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Understanding adoption of sustainable electronics: Household financial behaviour and consumption capacity

P Anitha[1], Dr. M Chithirai Selvan[2]
[1] Research Scholar, Department of Commerce, Nallamuthu Gounder Mahalingam College, Pollachi, Coimbatore, Tamil Nadu, India
[2] Assistant Professor, Department of Commerce, Nallamuthu Gounder Mahalingam College, Pollachi, Coimbatore, Tamil Nadu, India
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Abstract
The growing importance of environmental sustainability has increased consumer interest in sustainable electronics and technology products that offer environmental and economic benefits. Despite the rising availability of such products, adoption is often influenced by household financial conditions and consumption patterns. This study examines household financial behaviour, consumption capacity, and the adoption of sustainable electronics and technology products among consumers in various taluks of Coimbatore District, Tamil Nadu. The study adopted a descriptive and analytical research design and used primary data collected from 505 respondents through a structured questionnaire. Descriptive statistics, percentage analysis, the Consumption Capacity Index (CCI), and the Buying Behaviour Index (BBI) were employed to analyse household financial characteristics and adoption behaviour. The findings indicate that most households were financially stable, with family income exceeding expenditure, and that a large majority demonstrated high adoption of sustainable electronics and technology products. The results suggest that consumers increasingly perceive sustainable technologies as valuable long-term investments. The study concludes that financial stability and consumption capacity play a significant role in facilitating sustainable technology adoption.

Keywords: Sustainable electronics, household financial behaviour, consumption capacity, adoption behaviour, sustainable consumption, semi-urban and rural India

Introduction
Environmental degradation, climate change, and rising resource consumption have intensified interest in sustainable development and responsible consumption. Consumers are increasingly aware of the environmental and social consequences of their purchases, which has encouraged industry to develop products with lower lifecycle impacts and improved efficiency. In the electronics and technology sector, sustainable products such as energy-efficient devices, renewable energy technologies, electric mobility solutions, and environmentally responsible electronics are gaining importance because they reduce waste, conserve resources, and lower operating costs over time.

Despite this growth, adoption remains uneven. Product availability, affordability, awareness of sustainability certifications, and perceived value continue to influence purchasing decisions. For many consumers, sustainability concerns do not automatically translate into actual purchase behaviour. Household financial behaviour, consumption capacity, and spending patterns therefore become important determinants of whether consumers are able and willing to adopt sustainable technologies. Against this backdrop, the present study examines the relationship between household financial characteristics and the adoption of sustainable electronics and technology products in Coimbatore District, Tamil Nadu.

Review of Literature
Research on sustainable consumption has shown that environmentally responsible purchasing is shaped by economic, psychological, and product-related factors. Gaur *et al*. (2024) [3] note that e-waste management contributes to the Sustainable Development Goals, especially SDG 12 and SDG 13. Biswas and Roy (2015) [1] describe sustainable consumer behaviour as a lifestyle that seeks to minimise natural resource use while supporting environmentally friendly products. Hofmeister-Toth *et al*. (2011) emphasised the need to understand the conditions enabling sustainable consumption so that consumer choices can be improved.

Several studies point to the importance of perceived value and product attributes. Tu *et al*. (2018) found that sustainability perceptions for smartphones are influenced by brand recognition, price, lifespan, and service quality. Liao and Chuang (2022) [5] identified energy efficiency, cost, and recyclable materials as major drivers of consumer preference for eco-friendly laptops. Siddiqua *et al*. (2022) [7] observed that demographic and income-related differences can shape eco-friendly purchase and disposal behaviour. Sharma and Jha (2017) [6] also showed that contextual values influence sustainable consumption intentions.

However, relatively limited research has examined how household financial behaviour and consumption capacity affect the adoption of sustainable electronics, particularly in semi-urban and rural settings. This gap motivated the present study, which focuses on the financial readiness of households and its relationship with adoption behaviour.

Objectives of the Study
1. To examine the financial behaviour and consumption capacity of households with respect to sustainable electronics and technology products.

2. To assess consumer adoption behaviour towards sustainable electronics and technology products in the context of household consumption capacity.

Methodology

The study adopted a descriptive and analytical research design with a quantitative approach. Primary data were collected through a structured questionnaire administered to consumers in various taluks of Coimbatore District, Tamil Nadu. Respondents were selected using snowball sampling, and 505 valid responses were obtained. The questionnaire covered socio-economic characteristics, monthly income and expenditure, savings behaviour, consumption capacity, and adoption of sustainable electronics and technology products.

Secondary data were obtained from journals, books, and research reports. The major product categories considered included renewable energy products, energy-efficient smart devices, electric mobility solutions, water and e-waste management devices, and sustainable electronics packaging. Data were analysed using percentage analysis, descriptive statistics, the Consumption Capacity Index (CCI), and the Buying Behaviour Index (BBI). The CCI was used to classify households according to consumption capacity, while the BBI was used to measure adoption behaviour through product usage period, purchase frequency, and annual expenditure.

Analysis and Discussion

The analysis and discussion present findings related to socio-economic characteristics, financial behaviour, consumption capacity, and adoption of sustainable electronics and technology products among respondents. Understanding these aspects is essential for evaluating household financial readiness and potential engagement with sustainable consumption practices.

1. Socio-Economic Profile of Respondents

An examination of the socio-economic characteristics of respondents is important for understanding the demographic and occupational background of consumers, which may influence their financial behaviour and consumption decisions. The socio-economic profile provides a foundation for interpreting household income, expenditure patterns, and adoption behaviour towards sustainable electronics and technology products.

Table 1 presents the distribution of respondents based on selected socio-economic characteristics, including gender, marital status, area of residence, educational qualification, and occupation.

Table 1: Distribution of Respondents Based on Socio-Economic Characteristics (N=505)

Variables	Number of Respondents (N)	Percentage (%)
Gender		
Male	155	30.69
Female	350	69.31
Marital Status		
Married	384	76.04
Unmarried	102	20.20
Single	19	3.76
Area of Residence		
City	120	23.76
Town	163	32.28
Village	222	43.96
Educational Qualification		
No Formal Education	8	1.58
Up to Primary	16	3.17
SSLC	16	3.17
HSC	28	5.54
Diploma	17	3.37
Under Graduate	152	30.10
Post Graduate	156	30.89
Professional	63	12.48
Others include M.Phil., Ph.D., etc.	49	9.70
Occupation		
Government Employee	49	9.70
Private Employee	199	39.41
Self-Employed	83	16.44
Professional	5	0.99
Agriculturist	46	9.11
Housewife	63	12.48
Retired	8	1.58
Students	52	10.30

Source: Primary Data

The socio-economic profile indicates that female respondents constituted the majority of the sample (69.31%), while male respondents accounted for 30.69%. A large proportion of respondents were married (76.04%), and most resided in villages (43.96%) and towns (32.28%) areas. The educational profile reveals that a substantial share

of respondents possessed higher educational qualifications, with postgraduates (30.89%) and undergraduates (30.10%) representing the largest groups. In terms of occupation, private employees formed the largest category (39.41%), followed by self-employed individuals (16.44%) and housewives (12.48%). The diversity observed across educational, occupational, and residential categories suggests that the study encompasses respondents from varied socio-economic backgrounds, thereby providing a broad perspective for analysing household financial behaviour and adoption of sustainable electronics and technology products.

2. Financial Behaviour and Consumption Capacity of Households

While the socio-economic profile provides an overview of the demographic background of respondents, understanding their financial characteristics is essential for evaluating their capacity to purchase and adopt sustainable electronics and technology products. Income and expenditure patterns reflect the economic resources available to households and influence their consumption decisions. Table 2 presents the descriptive statistics relating to age, monthly income, monthly family income, and monthly family expenditure of the respondents.

Table 2: Descriptive Statistics of Other Socio-Economic Variables

Statistics	Age (Years)	Monthly Income (₹)	Monthly Family Income (₹)	Family Expenditure per Month (₹)
N (Valid)	505	505	505	505
Mean	36.69	33,002.97	61,223.76	27,927.33
Median	35	25,000.00	45,000.00	20,000.00
Mode	35	32,000.00	32,000.00	20,000.00
SD	9.62	32,199.01	53,800.63	23,484.46
Minimum	20	7,000.00	8,000.00	2,000.00
Maximum	78	2,00,000.00	3,75,000.00	2,00,000.00

Source: Primary Data

The financial profile of respondents indicates a mean monthly income of ₹33,002.97 and a mean monthly family income of ₹61,223.76, while the average monthly family expenditure was ₹27,927.33. The substantial difference between family income and expenditure suggests the presence of disposable income among many households. Furthermore, the relatively high standard deviations observed across income and expenditure variables indicate considerable variation in the economic status of respondents. Overall, the findings suggest that the respondents possess varying levels of financial capacity, which may influence their ability to adopt sustainable electronics and technology products.

3. Savings Behaviour and Consumption Capacity of Households

Beyond income levels, it is important to examine how households manage and utilize their financial resources. Savings behaviour and consumption capacity provide deeper insights into the financial readiness of consumers and their potential ability to invest in sustainable technologies. Table 3 presents the distribution of respondents based on savings behaviour, while Table 5.4 shows the classification of respondents according to the Consumption Capacity Index (CCI).

Table 3: Distribution of Respondents Based on Savings Behaviour

Savings Behaviour	Number of Respondents (N)	Percentage (%)
Deficit	2	0.40
Surplus	503	99.60
Total	505	100.00

Source: Primary Data

Table 4: Distribution of Respondents Based on Consumption Capacity Index (CCI)

Consumption Capacity Index	Number of Respondents (N)	Percentage (%)
Low Consumption	367	72.67
Moderate Consumption	136	26.93
Financial Stress	2	0.40
Total	505	100.00

Source: Primary Data

The analysis of savings behaviour reveals that an overwhelming majority of respondents (99.60%) belong to the surplus category, indicating that their household income exceeds expenditure. Only a negligible proportion of respondents (0.40%) reported deficit conditions. Similarly, the Consumption Capacity Index indicates that 72.67% of respondents fall under the low-consumption category, while 26.93% exhibit moderate consumption behaviour. Only 0.40% of respondents experience financial stress. These findings suggest that most households are financially stable and maintain conservative spending patterns, thereby possessing the economic capacity to consider sustainable electronics purchases when perceived as beneficial or necessary.

4. Adoption Behaviour Towards Sustainable Electronics and Technology Products

Having examined the financial position and consumption capacity of households, it is important to assess the extent to which consumers adopt sustainable electronics and technology products. Adoption behaviour provides insights into the actual engagement of consumers with sustainable technologies beyond their financial capability. Table 5.4 presents the distribution of respondents based on the Buying Behaviour Index (BBI), which classifies consumers according to their level of adoption of sustainable electronics and technology products.

Table 5: Distribution of Respondents Based on Buying Behaviour Index (BBI)

Buying Behaviour Index (BBI)	Number of Respondents (N)	Percentage (%)
Low Adoption	62	12.28
Moderate Adoption	51	10.10
High Adoption	392	77.62
Total	505	100.00

Source: Primary Data

The findings indicate that a substantial majority of respondents (77.6%) belong to the high-adoption category,

while 12.3 percent and 10.1 percent fall under the low and moderate adoption categories, respectively. The predominance of high adoption behaviour suggests that consumers demonstrate considerable engagement with sustainable electronics through product usage, purchase frequency, and expenditure patterns. When viewed alongside the earlier findings on savings behaviour and consumption capacity, the results indicate that financially stable households may selectively allocate their resources towards sustainable technologies despite maintaining relatively conservative overall consumption patterns.

Discussion

The findings indicate that financial stability does not necessarily lead to high consumption, but it can support selective adoption of sustainable technologies. This is important because the sample showed conservative spending behaviour alongside strong adoption of sustainable electronics. In practical terms, households may limit day-to-day discretionary spending while still investing in durable products that provide long-term value. This pattern supports the view that sustainable electronics are increasingly perceived as functional, cost-effective, and environmentally responsible choices.

The results also align with earlier studies showing that value perception, product efficiency, and affordability influence sustainable consumption behaviour. In semi-urban and rural areas, adoption is likely to improve when consumers can clearly see long-term savings, product reliability, and environmental benefits. Therefore, the role of household financial behaviour should be considered alongside awareness and product availability when designing policy or marketing strategies.

Conclusion

The study found that respondents were drawn from varied socio-economic backgrounds, with many residing in village and town areas and a large share employed in private sector jobs. Household finances were relatively stable, as reflected in higher family income than expenditure and a very high proportion of surplus households. At the same time, respondents generally exhibited conservative consumption behaviour. Despite this, adoption of sustainable electronics and technology products was high.

The findings suggest that consumers increasingly view sustainable electronics as long-term investments that offer economic, functional, and environmental value. To support wider adoption in semi-urban and rural areas, policymakers and marketers should improve affordability through subsidies or low-interest financing, expand distribution networks, strengthen awareness of sustainability certifications, and promote e-waste collection and recycling initiatives aligned with SDG 12 and SDG 13.

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