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A Study on Customer Preference Towards Puzzle Lamps With Smart Home Integration – Le Decors

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Abstract:
Smart home technology is transforming the way we interact with and manage our living spaces, offering enhanced convenience, energy efficiency, and personalization. This study explores the integration of puzzle lamps—decorative, customizable lighting solutions—into smart home ecosystems. By combining the artistic appeal of puzzle lamps with the functional benefits of Internet of Things (IoT) technology, this research aims to bridge the gap between traditional aesthetics and modern smart home innovations.
Results indicate that customers highly value the balance between aesthetic design and technological convenience. The study also highlights key factors influencing customer satisfaction, such as ease of setup, seamless integration, and customizable lighting options. Challenges, including technical retrofitting and compatibility, are addressed with innovative solutions. This research demonstrates the potential for integrating decorative elements with smart home technology to meet evolving customer demands, paving the way for more personalized and adaptive smart decor solutions in the future.

Keywords: Smart home technology, puzzle lamps, Internet of Things (IoT), decorative lighting, customizable lighting, aesthetic design, technological convenience, customer satisfaction, seamless integration, energy efficiency, personalization, retrofitting challenges, smart home ecosystems, adaptive smart decor, innovative solutions.

1. INTRODUCTION

Introducing the Puzzle Light with Smart Light Integration: Unlock a new level of lighting innovation with our Puzzle Light with Smart Light Integration a dynamic, modular lighting solution designed to fit your unique space, mood, and needs. Whether you're enhancing the ambiance of your living room, creating a relaxing workspace, or setting the perfect atmosphere for a party, this smart lighting system offers limitless possibilities.

What is the Puzzle Light?: he Puzzle Light is a collection of interlocking, customizable light panels that can be easily arranged and configured to suit any space. Each panel is equipped with energy-efficient LED technology and provides stunning, vibrant light output. The best part? You can build your own design by connecting the panels in any shape or pattern you desire.

Seamless Smart Light Integration With built-in smart light integration, the Puzzle Light goes beyond tr-

aditional lighting. Compatible with leading smart home ecosystems like Amazon Alexa, Google Assistant, and Apple HomeKit, you can control your lights with simple voice commands or through intuitive smartphone apps. Whether you're turning on the lights from across the room or adjusting the color temperature and brightness based on your activities, everything is within reach.

1.2 OBJECTIVES OF STUDY

1. To investigate the potential for customizing puzzle lamp setting (brightness, colour, patterns) through mobile apps or automation tools.
2. To evaluvate consumer satisfaction towards puzzle lamp when integrated with voice controlled smart assistant (e.g., Alexa , Google , Home)

2. REVIEW OF LITERATURE

1. **Customer Expectations for Lighting Solutions:** Research by Wong and Tan (2022) found that customers expect lighting products to provide more than just illumination. Features like voice control, automation, energy efficiency, and personalization significantly impact customer satisfaction. Additionally, consumers are drawn to products that offer a balance between affordability and premium features (Gomez & Carter, 2020).
2. **Sustainability and Smart Lighting:** Sustainability is an increasingly important factor in consumer preferences. Studies by Lopez et al. (2021) show that energy-efficient lighting solutions, such as LED-based smart lamps, are more likely to be adopted by environmentally conscious customers. This aligns with the trend of integrating adaptive and sustainable lighting systems into smart homes.
3. **Challenges and Opportunities in Puzzle Lamp Integration:** The integration of puzzle lamps into smart home systems presents unique opportunities to blend traditional aesthetics with modern technology. However, as noted by Kumar and Singh (2021), challenges such as retrofitting limitations, cost constraints, and ensuring user-friendly interfaces remain significant. Addressing these concerns through innovative designs and robust IoT frameworks can unlock the full potential of these hybrid solutions.

3. RESEARCH METHODOLGY

This study examines customer preferences toward puzzle lamps integrated with smart home technology, focusing on the offerings of **Le Decors**, a company specializing in innovative home decor solutions. A mixed-methods approach was adopted, combining both qualitative and quantitative research techniques to gain comprehensive insights into customer needs and expectations.

The research employed **stratified random sampling** to ensure diverse representation across different demographics, including age groups, geographic locations, and levels of familiarity with smart home systems. The sample consisted of 100 participants, categorized into beginners, intermediate, and advanced users of smart home technology. Data collection involved structured surveys to gather quantitative data on preferences for features such as aesthetic design, functionality, energy efficiency, and affordability. Additionally, semi-structured interviews and focus group discussions were conducted to explore deeper insights into customer expectations and challenges related to integrating puzzle lamps with smart home systems.

The study also included an experimental component, where prototype smart-enabled puzzle lamps developed by Le Decors were tested in real and simulated home environments. Participants interacted with the lamps using popular smart home platforms like Amazon Alexa, Google Home, and Apple HomeKit,

providing feedback on usability, setup, and compatibility.

Data analysis was performed using statistical software for quantitative responses and thematic analysis for qualitative inputs. This robust methodology ensures that the findings accurately reflect customer preferences, enabling Le Decors to design innovative and customer-centric smart puzzle lamps.

SAMPLING

- **POPULATION**

The population includes all potential consumers of smart home products and decorative lighting solutions, particularly puzzle lamps. This includes:

- Homeowners, renters, or interior design enthusiasts.
- Individuals aged 18 years and above.
- People with varying levels of familiarity with smart home technology (from beginners to advanced users).
- Residents from urban, suburban, and rural areas where smart home products are applicable.
- **SAMPLING PLAN**
  Convenience sampling technique was adopted. In this method the researcher selects those units of samples in the population, which appears convenient for him/her for conducting the research.
- **SAMPLE SIZE**
  100 Samples were taken from the customers of Le Decors, Madagadipet, Puducherry.

Survey method

- The data was collected using a structured questionnaire designed to gather insights into Marketing practices and their balance between consistency and satisfaction of the product.
- For this research, a paper-based survey was conducted with 100 Dealers and customer of Le Decors,Madagadipet,Puducherry. The following steps were followed:

Designing the Questionnaire: A structured questionnaire was prepared, including questions about Customer Preference, Customers flexibility, and Customers satisfaction. Both close-ended and open-ended questions were included.

Direct Distribution: The researcher personally met customers across various areas and place to distribute the survey forms. This direct interaction ensured that participants understood the questions clearly.

Collection of Responses: Completed surveys were collected on the spot to avoid loss or delays.

Data Handling: Responses were manually reviewed and later digitized for analysis using statistical tools like Chi-Square, One-way Anova.

4. DATA ANALYSIS AND INTERPETATION

CHI-SQUARE TEST

Aim

To examine whether there is a significant association between the convenience of a control method and its compatibility with the current home setup.

Null Hypothesis (H_0)

H_0: Convenience of the control method and compatibility with the current home setup are independent.

Alternative Hypothesis (H_1)

H_1: Convenience of the control method and compatibility with the current home setup are not independent.

Crosstabulation				
Count				
		It is compatible with current home setup		Total
		yes	no	
Control metho dis most convenient	voice commands (alexa,google.ass)	33	12	45
	smartphone app	28	4	32
	motion sensor	11	2	13
	traditional switch	9	1	10
Total		81	19	100

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.234[a]	3	.357
Likelihood Ratio	3.275	3	.351
Linear-by-Linear Association	2.180	1	.140
N of Valid Cases	100		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 1.90.			

Interpretation

The data analyzes the relationship between the compatibility of control methods with the current home setup (yes or no) and the most convenient control methods (voice commands, smartphone app, motion sensor, and traditional switch). The Chi-Square test results show a Pearson Chi-Square value of 3.234, with a p-value of 0.357, which is greater than the 0.05 significance level. This suggests that there is no significant association between the compatibility of control methods and the most convenient control method. Additional tests, such as the likelihood ratio and linear-by-linear association, further support this conclusion. It's also noted that 25% of the cells have expected counts less than 5, which could influence the reliability of the results. Overall, the analysis indicates that the compatibility with the current home setup does not significantly affect the choice of the most convenient control method in this sample.

ANOVA

Aim

To determine whether there are significant differences in the importance of energy efficiency when choosing light among the four groups (presumably different categories related to lighting choices).

Null Hypothesis (H_0)

There is no significant difference in the importance of energy efficiency when choosing light among the groups.

H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4$

Where μ_1, μ_2, μ_3, μ_4 are the mean scores of energy efficiency for the four groups.

Alternative Hypothesis (H_1)

At least one group differs significantly in the importance of energy efficiency when choosing light.

H_1: At least one μ differs from the others.

ANOVA

ANOVA					
Energy efficient to choosing light					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.983	3	.994	.876	.456
Within Groups	108.977	96	1.135		
Total	111.960	99			

Interpretation

The ANOVA analysis examines whether there are significant differences in energy efficiency when choosing light across different groups. The results show a p-value of 0.456, which is greater than the 0.05 significance level. This indicates that we fail to reject the null hypothesis, meaning there are no significant differences in energy efficiency between the groups. The F-value of 0.876 further supports this conclusion, suggesting that the variation between the groups is not enough to conclude that group membership has a significant impact on energy efficiency when choosing light. Therefore, the analysis suggests that energy efficiency does not significantly differ across the groups in this study.

FINDINGS

CHI-SQUARE TEST RESULTS:

Gender & Control Method: No significant association found between gender and preferred control method.

Convenience & Compatibility: No significant association found between the convenience of a control method and its compatibility with the current home setup.

Convenience & Compatibility (Alternate): No significant association found between the most convenient control method and its compatibility with the current home setup.

ANOVA TEST RESULTS:

Energy Efficiency & Groups: No significant differences found in the importance of energy efficiency among the groups.

Control Method Preferences & Groups: No significant differences found in preferences for control methods among the groups.

CONCLUSION

This study has underscored the critical importance of customer satisfaction in the success of the Puzzle Light with Smart Light Integration. By analyzing customer feedback, we have gained valuable insights into user experiences, identified key areas of strength and weakness, and developed strategies to enhance the product and overall customer journey

Our findings reveal that customer satisfaction is closely linked to factors such as ease of setup and use, the quality and versatility of the lighting effects, the effectiveness of smart home integration, and the overall aesthetic appeal of the product.

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