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RESEARCH ARTICLE

SMART BUILDING TECHNOLOGY AND CONSUMER BEHAVIOR: EVIDENCE FROM THE INDIAN REAL ESTATE MARKET

TECNOLOGIA DE EDIFICAÇÕES INTELIGENTES E COMPORTAMENTO DO CONSUMIDOR: EVIDÊNCIAS DO MERCADO IMOBILIÁRIO INDIANO

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ABSTRACT

Objective: This study aimed to investigate the impact of Smart Building Technology (SBT) on Customer Buying Behaviour (CBB) in the Indian real estate sector. The research addresses the problem of limited understanding of how emerging smart technologies influence consumer decision-making in real estate purchases. It further sought to identify key smart technology factors influencing purchasing decisions and to examine their contribution to sustainable development goals, particularly SDG-13 (climate action).

Methodology/Approach: A structured questionnaire was developed and distributed among 232 respondents, including customers, architects, developers, and real estate company staff. Data were analysed using SPSS-25 and AMOS. Factor analysis identified five critical components of SBT, while Structural Equation Modelling (SEM) was employed to test hypotheses and evaluate the influence of these factors on consumer behaviour.

Originality/Relevance: This research provided original insights into how smart building components contribute not only to enhancing customer satisfaction but also to achieving environmental sustainability goals. The relevance lies in addressing the growing demand for climate-conscious infrastructure solutions in the Indian real estate market.

Main Conclusion: Among the five identified factors—Smart Security System, Building Automation System, Information Technology Services, Smart Waste Management, and Smart Water Management—Building Automation and Smart Security emerged as the most influential determinants of consumer satisfaction. SEM results confirmed a significant and positive influence of SBT on CBB (β = 0.56, p = 0.000), validating hypotheses H1, H4, and H6.

Theoretical/Methodological Contributions: The study contributed to the existing literature by integrating environmental sustainability with consumer behavior in smart infrastructure adoption. Methodologically, it validates a conceptual framework through robust statistical techniques, offering a scalable model for future research in technology-enabled sustainable real estate development.

Keywords: Smart Building Technology, Consumer Buying Behavior, Smart Waste Management, Smart Water Management, Sustainable Development Goals, Indian Real Estate

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RESUMO

Objetivo: Este estudo teve como objetivo investigar o impacto da Tecnologia de Edificações Inteligentes (*Smart Building Technology* – SBT) sobre o Comportamento de Compra do Consumidor (Customer Buying Behaviour – CBB) no setor imobiliário indiano. A pesquisa aborda a lacuna existente na compreensão sobre como as tecnologias emergentes influenciam a tomada de decisão dos consumidores na aquisição de imóveis. Adicionalmente, buscou-se identificar os principais fatores tecnológicos que afetam essa decisão e analisar sua contribuição para os Objetivos de Desenvolvimento Sustentável (ODS), com ênfase no ODS 13 (ação contra a mudança global do clima).

Metodologia/Procedimentos: Foi elaborado um questionário estruturado, aplicado a 232 respondentes, entre clientes, arquitetos, incorporadores e colaboradores de empresas do setor imobiliário. Os dados foram analisados por meio dos softwares SPSS-25 e AMOS. A análise fatorial permitiu identificar cinco componentes críticos da SBT, e o Modelo de Equações Estruturais (SEM) foi utilizado para testar hipóteses e avaliar a influência desses fatores sobre o comportamento do consumidor.

Originalidade/Relevância: Esta pesquisa oferece contribuições originais ao demonstrar como os componentes de edificações inteligentes contribuem não apenas para o aumento da satisfação do cliente, mas também para o alcance de metas ambientais sustentáveis. Sua relevância reside no atendimento à crescente demanda por soluções de infraestrutura ambientalmente responsáveis no mercado imobiliário indiano.

Conclusão Principal: Dentre os cinco fatores identificados — Sistema de Segurança Inteligente, Sistema de Automação Predial, Serviços de Tecnologia da Informação, Gestão Inteligente de Resíduos e Gestão Inteligente da Água — os componentes *Sistema de Automação Predial* e *Sistema de Segurança Inteligente* destacaram-se como os mais influentes na satisfação do consumidor. Os resultados do SEM confirmaram uma influência significativa e positiva da SBT sobre o CBB (β = 0,56; p = 0,000), validando as hipóteses H1, H4 e H6.

Contribuições Teóricas/Metodológicas: O estudo contribui para a literatura ao integrar a sustentabilidade ambiental com o comportamento do consumidor na adoção de infraestrutura inteligente. Do ponto de vista metodológico, valida-se um modelo conceitual por meio de técnicas estatísticas robustas, oferecendo uma estrutura escalável para pesquisas futuras sobre o desenvolvimento imobiliário sustentável mediado por tecnologias.

Palavras-chave: Tecnologia de Edificações Inteligentes; Comportamento de Compra do Consumidor; Gestão Inteligente de Resíduos; Objetivos de Desenvolvimento Sustentável (ODS); Setor Imobiliário Indiano.

1. INTRODUCTION

Technology significantly influences the decision-making process of consumers in real estate purchases. One such technology is 'Smart Building Technology'. In the last decade, this technology has exploded, and the impact it has had on the Indian real estate clients is here to stay. A survey conducted by (KPMG 2019) shows that 63 percent of developers in India are interested to invest in smart building technology from the next five years, and 72 percent of Indian potential homebuyers are willing to pay more for smart housing features.

After the agricultural sector, the real estate industry in India is the second-largest employer. The real estate market is predicted to be worth $1 trillion USD by 2030. According to estimates, the Indian real estate market will contribute 13% of the GDP of the country by 2025. In terms of inflow, the construction sector is the third-largest beneficiary of foreign direct

investment (FDI), per the IBEF report from 2023. According to the IBEF (2023) study, some of the advances in Indian real estate include:

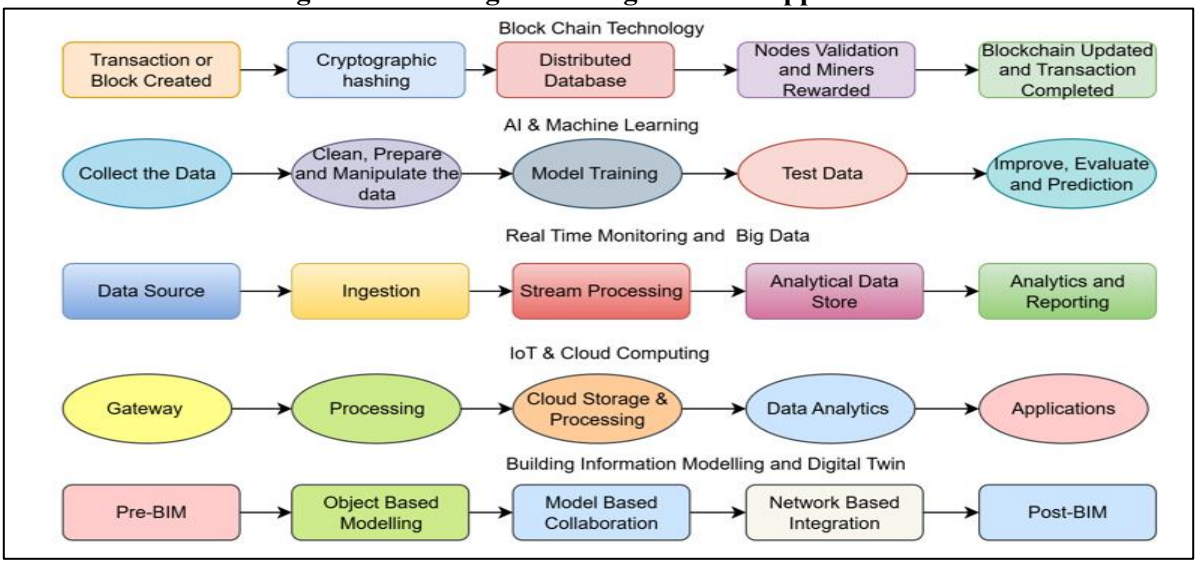
1. Residential – Sales of luxury properties in India had a substantial increase of 130% in the first half of 2023 compared to the same period the previous year. The Union Budget for the fiscal year 2023-24 has allocated Rs. 79,000 crore (US$ 9.64 billion) for the PM Awas Yojana, representing a substantial 66% increase from the prior year.

2. Commercial: Blackstone, a private market investor, has invested a significant amount of money—Rs. 3.8 lakh crore, or US$50 billion—in the Indian real estate industry. By 2030, they now want to invest an extra Rs. 1.7 lakh crore, or US$22 billion.

3. Retail: By the end of 2023, it is anticipated that the stock of organized retail real estate would have grown by 28% to 82 million square feet. Private equity investments in India's real estate sector totalled US$4.2 billion in 2023.

Additionally, Government has allowed 100% FDI in the construction of townships and settlements. Technologies allowing for better construction of buildings to enhance the experience and quality of life for people, are also being credited for the increased growth of the real estate sector. Figure 1 shows this correlation.

Figure 1: Building Technologies and its applications.



Source: Authors

A smart building must provide safety, security, comfort, and environment to live in a healthy way for consumers to be happy in it. That responsibility may be a new frontier for protections against unsafe and unhealthy practice and ensuring safety and wellness for our people and quality of life. This can be achieved by using state-of-the-art technology to assist, maintain, and create a conducive and perfect environment for the structures. Therefore, next-gen technologies play a smart character in minimizing the risk of clientele dissatisfaction.

Technologies such as IoT, BIM, smart security systems, smart water management, Building Automation System (Bhattacharjee & Rroy, 2024; Hair & Sabol, 2024; Rodrigues,

Dagobi da Silva, Espinosa, & Riscarolli, 2024; Silva & Janes, 2025), Smart waste management, building management systems, and IT-based services in conjunction with AR and VR have garnered significant interest and are considered highly suitable for automating and managing buildings. Contemporary BAS (Building Automation Systems) are constructed using open communication protocols that provide seamless integration with other systems and enable global accessibility. Smart Building Technology facilitates data visualization, report generation, complaint submission, and energy and water conservation, as well as enhancing safety and security for all building occupants.

The introduction of technology in the contemporary era has led to the impact of building technology improvements on consumers' decision-making and satisfaction levels. Insufficient research has been undertaken to examine the correlation between customer satisfaction with smart building technology and its influence on consumer purchasing behaviour. This highlights a significant inadequacy in the existing information repository, necessitating the undertaking of this project, which seeks to accomplish the following objectives:

- To analyse critical factors affecting customer satisfaction based on smart building technology (SBT).
- To analyse the role of smart building technologies on consumer decision-making in the Indian real estate market.

Research gap, Theoretical Relevance & Practical Contributions - While smart building technologies (SBT) are becoming more common around the world, there is still very limited research on how they influence consumer decision-making in the Indian real estate market. Most existing studies focus on the technical or environmental aspects of smart buildings, but not enough attention has been given to how these technologies affect buyers' choices.

This study will fill gap by exploring key factors that affect Indian consumers and linking smart technology with consumer behavior and SDG (Agboklou, Özkan & Gujrati, 2025). In practice, the findings can assist developers in better understanding client preferences, designing smarter, more environmentally friendly structures, and making marketing decisions that meet the demands of modern buyers.

2. THEORETICAL REFERENCE-

This section discusses the fundamentals of Smart Building Technology (SBT) in order to highlight the key features of SBT and consumer behavior to understand how it affects real estate customer purchasing decisions.

2.1 Building Automation Systems (BAS) & Waste Management

BAS is an important factor in influencing consumer purchasing decisions in the context of smart homes. According to Bhattacharjee et al. (2019), it provides users with ease and customisation through technology such as HVAC, security, lighting, and human interaction. Additionally, it improves the consumer experience. Automation not only provides comfort and security, but also improves energy and operational efficiency through real-time performance (Lee & Lee, 2017), resulting in increased customer satisfaction (Zhang et al., 2020). Dai and Liu (2024) discovered that AI-driven personalization helps customers manage shopping tasks by balancing psychological requirements against the practical benefits of automation

(Schweitzer et al., 2019).Although automation provides comfort, convenience, & efficiency, consumers still feel the loss of personal interaction particularly in shopping goods from autonomous shopping systems (AAS), suggesting need for retail strategies to balance human-interaction & automation for higher customer satisfaction (Sharma et al., 2024; Nizamuddin et al., 2019).

This trend also extends to smart building technology, where systems like smart waste management, which encompass the use of technologies to track, recycle and dispose of garbage properly, have a growing importance. Tech-based smart waste management operations clearly link the relationship of trash disposal with the grace of customer environment. Wang et al. [3] focused on intelligent waste management systems and mentioned that intelligent waste management systems enhance the environment and quality of life for builders. Because optimized garbage collection is more convenient and cleaner; both residents and users become more satisfied. Conversely, challenges in deploying and maintaining smart waste management systems could adversely affect customer satisfaction. As noted by Li et al (2018), malfunctions in technology, lack of user training, or failures in the system may lead to a breakdown in waste management operations, irritating and frustrating users. Therefore, in the smart waste management system, to maintain a long-term status of customer happiness, the negative relations must be resolved through well-renowned system maintenance, user education, and the continuous revision of the systems.

2.2 **Consumer Behavior and Sustainability in real estate**

Consumer decision-making in real estate, especially in relation to Smart Building Technology (SBT), can be better understood through a combination of consumer behavior theory, technology adoption models, and sustainability frameworks. According to the Theory of Reasoned Action (Ajzen & Fishbein, 1980) and its extension, the Theory of Planned Behavior (Ajzen, 1991), consumers form purchase intentions based on attitudes, social influences, and perceived control, which can explain how buyers evaluate smart technologies prior to purchase.

Davis (1989) proposes that perceived usefulness and simplicity of use have a substantial influence on users' propensity to accept new technology items. These models are especially useful for investigating smart security, automation, and IT systems in buildings, as customers evaluate these features based not just on functioning but also on perceived benefits and ease. Venkatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT) incorporates additional factors such as performance expectancy and effort expectancy, making it appropriate for assessing consumer responses to advanced building systems. In parallel, the concept of sustainable consumption (Peattie, 2010) emphasizes the role of environmental concern (Rehal, Pal, Gujrati, & Uygun, 2023; Pektaş, 2024; Ideyama & Becker, 2024; Jha, 2024; Fernandes & Gabriel, 2025) in shaping buyer preferences, particularly in urban India, where eco-conscious housing demand is rising. Recent studies highlight that Indian homebuyers, especially in metropolitan areas, are increasingly influenced by environmental factors and are willing to pay a premium for green and energy-efficient homes (KPMG, 2020; JLL, 2022).

Globally, real estate sustainability is associated with lowering carbon emissions and promoting the SDGs, particularly SDG-11 (sustainable cities) and SDG-13 (climate action) (United Nations 2015). In India, however, there is currently a lack of systematic consumer

awareness and common green certification frameworks, which impacts decision-making (Ganguly & Mishra, 2021). As a result, combining these behavioral and adoption theories with the perspective of sustainability provides a solid platform for investigating how and why customers pick smart buildings, bridging the gap between global models and regional real estate dynamics.

2.3 Water Management System

High-quality water is essential for enhancing customer satisfaction and directly impacts consumer health and trust (Shinde et al., 2013). Consequently, the water management system is a crucial element in SBT, since customers anticipate safe, clean, and dependable water devoid of impurities. A research by Ahmed et al. (2020) indicated that automated water management systems provide users with real-time information on water quality in tanks, usage patterns inside buildings, and daily water consumption. The incorporation of smart water systems and process automation enhances water consumption efficiency, control, and awareness, resulting in increased customer satisfaction (Latifi et al., 2018). Conversely, Salleh (2007) and Li et al. (2019) discovered that intelligent water management systems in smart buildings may result in customer discontent owing to system malfunctions or inaccuracies in sensor readings. Consequently, inadequate water management systems will increase customer readiness to pay a premium for enhanced services. (Mohanty & Rout, 2024).

2.4 Smart Building Technology (SBT) &Internet of Things (IoT)

Smart Building Technology (SBT) integrated with Internet of Things (IoT), uses digital twin technology- AR and VR which has transformed the maintenance and operations of buildings (Casini, 2022), enhancing user interaction & promoting sustainability (Zarzycki, 2023), and customer satisfaction (Chen et al., 2018). Another study by Lee and Lee (2017), found that the seamless integration of IOT in SBT boost consumer satisfaction, efficiency and performance of the building. Conversely, AR & VR in smart building through several challenges that negatively impact effectiveness and customer satisfaction like technological complexity (Xu et al, 2024), integration challenges (Casini, 2022), Cost Barriers (Manimekalai et al., 2024; Outlay et al., 2022).

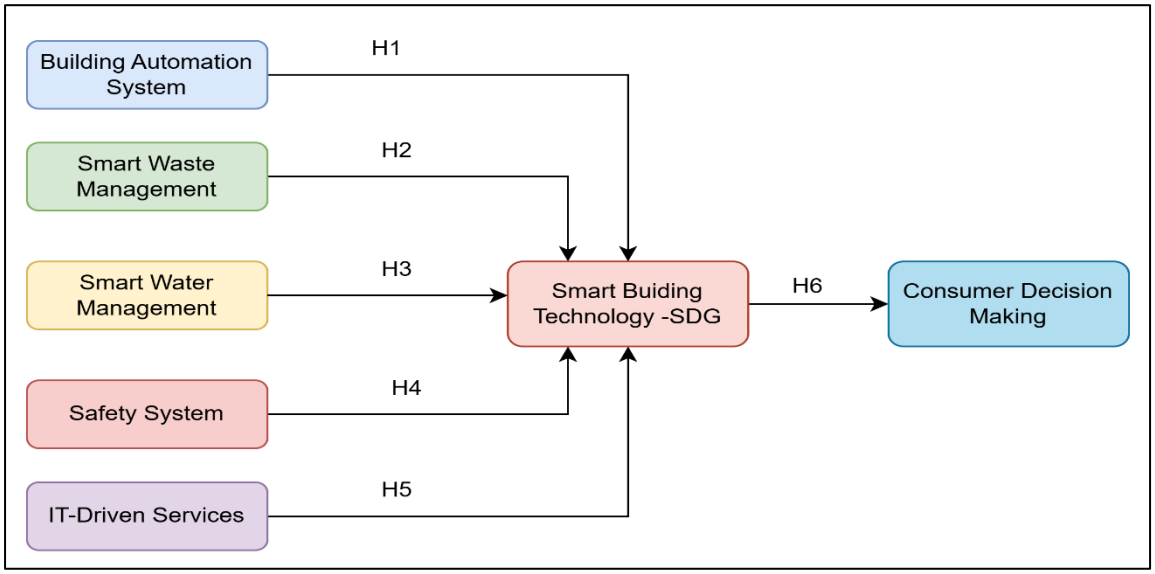
2.5 Smart Security System

According to Lee and Lee (2017), the installation of a smart security system has always been a primary worry for everyone who may be working or living in a smart building. As a result, the provision of safety through automation through the utilization of surveillance cameras and digital equipment would increase the security of the building through the capabilities of real-time monitoring and detection (Bhattacharjee & Bhattacharya, 2019). According to the findings of another study conducted by Wang et al. (2019), strategically positioned cameras within a building can assist in the management of incursions, ultimately leading to increased customer satisfaction. Additionally, it is essential for the customer's confidence as well as for the client to feel comfortable and secure.

In this age of technology, real estate companies have begun incorporating technology into their buildings in order to influence the purchasing decisions of customers. As a result of this, smart security systems, the internet of things, and building automation systems have been deployed to enhance the need for smart buildings. In order to cater to the requirements of

clientele who are well-versed in technology, real estate developers and marketers need to modify their strategies. For this reason, a conceptual framework has been designed, as depicted in Figure 2, with the purpose of investigating the elements and assessing the influence that smart building technology has on the consumer decision-making process.

Figure 2: Conceptual Framework



Source: Authors Compilation

Hypothesis:

H1: Building automation systems affect the customer satisfaction based on SBT.
H2: Smart waste management systems affect the customer satisfaction based on SBT.
H3: Smart water management systems affect the customer satisfaction based on SBT.
H4. Smart security systems affect the customer satisfaction based on SBT.
H5. Smart IT services affect the customer satisfaction based on SBT.
H6: SBT have significant effect on consumer decision making in Indian Real Estate.

3. METHOD

This study used a systematic and rigorous approach to assess how Smart Building Technology (SBT) affects consumer buying behaviour. A comprehensive and systematic literature review identified and understood the various factors that affect SBT. The study used a detailed questionnaire utilising academic literature and real estate specialists' views. The poll, on a Likert scale from 1 to 5, was designed to gather thorough input to assess customer satisfaction using SBT. Further, questions on Likert scale were validated with the help of experts from industry and academia before collecting data. To create a representative and meaningful dataset, stratified sampling was used to categorise respondents by residential unit. Stratified sampling was used to ensure fair representation by categorizing respondents based on their residential unit type, as different units may offer varying smart building experiences. Data was collected from five major cities—Delhi-NCR, Mumbai, Hyderabad, and Bangalore—selected for their active real estate markets and adoption of smart technologies. A pilot study with 20 respondents was also conducted to check if the questions were clear and easy to

understand before final data collection. In addition, a pilot study was performed on 20 respondents to check the understandability of the question used in the study.

A total of 232 valid responses were collected from the respondents and were considered adequate for the EFA and CFA, particularly since the study involved seven major components assessed through 23 Likert-scale items, after removing two items with low communalities. According to Hair et al. (2010), a minimum of 5 to 10 responses per item is sufficient, making the sample size appropriate for SEM-based modelling. To ensure data reliability**,** Cronbach's Alpha was calculated and found to be 0.821**,** indicating good internal consistency. Construct reliability and validity were assessed using Composite Reliability (CR**)** and Average Variance Extracted (AVE**)**, with all values meeting acceptable thresholds. Convergent validity was confirmed as all factor loadings exceeded 0.6 and AVE values were above 0.5. Discriminant validity was established using the Fornell-Larcker criterion and cross-loadings, ensuring that constructs were distinct from one another. Missing data were minimal and handled using listwise deletion for consistency. To minimize response bias, the questionnaire was pre-tested through a pilot study with 20 respondents, and neutral wording was used to reduce leading or socially desirable responses. The overall approach—grounded in expert-driven design, stratified sampling, and robust statistical validation—ensures that the findings are both reliable and generalizable.

4. RESULTS AND DISCUSSIONS

4.1 Data Analysis- The data analysis was conducted in **a** sequential manner to ensure clarity and consistency in interpreting results. It began with a demographic profile analysis to understand the background characteristics of respondents. This was followed by Exploratory Factor Analysis (EFA**)** to identify underlying factor structures, and Confirmatory Factor Analysis (CFA) to validate the measurement model. Finally, hypothesis testing was carried out using Structural Equation Modelling (SEM) to examine the relationships between Smart Building Technology (SBT) components and Customer Buying Behavior (CBB).

4.1Demographic Profile Analysis:

Table 1. Demographic Profile

Profile of Consumers		Frequency	Percentage
Age	<28 Years	54	23.28
	28-35	54	23.28
	35-42	43	18.53
	42-49	42	18.1
	>49	39	16.81
Gender	Male	149	64.22
	Female	83	35.78
Education	Graduate	97	41.81
	Post-Graduate	62	26.72
	Professional	43	18.53
	Other	30	12.93
Income	<10 lakhs	46	19.83
	10-20 lakhs	132	56.9
	> 20 lakhs	54	23.28
Service	Govt Service	37	15.95
	Business	75	32.33
	Private Service	88	37.93

	Others	32	13.79
City	Delhi-NCR	67	28.88
	Hyderabad	49	21.12
	Bangalore	55	23.71
	Mumbai	61	26.29

Source: Authors Analysis

According to the customer profile, the study's participants are diverse. Age breakdown shows that 23.28% of respondents are under 28 and 23.28% are between 28 and 35. The sample has 18.53%, 18.10%, and 16.81% 35-42, 42-49, and over-49 years old. The survey found that 64.22% of respondents are male and 35.78% are female. Most people (41.81%) have finished their undergraduate degrees, while 26.72% have gone on to graduate school. 18.53 percent have professional credentials, while 12.93 percent are "Other".

The income distribution shows that 56.90% of respondents earn between 10-20 lakhs. The sample included 19.83% of people earning less than 10 lakhs and 23.28% earning more than 20 lakhs. Employment status varied across several industries among respondents. At 37.93%, private service professionals dominate. Company owners follow at 32.33%. Government workers make up 15.95% of the population. 13.79% of the sample is the remaining jobs. The sample included respondents from four major Indian cities known for active real estate development and smart infrastructure adoption. Delhi-NCR contributed the highest share (28.88%), followed by Mumbai (26.29%), Bangalore (23.71%), and Hyderabad (21.12%). The study's representativeness is due to the population's diverse demographics, which provide insights from a wide spectrum of consumers with distinct characteristics and experiences exposure to Smart Building Technologies (SBT).

4.2 Exploratory, Confirmatory Factor Analysis and Hypothesis Testing

In this section, we conducted a rigorous assessment of the factors influencing customer satisfaction based on smart building technology (SBT). For this, EFA was performed after KMO value was found to be 0.83 for 17 items. Factor analysis revealed 71.50% variance that influences customer satisfaction based on smart building technologies. Before proceeding to the measurement model, the factor loading values for all items exceeded the threshold of 0.70, both in EFA using SPSS-25 and later revalidated through Confirmatory Factor Analysis (CFA). A factor loading represents the correlation between an observed variable and its underlying latent construct—higher values (typically > 0.70) indicate that the item contributes strongly to the construct's measurement. Furthermore, multicollinearity was assessed using Variance Inflation Factor (VIF) scores, all of which were below 2, confirming that there was no concern of multicollinearity among the observed variables. In addition, since no factor were contributing beyond 50% using Harman Single factor test. Hence no common method bias was not a significant concern in this study. Further, the measurement model analysis involved an in-depth examination of individual constructs, incorporating composite reliability, average variance extracted (AVE), and overall model fit indices. The results of EFA and CFA are shown in Table2.

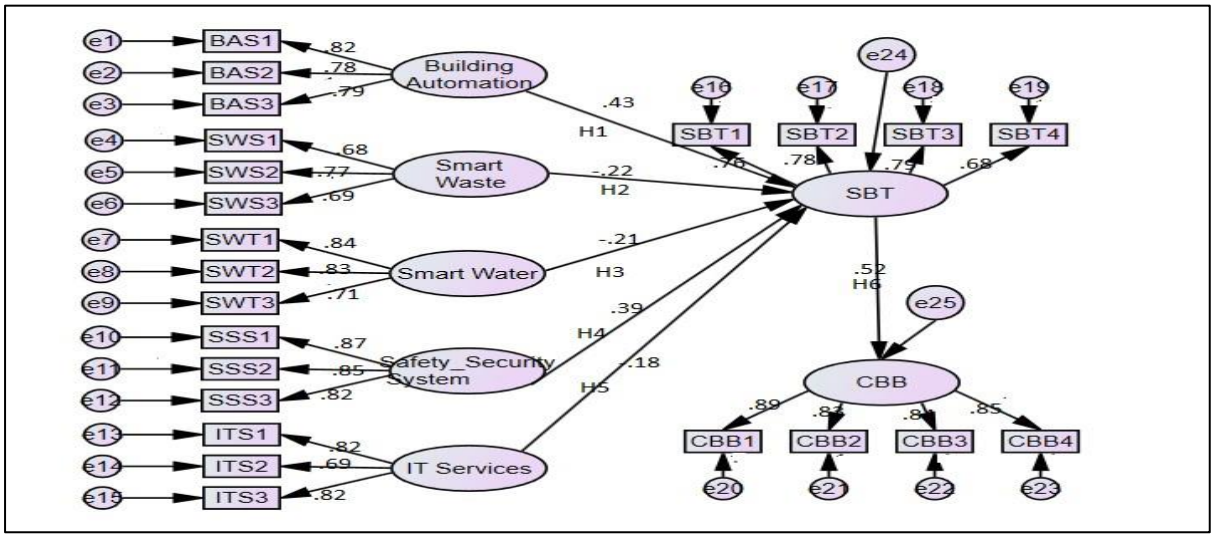
Table 2: EFA & CFA

Construct	Statement	% of Var	F.L	CR	AVE
Building Automation systems (BAS)	BAS help make building processes more effective and efficient as a whole.	16.24	0.821	0.831	0.632
	BAS helps handle and improve many building functions, like lights, security, HVAC, and so on.		0.782		
	Building energy efficiency is increased with BAS.		0.793		
IT-Services	VR enhances smart building interactivity and engagement.	14.72	0.821	0.812	0.64
	IoT sensor integration in the SBT, which offers data and insights in real time.		0.693		
	Augmented Reality (AR) applications in smart buildings aid various tasks and improve pleasure.		0.825		
Smart Waste Management Systems	The building's waste levels can be monitored and regulated using a smart waste management system.	11.55	0.684	0.754	0.515
	The adoption of a smart waste management system encourages and facilitates recycling initiatives throughout the facility.		0.776		
	The Smart waste Management System facilitates sustainable trash disposal within the building.		0.694		
Smart Water Management Systems	A smart water management system makes it easier to monitor and control water use in the building.	10.87	0.843	0.822	0.634
	The Smart Water Management System encourages the building's water conservation activities.		0.831		
	Water leaks and inefficiencies inside the building may be found and stopped with the use of a smart water management system.		0.712		
Smart Security System	Effectively supporting the building's fire safety measures are the integrated security and fire systems.	18.12	0.87	0.88	0.71
	The security system can detect and address potential security issues within the facility quickly.		0.85		
	The Smart Security and Fire Systems boost customer satisfaction by combining intrusion detection, access control, and surveillance cameras.		0.82		
Smart Building Technology (SBT)	A property's overall functionality is enhanced by smart building technology.		0.76	0.83	0.56
	The extent to which you are happy by the present status of smart building technologies in construction projects.		0.78		
	Smart building technology integration aids in assessing a property's overall attractiveness.		0.79		
	The smart building technology elements in homes offer a very positive user experience.		0.68		
Consumer Buying Behavior (CBB)	Your level of satisfaction with the smart home features in your existing or potential house, such as automation and connectivity		0.89	0.91	0.72
	How important are smart security features when deciding whether or not to buy a property		0.83		
	Choose buildings with innovative technology, such smart building features, over more conventional ones.		0.84		
	Overall satisfaction with the purchase or rental experience, taking into account the property's SBT characteristics.		0.85		

Source: Authors Analysis

The result of EFA contributed 71.5% of variance with Building automation system contributing 16.25%, IT-Services-14.72%, smart waste management systems= 11.55%, smart water management systems =10.87% & smart security systems =18.12%. CFA was proven with convergent validity of each construct. The composite reliability (CR) of each construct and average variance extracted (AVE), of each construct were measured and were found to be above threshold limit (0.7 & 0.5), validating the construct as shown in Table 2. Additionally, Goodness of fit Index(GFI) = 0.911, Adjusted Goodness of Fit Index (AGFI) = 0.905, Tucker-Lewis Index (TLI)=0.903, CMIN/df = 2.96, Root Mean Square Error of Approximation (RMSEA) =0.043, affirming the adequacy of the measurement model

Figure 3: Path Analysis



Source: Authors Analysis

Further, to test the hypothesis, the effect of independent factor on dependent variable is analysed using SEM. The result of the analysis is shown in Table 3. The GFI, AGFI, and TLI values reaffirmed the model's goodness of fit.

Table 3: Hypothesis Testing and Path Analysis result.

Hypotheses	Path Analysis	S.R.W	p-value	Results
H1	BAM ------> SBT	0.431	0.021	Accepted
H2	SWMS----->SBT	-0.222	0.134	Rejected
H3	SWTMS---->SBT	-0.211	0.231	Rejected
H4	SAFETY ---->SBT	0.391	0.016	Accepted
H5	IOT -------->SBT	-0.182	0.256	Rejected
H6	SBT--------> CBB	0.522	0.032	Accepted

Source: Authors Analysis

The results of the path analysis indicated that Building Automation Management (BAM) and Safety Management Systems significantly influence the adoption of Smart Building Technology (SBT), supporting H1 and H4. This finding aligns with existing literature that emphasizes the pivotal role of building automation in enhancing energy efficiency, operational control, and occupant comfort, all of which contribute directly to higher satisfaction levels. Similarly, safety-related features are often viewed as non-negotiable aspects of smart

buildings, making them a critical determinant of customer perception and acceptance (Alhomod & Shafi, 2022).

However, H2, H3, and H5—which tested the influence of Smart Waste Management Systems (SWMS), Smart Water Management Systems (SWTMS), and Internet of Things **(IoT)**—were not statistically significant. Several plausible theoretical and contextual explanations can account for these rejections:

Limited User Visibility & Awareness: Smart waste and water systems often operate in the background and may not be directly visible or impactful from a user's day-to-day experience. As a result, customers may undervalue their presence or fail to associate them with improved satisfaction. This is consistent with past findings indicating that customer perception is highly driven by visible and interactive features (Zhao et al., 2021).

Perceived Complexity of IoT: While IoT serves as the backbone for many SBT functionalities, users may not directly perceive its benefits unless it translates into tangible experiences (e.g., app-based controls, automation feedback). In contexts where IoT applications are still emerging or poorly integrated, consumers might associate them with technical complexity or data privacy concerns, limiting their influence on satisfaction (Lee & Lee, 2015).

Early Stage of Implementation in the Local Context:In emerging economies or developing urban sectors, smart waste and water systems may still be in pilot phases or inconsistently deployed. Hence, their effectiveness may not yet be widespread or trusted enough to impact consumer sentiment significantly. The gap between technological potential and ground-level implementation could explain the lack of significance in H2 and H3 (Ghaffarianhoseini et al., 2016).

Customer Prioritization of Core Features: Consumers tend to prioritize features that directly relate to comfort, safety, and energy savings, especially in the built environment. Since BAM and Safety systems directly align with these core concerns, their impact is stronger, whereas waste, water, and IoT—despite being important—may not be immediate decision drivers.

Finally, the significant and positive relationship between SBT and Consumer Buying Behavior (CBB) (H6) underscores the critical role of smart technologies in shaping customer preferences and purchase intentions. This supports the growing body of research indicating that the integration of smart systems can enhance property value perception and positively influence buying decisions.

5. Conclusion, Discussion, and Managerial Implications

In this research, significant and meaningful determinants of consumer satisfaction and purchase intention toward SBT were detected and validated. Concrete through strong testing of measurement model, of having EFA and CFA, such as BAM and the CONSUMER BAULDINQ AUTOMATION Safety Management Systems were discovered to have significantly influenced consumer satisfaction. Secondly, SBT has a significant and positive impact on the Consumer Buying Behavior (CBB), and so performs a pivotal role in influencing buying behavior in the real estate market.

But, the relationships that we hypothesized for other constructs such as SWMS, SWTMS, and IoT were not supported. Theoretically you could also see that, although these are components in the wider ecosystem of smart technology, they may not have as prominent a role (or be as valued) to end users in their purchase decision. For example, users may be interested on security and automation -which are, to a great extent, features with which directly interact- over infrastructure disciplines like waste or water management, which are less visible.

This is consistent with previous research indicating that customer satisfaction in real estate is more sensitive to features providing immediate and tangible benefits (Wang et al., 2021; Lee and Park, 2020). Further, the absence of tangible results for IoT could indicate a gap in consumer knowledge, or confidence in technology that is more readily addressed, possibly through better communication or user training.

Managerial Implications

These findings are strategic for real estate developers to consider investing in such smart technologies in order to work on the enhanced safety and user experience. Building Automation and Safety Management Systems: AH Buildings: distinguishing itself in the marketplace Using building technology, people create and develop their habitats. Developers should communicate effectively about these features, demonstrating to a potential buyer or tenant that they make the home or office less of a worry and more of a pleasure.

Also companies must address the knowledge gap in the use of other smart systems (SWMS, SWTMS, IoT) by promoting customer awareness about them, smart demonstrations, and open performance information. This could also build the trust for technology acceptance incorporating user-friendly interface and providing post-sale services.

Furthermore, sustainability communications need to do better at connecting smart infrastructure to wider environmental and social objectives. Managers must adapt strategies to changing consumer demands for ethical and tech-savvy living environments.

Ethical, Social, and Economic Considerations

Ethical and social considerations are crucial in the adoption of smart building technologies. Issues like data privacy, cybersecurity, and digital equity must be addressed, particularly as these systems collect and process user data. Developers and property managers should ensure ethical data handling and inclusivity in smart building design, preventing digital divides in housing affordability or accessibility. Economically, the integration of SBT could lead to higher costs, posing affordability concerns in price-sensitive markets such as India.

Limitations and Future Research Directions

This study does have some limitations. For one, the use of cross-sectional data limited our ability to infer causation. Longitudinal studies could help to better understand changes in perceptions and satisfaction over time.

Second, we only used self-reported data, which could be prone to social desirability bias and response inaccuracy. Qualitative methods, such as interviews or focus groups, could provide more nuanced insights into user experiences and perceptions.

Third, the results' applicability to other cultural or commercial contexts is restricted by the geographic focus on India. Comparative analyses between various nations or regions should be taken into account in future research.

Additional restrictions include selection bias in the sampling procedure and possible non-response bias, which could distort the findings if particular respondent groups were underrepresented.

Future Research Suggestions

Future studies should use qualitative approaches to find more profound psychological and social drivers as well as longitudinal studies to monitor changing consumer perceptions over time. More thorough insights can be obtained by comparing different property types and extending the model to incorporate variables like cost perception, privacy concerns, and environmental awareness. Theoretical knowledge of SBT adoption will also be strengthened by investigating the mediating functions of awareness and trust.

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