (ACs), water heaters, and various kitchen appliances. These appliances not only enhance convenience but also contribute significantly to the overall comfort and well-being of household members. Furthermore, modern households often feature an array of consumer durables that depend on electricity for operation. These may include televisions, music systems, computers, and other electronic devices, all of which add to the overall electricity consumption in residential settings (Schien et al., 2021; Poblete-Cazenave and Pachuauri 2021). Given the diverse range of appliances and devices that rely on electricity in households, it's evident that electricity consumption in the domestic sector is driven by the demand for the services provided by these appliances. As such, understanding household electricity consumption patterns involves considering not just the raw amount of electricity consumed but also the specific activities and services for which it is utilized.

The statistics provided by the World Bank in 2008 highlight the significant role of electricity in the residential sector, particularly in India. Lighting emerges as the largest contributor to residential electricity consumption, accounting for roughly 30 percent of the total usage (World Health Organization. 2016). Following lighting, other major appliances such as refrigerators, fans, electric water heaters, and televisions (TV) also make substantial contributions to residential electricity consumption. Additionally, standby power, which refers to the electricity consumed by appliances and devices even when they are not in active use, represents approximately four percent of total residential electricity usage. This underscores the pervasive presence of electricity consumption in households, even when appliances are not actively providing services.

Taken together, these findings emphasize the crucial role of electrical power as the backbone of the residential sector in India (Alasseri et al., 2020; Patyal et al., 2021; Salam el al., 2020). From basic lighting needs to the operation of essential appliances for daily living, electricity plays a central role in supporting the comfort, convenience, and functionality of households. The trend of increasing domestic electricity consumption in Delhi, as depicted in Table 1, reflects broader socioeconomic changes shaping household behaviors and lifestyles in India. The rise in disposable incomes, driven by factors such as urbanization and increased purchasing power, has led to a surge in the usage of kitchen appliances and home electronics among Indian households. This trend is particularly pronounced in urban areas like Delhi, where access to electricity is more prevalent and consumer lifestyles are more affluent. As households experience improvements in their economic conditions, they are able to afford a greater variety of electrical appliances and devices, ranging from refrigerators and air-conditioners to televisions and kitchen gadgets. These appliances not only enhance comfort and convenience but also contribute to a higher quality of life (Becerik-Gerber et al., 2022; Li., et al., 2021). Moreover, the ongoing urbanization process in India has further facilitated access to electricity in domestic settings. As more rural residents migrate to urban areas in search of better economic opportunities, they often transition from traditional energy sources to electricity for their household needs. This transition, coupled with the proliferation of modern amenities in urban dwellings, has led to a notable uptick in domestic electricity consumption. Overall, the increasing domestic electricity consumption in Delhi and other urban centers reflects a broader societal shift towards modernization and improved living standards (Das, 2020; Goswami and Manna 2013). As incomes continue to rise and consumer preferences evolve, the demand for electricity is expected to remain robust across both rural and urban India, further driving growth in the domestic electricity sector.

Household income stands as a key determinant in shaping the demand for electrical appliances. As incomes rise, households typically experience an increase in their purchasing power, enabling them to afford a broader array of electrical appliances and devices (Tesfamichael et al., 2020; Avordeh et al., 2022; Bouzarovski et al., 2017). However, this demand is not solely dictated by income; rather, it's influenced by a multifaceted interplay of factors. Firstly, the price of appliances plays a crucial role. Lower prices make appliances more accessible to a wider consumer base, thereby stimulating demand. Moreover, technological advancements contribute significantly to demand dynamics. Innovations often lead to the development of more efficient and feature-rich appliances, enticing consumers to upgrade to newer models. Consumer preferences and lifestyle choices also weigh in heavily. Some households may prioritize energy-efficient appliances, while others may seek out devices with advanced smart technology features. Such preferences drive the demand for specific types of appliances that align with consumers' needs and desires. Additionally, infrastructure and access to electricity infrastructure are pivotal. Regions with reliable and widespread access to electricity typically exhibit higher demand for appliances compared to areas with limited access. Government policies and incentives further shape consumer behavior. Subsidies for energy-efficient appliances or tax incentives can incentivize consumers to invest in particular types of appliances.

Demographic factors such as population growth, urbanization rates, and household composition also influence demand. (Gong and yao, 2022; Jedwab et al., 2017) Cultural and social norms play a role too, as they affect preferences regarding appliance ownership and usage practices.

Furthermore, consumer awareness and education initiatives about energy efficiency and sustainable consumption practices can drive demand for eco-friendly appliances (Hossain et al., 2022; Li et al., 2021; Sheoran and Kumar 2022; Ali et al., 2021; Sharma, 2022). Understanding these intricate factors is essential for policymakers, manufacturers, and retailers to effectively cater to consumer needs and promote sustainable consumption patterns in the electrical appliance market. Petersen (1982) study in shed light on the determinants of electricity demand, emphasizing the role of both the quantity and usage patterns of electricity-using devices. The stock of electrical appliances within households, representing the number and types of devices owned, serves as a fundamental driver of electricity demand. Additionally, the intensity of usage, or how frequently and for what duration these devices are utilized, influences overall electricity consumption. This research underscores the importance of considering not only the number of appliances but also how they are utilized in understanding electricity demand. Factors such as household size, lifestyle preferences, and technological advancements can all impact the intensity of appliance usage (Harputlugil and Wilde 2021; Verma et al., 2021). For instance, larger households with more occupants may tend to use appliances more frequently, while households with energy-efficient devices may exhibit lower usage intensity. By recognizing the interconnectedness between appliance stock and usage intensity, Petersen (1982) findings provide valuable insights for policymakers and utility companies seeking to forecast and manage electricity demand. Understanding the dynamics of appliance ownership and usage patterns can inform strategies aimed at promoting energy efficiency, managing peak demand periods, and ensuring sustainable electricity consumption practices.

Dubin and McFadden (1984) model, introduced in 1984, adopts a structural approach to understand the dynamics of household electricity consumption. Unlike previous models that treated appliance ownership and usage intensity as separate decisions, this model integrates them into a unified framework based on the same utility function. By doing so, it explicitly accounts for the interrelated nature of appliance choice and electricity use, providing a more comprehensive understanding of household energy behavior. One key advantage of this approach is its ability to address potential biases arising from unobserved factors influencing both appliance selection and usage intensity. By modeling these decisions jointly, Dubin and McFadden (1984) framework enables researchers to better isolate the effects of observed variables, such as income, on electricity consumption patterns. Their study highlighted the role of income in shaping household electricity consumption, particularly through its influence on housing choices. The authors suggested that household income affects the type of housing acquired, whether through purchase or rental, and that these housing arrangements can impact the lifestyle and electricity usage patterns of residents. This insight underscores the importance of considering broader socioeconomic factors, such as housing tenure and household composition, in understanding energy consumption behavior. Dubin and McFadden (1984) structural model offers a valuable tool for policymakers, utility companies, and researchers seeking to analyze and address factors driving household electricity demand. By recognizing the interconnectedness of appliance ownership, housing choices, and usage patterns, this framework contributes to a more nuanced understanding of energy consumption dynamics and informs targeted interventions to promote energy efficiency and sustainability.

Aune et al. (2002) in their study, shed light on the indirect influence of income on household energy consumption. They underscored this indirectness by referencing two separate studies that yielded intriguing findings regarding the relationship between energy use and socioeconomic variables like income and education. Contrary to conventional expectations, these studies did not uncover direct correlations between energy consumption and individual income levels or educational attainment. Instead, they revealed a more nuanced relationship, suggesting that the effect of income on energy usage operates through a different pathway. Specifically, Aune et al. (2002) highlighted findings indicating that the size of the house plays a pivotal role in mediating the impact of income on energy consumption. In other words, households with higher incomes may tend to occupy larger residences, which inherently require more energy to heat, cool, and power various appliances and amenities. By drawing attention to this indirect mechanism linking income to energy use, Aune et al. (2002) colleagues contributed valuable insights to the understanding of household energy dynamics. Their work underscores the need to consider multiple factors, including housing size and other contextual variables, when analyzing the complex interplay between socioeconomic factors and energy consumption patterns. Such nuanced perspectives can inform more effective energy policy initiatives and interventions aimed at promoting sustainability and efficiency in residential energy usage.

Labandeira et al., (2006) colleagues identified several key explanatory variables that influence household electricity demand. These include factors such as the place of residence, household size, age, education level, and labor force participation. Their study underscores the multifaceted nature of electricity demand, which is shaped by a complex interplay of demographic, socioeconomic, and behavioral factors. According to their findings, the acquisition of additional appliances tends to drive up electricity demand within households. This increase in appliance ownership is often associated with rising household incomes, as families have greater purchasing power to invest in modern

conveniences and technologies that rely on electrical power. Interestingly, Labandeira et al. note that empirical studies have yet to reach a consensus on certain socio-economic variables and their impact on electricity consumption. For instance, while some studies suggest a negative or non-significant relationship between factors like age and the number of children in a household, others have found positive associations. This discrepancy highlights the complexity of household energy dynamics and the need for further research to elucidate the underlying mechanisms at play. By exploring the nuanced relationships between socio-economic variables and electricity demand, Labandeira and colleagues contribute valuable insights to the field of energy economics. Their work underscores the importance of considering a diverse range of factors when analyzing household energy consumption patterns, ultimately informing more effective energy policy and resource allocation strategies.

Chambwera and Folmer (2007) provided further evidence of the positive relationship between household appliance ownership and energy consumption. Their findings suggest that as households invest in additional appliances, there is a corresponding increase in both energy and electricity usage. This aligns with the broader trend observed in studies that link rising household wealth to greater demand for electrical appliances and corresponding increases in electricity consumption. Electricity plays a pivotal role in powering the myriad appliances that accompany increasing affluence. As households acquire more electronic devices, kitchen appliances, entertainment systems, and other modern conveniences, their reliance on electricity escalates accordingly. This trend is reflected in data from India, where a significant portion of electricity consumption in 2004-05 was attributable to the top 20 percent of the population, underscoring the link between wealth and electricity usage. The body of research on household appliance demand consistently points to income as a primary determinant. Higher incomes enable households to afford a greater array of appliances, driving up both appliance ownership rates and electricity consumption levels. This underscores the importance of considering socio-economic factors, such as income levels, when analyzing electricity demand patterns and formulating energy policy interventions.

Table 1 provides a comparative analysis between population distribution and electricity demand share. The data is segmented into three distinct categories based on the share of population: the top 20%, middle 40%, and bottom 40%. The findings from the table indicate that the top 20% of the population accounts for the majority of electricity demand, contributing 53% to the total consumption. In contrast, the middle 40% of the population contributes to a smaller but still substantial portion, representing 34% of the total electricity demand. On the other hand, the bottom 40% of the population has the smallest share, accounting for only 13% of the overall electricity demand. These statistics suggest a significant imbalance in electricity consumption across different segments of the population, with a considerable portion of demand concentrated among the top 20% of the population. This distribution highlights potential disparities in access to electricity and underscores the importance of equitable distribution strategies to ensure access for all segments of society.

Table 1: Population vs. Electricity demand

S.No	Population Share (%)	Electricity Demand Share (%)
1	Top 20	53
2	Middle 40	34
3	Bottom 40	13

An assessment through actual field level survey of appliance ownership patterns in rural, semi-urban and urban households of West Bengal has been done by Roy et al., (2011). But very few detailed quantitative estimates exist for Delhi, which explain the factors which influence the household electrical appliance demand. Against this backdrop, the present paper identifies and assesses the factors which explain the stock of electrical appliances with a household in Delhi.

2. METHODOLOGY

Stock of electrical appliances is directly responsible for the electricity consumption for a household. It is assumed to be explained by the factors like household income (Y_H), family size (F_S), house size (H_S), household education level (E), place/location of residence (L). The function of the ownership of electrical appliances is as follows:

$S_A = f(Y_H, F_S, H_S, E, L)$

The independent variables considered in the study are a mix of quantitative and qualitative variables. The education level of the head of the household is used as a proxy for household awareness. It is divided in four categories, i.e., the education level of the head of the household being nil (no formal education), up to school level, up to graduation and lastly, post-graduation or beyond. Other qualitative variable, i.e., place/location of the residence also requires the use of dummy variables. The data is collected from five strata of Delhi, i.e., East, West, North, South and Centre. South district is considered to be the most affluent of all residential districts of Delhi. This comparison of course, excludes the districts falling under Lutyen's Delhi, viz., New Delhi and Central Delhi. The upscale areas have the highest land prices outside

Lutyen's Zone in Delhi. Urban villages in South Delhi have become hub for designer boutiques, restaurants and art galleries and design studios. Many renowned markets of Delhi and malls are located in South Delhi. The location of a household in South-Delhi stratum is assumed to have significant effect on the household electricity consumption and hence only one dummy is considered for location.

3. FINDINGS

Table 2 presents the estimated outcomes of the regression analysis with various explanatory variables. The dependent variable, lnSA, represents a logarithmic transformation of a certain variable. The coefficients of the explanatory variables indicate their impact on the dependent variable. The constant term, -0.979, signifies the intercept of the regression equation. The explanatory variables include lnYH, HS, FS, and several dummy variables (D1, D2, and D3) representing different levels of schooling. Additionally, there's a dummy variable (L1) representing a geographical location (South-Delhi). The standard error, standardised β coefficient, t-ratio, and p-value are provided for each coefficient. These statistics help assess the significance and magnitude of the relationships between the explanatory variables and the dependent variable. The Durbin-Watson (D-W) statistic, with a value of 1.826, indicates the presence of autocorrelation in the regression residuals. The R-squared value of 0.543 suggests that approximately 54.3% of the variability in the dependent variable is explained by the regression model. The adjusted R-squared value, which accounts for the number of predictors in the model, is slightly lower at 0.534. Overall, the regression model provides insights into how the explanatory variables collectively influence the dependent variable, lnSA, and helps in understanding the factors that contribute to its variation.

Table 2: Estimated Outcomes

Explanatory Variables	Coefficient	Std Error	Standardised β Coefficient	t-ratio	p-value
Constant	-0.979	0.262		-0.3737	0.000
lnY_H	0.283	0.023	0.544	12.209	0.000
H_S	0.001	0.000	0.122	3.088	0.002
F_S	0.050	0.015	0.122	3.371	0.001
D1 (schooling)	-0.183	0.131	-0.170	-1.397	0.163
D2 (Graduation)	0.052	0.130	0.057	0.401	0.689
D3 (Post-Graduation)	-0.063	0.133	0.061	0.471	0.638
L1 (South-Delhi)	0.120	0.037	0.115	3.217	0.001

4. DISCUSSION AND CONCLUSIONS

The survey captured the intricate interplay between household dynamics and appliance preferences. It provided a snapshot of how families integrate electrical appliances into their daily lives, from essential devices like refrigerators and air conditioners to more discretionary items such as entertainment systems and kitchen gadgets. One notable finding was the correlation between rising incomes and appliance ownership. As households experienced greater financial stability, they were more inclined to invest in a wider range of electrical devices, enhancing their quality of life and convenience. This trend underscores the pivotal role of income levels in shaping consumption patterns and driving demand for electrical appliances. Moreover, the survey highlighted the importance of understanding regional variations and cultural influences on appliance preferences. Different regions exhibited distinct patterns of appliance usage, reflecting varying lifestyle preferences, climatic conditions, and economic factors. Such nuances underscore the need for tailored strategies to meet the diverse needs of households across different demographic segments and geographic locations.

The survey provided valuable insights into the evolving landscape of household appliance usage and consumption patterns. By understanding the factors driving consumer behavior and preferences, policymakers and businesses can better anticipate market trends and develop targeted strategies to meet the evolving needs of consumers in an increasingly electrified world. Understanding the factors driving appliance ownership and purchase decisions is crucial for elucidating consumer behavior in the electrical appliance market. The survey shed light on how various socio-economic factors, such as income levels and dwelling size, influence appliance ownership among households. Income emerged as a significant determinant of appliance ownership, with higher-income households exhibiting a greater propensity to own a wider range of electrical devices. This finding underscores the role of economic prosperity in enabling households to afford and acquire appliances that enhance their quality of life and convenience. Similarly, dwelling size was identified as another influential factor shaping appliance ownership patterns. Larger dwellings tended to have a higher prevalence of electrical appliances, reflecting the need to equip larger living spaces with the necessary amenities for comfort and functionality. Furthermore, the survey delved into the motivations behind household appliance purchases, revealing diverse drivers that influence consumer decisions.

Factors such as technological advancements, energy efficiency, brand reputation, and lifestyle preferences were cited as key considerations influencing appliance purchases. These findings underscore the multifaceted nature of consumer decision-making in the electrical appliance market, where a combination of practical, economic, and aspirational factors come into play. By gaining insights into the factors driving appliance ownership and purchase motivations, policymakers, manufacturers, and retailers can tailor their strategies to better meet the evolving needs and preferences of consumers. Whether through product innovation, marketing initiatives, or pricing strategies, understanding consumer behavior is essential for fostering a competitive and responsive electrical appliance market that delivers value to households across diverse demographic segments. The correlation between household income and appliance purchases underscores the role of economic capacity in shaping consumer behavior. Higher-income households are often more inclined to invest in appliances not only for their utility but also as symbols of comfort and social status. For these households, purchasing electrical appliances represents a means of enhancing their quality of life and streamlining daily tasks, thereby saving valuable time and effort.

Similarly, the size of the dwelling influences the types and quantity of appliances that households choose to acquire. Larger dwellings typically require a greater number of appliances to meet the needs of occupants and provide adequate comfort and convenience. As such, households residing in larger homes may be more inclined to invest in a diverse range of electrical devices to cater to various living spaces and lifestyle preferences. Moreover, the motivations behind appliance purchases extend beyond mere functionality to encompass broader considerations such as social status and lifestyle aspirations. Consumers often view appliance ownership as a reflection of their social standing and desire to keep pace with technological advancements. Additionally, the perceived utility and time-saving benefits offered by appliances play a significant role in driving purchase decisions, as households seek to streamline household chores and maximize efficiency in daily routines. The decision-making process surrounding appliance purchases is influenced by a combination of economic, social, and practical factors. By understanding these dynamics, manufacturers and retailers can tailor their product offerings and marketing strategies to align with consumer preferences and aspirations, thereby fostering a thriving market for electrical appliances that meets the diverse needs of households. It's true that households may not always prioritize energy efficiency when making appliance purchasing decisions, especially when considering factors such as functionality, size, and cost. In the case of refrigerators and air conditioners, consumers may focus more on meeting their immediate needs, such as storage capacity or cooling capacity, rather than considering long-term energy consumption and efficiency. However, the concept of "consumption versus efficiency" is becoming increasingly important as environmental concerns and energy costs continue to rise.

Energy-efficient appliances not only help reduce electricity bills but also have a lower environmental impact by consuming less energy and reducing greenhouse gas emissions. While some households may prioritize upfront cost savings over long-term energy savings, there is growing awareness about the benefits of energy-efficient appliances. Government initiatives, energy labeling programs, and consumer education campaigns aim to promote energy-efficient choices and encourage households to consider factors such as Energy Star ratings and annual energy consumption when making purchasing decisions. By weighing the trade-offs between consumption and efficiency, households can make more informed choices that not only meet their immediate needs but also contribute to sustainability and energy conservation efforts. Manufacturers and retailers also play a crucial role in offering a range of energy-efficient options and providing clear information to help consumers make environmentally conscious decisions. It's common for households to be influenced by the choices of their neighbors when it comes to purchasing appliances like refrigerators. This phenomenon, known as social comparison or peer influence, can play a significant role in shaping consumer behavior. Seeing others with larger or more advanced appliances may lead individuals to feel pressure to keep up or conform to societal norms, even if those choices may not align with their personal preferences or needs. When it comes to appliances like televisions and computers, factors such as standby power consumption, on-mode power usage, operating costs, and energy efficiency are indeed important considerations that are sometimes overlooked by consumers. Standby power, also known as vampire power or phantom load, refers to the energy consumed by appliances when they are plugged in but not in use. This can account for a significant portion of household electricity consumption over time.

Understanding the true cost of running appliances, including both the upfront purchase price and ongoing energy expenses, is essential for making informed decisions. Energy-efficient models may have higher upfront costs but can lead to significant long-term savings on electricity bills. Additionally, choosing appliances with energy-saving features and certifications, such as Energy Star ratings, can help minimize energy consumption and reduce environmental impact. Consumer education and awareness campaigns about the importance of energy efficiency and the environmental consequences of high energy consumption are crucial for encouraging households to prioritize these factors when making appliance purchases. Providing clear information and labeling about the energy efficiency of appliances can empower consumers to make more sustainable choices that benefit both their wallets and the planet. The thorough examination of appliance usage by households provides valuable insights into the essential role these devices play in daily life. Factors such as household income, family size, house size, and location all contribute to variations in the types and quantities of appliances owned by households. Interestingly, the education level of the household head does not appear to significantly

influence appliance ownership, suggesting that other socioeconomic factors may play a more prominent role in shaping consumer behavior in this context. While affordability and utility are undoubtedly important considerations for households when purchasing appliances, it's clear that consumer decisions are influenced by a variety of factors, including social status and regional norms.

The choice to acquire and utilize electrical appliances often extends beyond purely rational considerations to encompass broader social and cultural dynamics. This study underscores the complexity of consumer behavior in the context of household electrical appliances and highlights the need for further research in this area. Exploring the interplay between socioeconomic factors, cultural influences, and consumer choices can provide valuable insights into patterns of consumption and inform strategies for promoting more sustainable and equitable consumption practices. By understanding the underlying motivations driving consumer behavior, policymakers, businesses, and other stakeholders can develop more effective interventions and initiatives to promote responsible consumption and address emerging challenges in the appliance market.

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