International Conference on Business Research
University of Moratuwa, Sri Lanka
December 04, 2024

https://doi.org/10.31705/ICBR.2024.23

Paper ID: 29

IMPROVING THE USABILITY OF HOTEL APPLIANCES WITH MINIMUM ENGINEERING ASSISTANCE

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ABSTRACT

The TV, AC, and faucet in a hotel room should be the easiest things to operate. Although complaints from the guests to the engineering department have increased significantly over the years. The primary goal of this study is to investigate the guests' difficulties and identify the relationship between guests' abilities and what are the influencing factors. The objective of this study is to develop clear-cut recommendations to solve these concerns by focusing on complaints related to guests' inability to use appliances. The method uses an exploratory research design, and the first phase of the research is based on a qualitative approach, while the second phase is based on a quantitative approach. This study categorized the main influencing factors into two: technical factors and personal factors. Interviews conducted with duty runners and duty engineers were the primary data collection, as well as the complaint database can be identified as a secondary data collection method. Process modeling, Pareto analysis, cause and effect diagram, and correlation analysis were used to analyze the data. The results show that there are some correlations between technical factors and guests' abilities as well as personal factors and guests' abilities. One of the recommendations includes a video that contains instructions on how to use the appliances presented using Sri Lankan traditions, which is a solution and emerged as an expert opinion during the discussions with duty engineers and duty runners in the hotel.

Keywords: Engineering Assistance, Guest's Ability, Hotel Appliances, Personal Factors, Process Improvement, Technical Factor

1. Introduction

Luxury accommodations such as hotels and resorts are gaining prominence in the hospitality industry. These establishments serve a wide range of guests with different personal backgrounds and varying

familiarity with contemporary appliances. However, visitors who are unfamiliar with the specifics of hotel room appliances may experience obstacles due to the growing focus on self-service features and the limited availability of technical support on-site (Lai & Yik, 2012). The challenge arises when guests attempt to operate appliances independently, as they are unfamiliar with the models and features or unclear instructions. Some items and their operation are not clearly understood, and the absence of readily available assistance can result in dissatisfaction, time loss, and diminished overall guest satisfaction. For example, some guests are unaware that they cannot link their iPhones to the smart TV. Then they made a complaint with the engineering department. Furthermore, some guests are unaware that if they open the window, the A/C will turn off automatically, prompting them to say that the A/C is not operating properly (Kodikara, 2024).

An exclusive hotel currently employs various methods to handle appliance-related complaints reported by guests. For example, the guests can reach out to the service centre to report any appliance problems which are then passed on to the engineering department. The FCS database system manages the process, ensuring that engineers are dispatched, providing instructions, and resolving issues within ten minutes (Weerasinghe, 2024). The second method is to use user manuals to clarify the issues and to gain detailed guidance on how to use the appliance. However, this method can be lengthy as comprehension of these instructions is often difficult due to limited visuals. These current approaches have notable deficiencies since the guests mostly rely on engineering staff to resolve complaints. The empirical issue is that with limited engineering staff, approximately 450 guest complaints per month (FCS Database, 2023) are not resolved promptly, leading to dissatisfaction, and many of these complaints unnecessarily waste duty runners' time as the appliances are not malfunctioning (Thebuwana, 2023).

Therefore, this study aims to improve guests' ability to use appliances by themselves, as well as the assistance process. The following objectives are set based on the research problem of the study.

- Objective 1: Investigate the effectiveness of the current process of handling guest complaints regarding appliance operation and identify areas for improvement.
- Objective 2: Investigate the types of appliances that guests struggle with most when operating independently and investigate the root causes of those difficulties.
- Objective 3: Investigate the relationship between specific appliance types, guest personal characteristics, and the ability of guests to use appliances effectively, to develop targeted recommendations for improving guest experience and reducing complaints related to appliance use.

This research is centered on how well guests can operate appliances or their proficiency with appliances, without considering appliance malfunctions. This method is based solely on complaints from guests at hotels, focusing on how to reduce or minimize the reliance on engineering support. The outcome of this research will deliver actionable strategies to elevate guest satisfaction and streamline operations at the hotel.

2. Literature Review

2.1. Usability

Usability is defined as the effectiveness, efficiency, and satisfaction of a product utilized by a designated user to satisfy a specific aim. Eason defines three attributes of usability: task, user, and system according to Eason's model elaboration (K.D.Eason, 1984). However, factors like learnability and user attitude demonstrate a more user-centered approach. Jakob delimited utility using five parts to a degree learnability, efficiency, memorability, wrongs, and vindication indicating a trend toward a more holistic user experience (Jakob, 1993). Usability characteristics must be incorporated into the system or production design to attain usability attributes. User-centered design is vital to achieving utility (Lewis, 2021), and usability can influence consumer satisfaction (Jokela, 2004).

2.2. Cognitive Ergonomics

Cognitive ergonomics is focused on how a user experiences and understands what needs to be done or how something should be operated. (Mauro Marchitto, 2011) It is “to facilitate human performance through the adaptation of tools or devices to human characteristics and preferences.” (Mo Chen, 2021) “Cognitive ergonomics puts the focus on the way we think rather than the way we act, in particular on how people maintain control over their work” (Hollnage, 1997).

2.3. Interaction Design

Interaction design can be described as the practice of designing interactive digital products, services, systems, and environments (Alan Cooper, 2014)The focus is on designing behavior. Designers need to consciously influence behavior (Nynke Tromp, 2011). For interaction design, the goal is to design products that empower users to achieve their objectives most effectively (Theophilus Teo, 2020).

2.4. Guest Ability

According to (Yun, 2013) guest ability refers to the capacity of guests to effectively navigate and engage with hotel services and facilities. It encompasses a range of competencies, including decision-making,

information processing, communication skills, problem-solving, and adaptability. Guests with higher ability levels may demonstrate proficiency in using the facilities of a hotel and have enhanced overall satisfaction. According to Tran (Tran, 2020), the desire of visitors to return to hospitality facilities is influenced by several factors, including perceived value and brand equity. As highlighted by Lashley (Lashley, 2008), emotional reaction plays a significant role in shaping guest ability, Positive emotions such as feeling valued, at ease, and welcome contribute to heightened satisfaction levels, while negative emotions like disappointment or frustration detract from it.

2.5. User Experience

User experience (UX) is a broad term that involves what a dignitary feels about and reacts to a structure, commodity, or service subsequently utilizing it. (A. H. Allam, 2013) It considers the consumer's spirits, anticipations, wants, and ambitions during the encounter, going further with plain utility (Hassenzahl, 2006). Experiences can be detached into various types under UX: Ergonomic Experience, Cognitive Experience, and Emotional Experience.

2.6. Guest Satisfaction

Guest satisfaction describes how well a visitor feels that their expectations were fulfilled throughout their stay at a hotel (Oliver, 1981). favorable word-of-mouth recommendations, repeat business, and a stronger brand reputation are all correlated with favorable guest satisfaction (Xiang, 2010). On the other hand, unsatisfied customers can result in bad press, lost revenue, and reputational harm for a hotel (Ranade, 2018).

In the hotel sector, several things influence how satisfied customers are. These variables can be broadly divided into emotional response and perceived service quality (Lashley, 2008). A visitor's emotional reaction to their hotel stay also has a big role in how satisfied they are (Lashley, 2008). The variables affecting an emotional reaction are personalization, kindness of welcome, and special treatment. (Panchapakesan Padma, 2020).

Perceived service quality measures how well a hotel meets its guests' expectations in terms of service quality. The important elements in perceived service quality are hotel features and hospitality.

2.7. Process-Based Approach in the Hotel Sector

Hospitality management encompasses a broad scope of activities from dining services and customer interactions to cleaning services and managing bookings. Research (Chen, 2010) (Kandampully, 2003) highlights that interdepartmental collaboration is critical in the hospitality industry. Every distinct department must cooperate and

interact effectively for seamless operation, as the overall guest experience is impacted by all departments including housekeeping and reception (Akbay, 2012). Hospitality operations can be improved through process mapping, which ensures reliable, top-notch service while minimizing faults and boosting efficiency. (Yildiz, 2020)

3. Methodology

1.1. Data Sources

The study uses a combined research design with an exploration design. The first phase of the research consists of interviews with duty engineers and duty runners to collect data for an investigation into the causes of the guests' complaints. The collected data is fed into the next phase to determine the factors that are most likely to increase the guests' inability to use appliances. The first phase uses qualitative data, while the second phase uses quantitative data. The data collection method for this study is a mixed method with the explanatory sequential method. In the first stage, qualitative data is collected through interviews with duty runners and engineers. Data will also be gathered using questionnaires, distributed to duty runners, duty engineers, and guests. In the second stage, quantitative data is collected through the FCS database, which includes the records of guest complaints.

1.2. Conceptual Model

Figure 1 shows the main two factors that are impacting the guests' ability by the cause-and-effect analysis. The first factor to affect the guests' ability are personal factors which include age, region, and purpose of the visit. Under the technical factors, there are three variables: features of the appliances which means whether the appliances have different features. The interface of the appliance means the number of commands and buttons in the interface of the appliance. The third variable is the novelty of the appliance which means how many of these appliances are new to the guests.

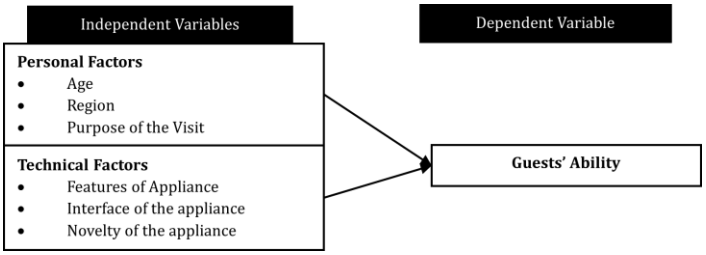

Figure 1: Conceptual Framework.

1.3. Data Analysis Method

Figure 2 shows the research process of the study. The As-Is process mapping is used to determine the existing complaint procedure and gain a better understanding of it. For the second objective, a Pareto analysis is carried out to identify the most difficult appliances. To determine the cause of the guests' complaints, a root cause analysis is performed. The correlation is used as a quantitative analysis method to identify which factor will impact the guests' inability significantly.

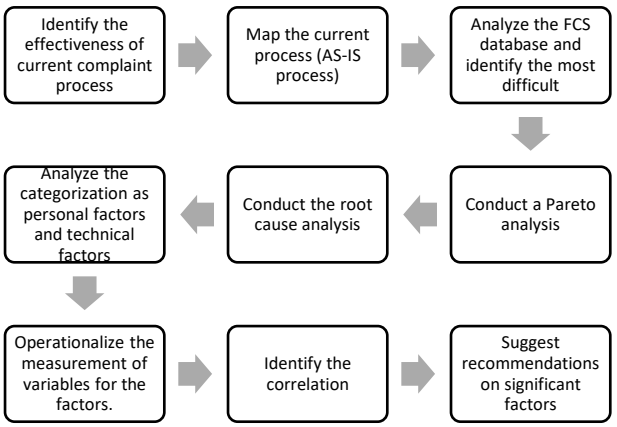

Figure 2: Research Process.

2. Results and Discussion

The first objective is to investigate the effectiveness of the current complaint process and identify the areas for improvement and the figure below shows the AS-IS process of the complaint process. Figure 5 shows the AS-IS process built by the BPMN 2.0 process mapping techniques. The data was gathered by interviewing the duty runners and duty engineers.

According to the complaint process, once the guest arrives, the bellboy gets the luggage and brings it to the guest's room. The bellboy gives a very brief introduction to the appliances. Afterward, the guest attempts to use the appliances and is unable to use them. The guest may study appliance manuals, watch relevant YouTube videos, and mostly contact the housekeepers for assistance. In some cases, the guest immediately contacts the housekeeper as they find it difficult to use an appliance. If the guest is unable to resolve the problem properly, he will contact the call center. The call center forwarded the issue to the engineering department. After assigning a job number to the engineering department, the engineering staff attend to address the concern.

The second objective is to identify the major types of issues by using Pareto analysis. To conduct the Pareto analysis, the data extracted from FSC was used. The analysis is considered for four months and

contains 162 complaints from the FCS database.

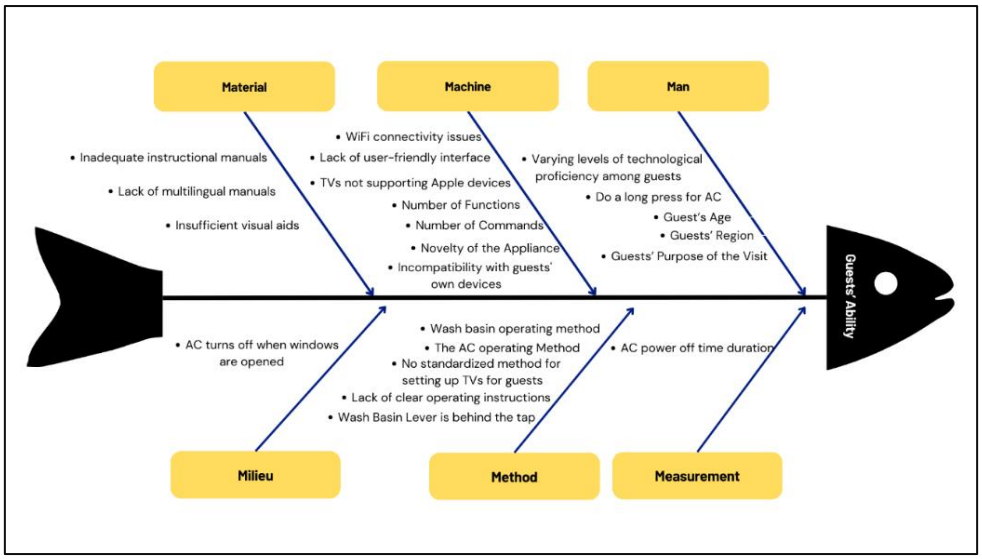

Figure 3: Cause and Effect Diagram

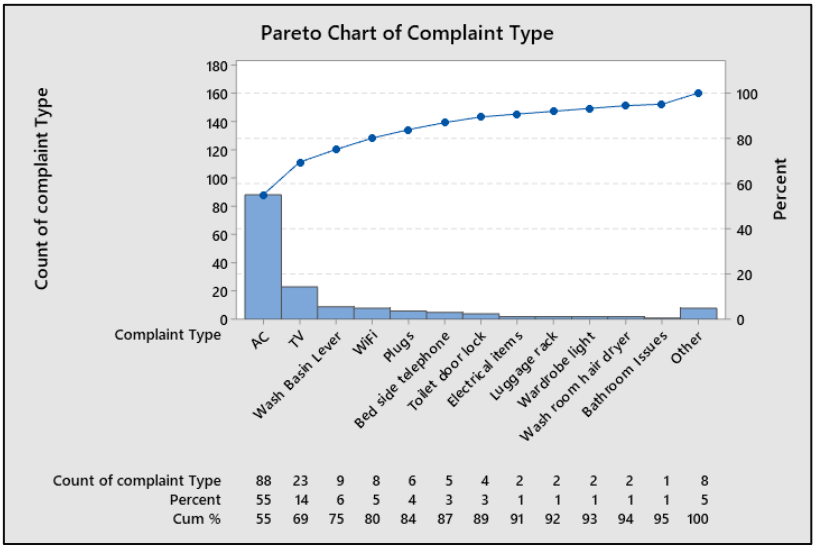

Figure 4: Pareto Analysis.

According to the Pareto analysis shown in Figure 4, the most frequent complaint type is AC. Based on the 80/20 rule, the AC, TV, wash basin lever, and Wi-Fi problems contribute to a major portion of the total complaints. The most significant category of complaints is the AC-related problem which has the highest count, which contributes to 55% of total complaints. Interviews were conducted to investigate the cause and effect of the above complaints. For example, during the interviews, the

duty runners revealed that if the guest opens the window, the AC automatically turns off. However, the guest would believe that there is a problem and launch a complaint. Another issue with AC is that if the guest turns off the AC, it takes a few seconds to turn off, and then the guest would do a long press for the AC, which will result in changing the mode of the AC. The guest then raises a complaint.

The issues with TV are primarily concerned with the fact that when guests wish to connect to YouTube, they must first set up the television. The duty runner must alter the settings and provide this facility for the guest; otherwise, the guest is unable to access YouTube. Sometimes, guests are unable to connect a particular type of smartphone to the television. The reason is that this smartphone is not supported by devices of other brands. The fishbone diagram illustrates the reasons for the complaints mentioned above (Figure 3). According to the fishbone diagram, the reasons can be divided into two categories: personal factors and technical factors.

The majority of the causes that were commented on by the experts (engineering staff) as possible fall into two categories: technical and personal. The cause could be a characteristic of the appliance or an issue with the guest's behavior.

The third objective is to identify the relationship between technical factors and personal factors for the guests' abilities. The questionnaire was responded to by 15 engineering staff referring to 50 random cases where guests have experienced different levels of difficulty in using the appliances. Correlation analysis is used to identify the relationship between guests' ability and technical factors. To get an estimate of the guests' ability (dependent variable), we inquired about the level of difficulty faced by the guest and the time it took to instruct the guest.

Under the technical factors, we identified three variables: the number of features of the appliances, the complexity of the interface of the appliance, and the novelty of the appliance. The features of the appliance are measured using the number of functions of the appliance compared to the regular appliance, and the interface of the appliance is measured using the number of commands of the appliance compared to the regular appliances. The personal factors include age, region, and the purpose of the visit. The table below includes the correlation coefficient between the variables.

Table 1: Correlation Analysis.

		Technical Factors			**Personal Factors**
		Number of Functions	**Number of Commands**	**Novelty**	**Age**
Guest's	**Level of**	0.08	0.04	0.34	0.15

Ability	Difficulty				
	Time of Instructing	0.34	0.16	0.03	-0.08

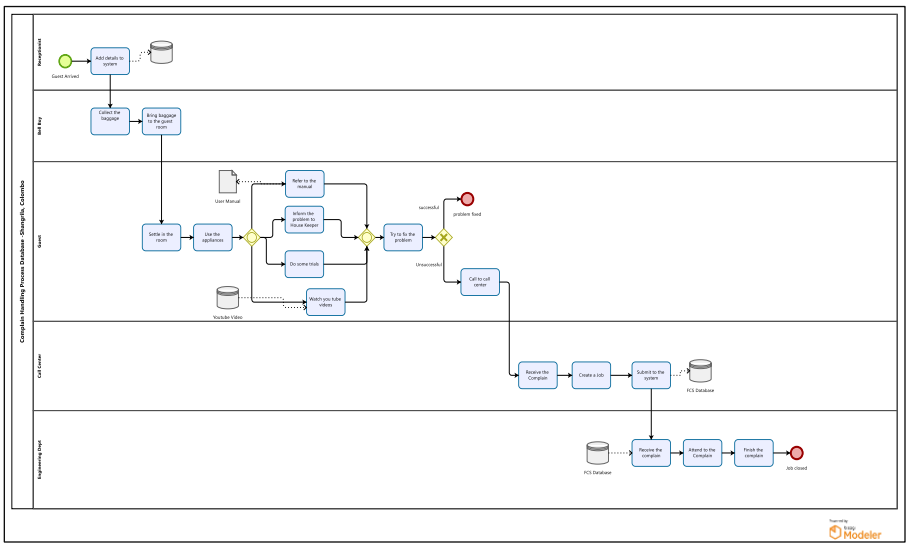

Figure 5: AS-IS Complaint Process

According to the correlation results, there is a weak negative correlation between the time for instructing and the age. There is a weak positive correlation between the number of functions and the level of difficulty. The time of instructing and the number of functions have a moderate positive correlation which indicates that as the number of functions increases, the time required for instructing also increases. The number of commands and the level of difficulty have no significant correlation. However, as the number of commands increases, the time of instruction required increases slightly since the correlation coefficient is 0.16. There is a moderate correlation between novelty and the guest's ability. This indicates that as the novelty of the appliance increases, the level of difficulty will also increase. The time for instructing and the novelty have no significant relationship.

As shown in Figures 6 to 11, we used the Mann-Whitney U test for comparing medians of level of difficulty for male and female groups. The null hypothesis cannot be rejected since the p-value is more than 0.05 significance level which indicates that there is no sufficient evidence to conclude that there is a difference in the median level of difficulty between males and females. By comparing the level of difficulty and the purpose of the visit, the null hypothesis can be rejected since the p-value is less than 0.05 significance level. However, there is a difference in the median level of difficulty between entertainment purposes and business purposes. According to the Kruskal-Wallis test, there is no

sufficient evidence to conclude that there is a difference in the median level of difficulty between the regions of the guests since the p-value is more than the significance level.

According to the Mann-Whitney U test for comparing the median time for instructing for male and female groups. The null hypothesis cannot be rejected since the p-value is more than 0.05 Significance level which indicates that there is no sufficient evidence to conclude that there is a difference in the median time for instructing between male and female. By comparing the time for instructing and the purpose of the visit, the null hypothesis can be rejected since the p-value is less than 0.05 significance level. There is no difference in the median time for instructing between entertainment purposes and business purposes. According to the Kruskal-Wallis test, there is no sufficient evidence to conclude that there is a difference in the time for instructing between regions since the p-value is more than the significance level.

Test

Null hypothesis	H_0: $\eta_1 - \eta_2 = 0$
Alternative hypothesis	H_1: $\eta_1 - \eta_2 \neq 0$

Method	W-Value	P-Value
Not adjusted for ties	1995.50	0.406
Adjusted for ties	1995.50	0.395

Figure 6: Mann- Whitney U Test for the Level of Difficulty and Gender.

Test

Null hypothesis	H_0: $\eta_1 - \eta_2 = 0$
Alternative hypothesis	H_1: $\eta_1 - \eta_2 \neq 0$

Method	W-Value	P-Value
Not adjusted for ties	694.00	0.002
Adjusted for ties	694.00	0.001

Figure 7: Mann-Whitney U Test for the Level of Difficulty and Purpose of the Visit.

Test

Null hypothesis	H_0: All medians are equal
Alternative hypothesis	H_1: At least one median is different

Method	DF	H-Value	P-Value
Not adjusted for ties	5	6.99	0.221
Adjusted for ties	5	7.33	0.197

The chi-square approximation may not be accurate when some sample sizes are less than 5.

Figure 8: Kruskal-Wallis Test for Level of Difficulty and Regions.

Test		
Null hypothesis	H_0: $\eta_1 - \eta_2 = 0$	
Alternative hypothesis	H_1: $\eta_1 - \eta_2 \neq 0$	
Method	**W-Value**	**P-Value**
Not adjusted for ties	1804.00	0.577
Adjusted for ties	1804.00	0.512

Figure 9: Mann- Whitney U Test for Time of Instructing and Gender.

Test		
Null hypothesis	H_0: $\eta_1 - \eta_2 = 0$	
Alternative hypothesis	H_1: $\eta_1 - \eta_2 \neq 0$	
Method	**W-Value**	**P-Value**
Not adjusted for ties	1013.00	0.778
Adjusted for ties	1013.00	0.735

Figure 10: Mann-Whitney U Test for Time of Instructing and Purpose of the Visit.

Test			
Null hypothesis	H_0: All medians are equal		
Alternative hypothesis	H_1: At least one median is different		
Method	**DF**	**H-Value**	**P-Value**
Not adjusted for ties	5	7.03	0.218
Adjusted for ties	5	9.74	0.083

The chi-square approximation may not be accurate when some sample sizes are less than 5.

Figure 11: Kruskal-Wallis Test for Time of Instructing and Regions.

A part of our third objective is to provide some recommendations to improve the guests' ability. To achieve this, we had a panel discussion with the expert team of the exclusive hotel representing engineering staff and customer service personnel. We facilitated the discussion with our main finding that the purpose of the visit can have an influence on the guest's ability, meaning the guests who come for entertainment purposes find it more difficult to use the appliance despite their age or region. Considering the guests who are more interested in entertainment, an idea emerged to implement an innovative video-sharing system incorporating Sri Lankan cultural values through the Smart TVs available in each hotel room. These videos are to provide clear and concise instructions demonstrating how to use the specific appliance that we identified through the Pareto analysis.

3. Conclusion

In conclusion, the study achieved the objectives of investigating and mapping the current processes. However, according to the results, there were no strong correlations between any of the technical factors or personal factors with the guest's ability. However, there were some significant correlations between the purpose of the visit and the guest's ability, therefore emerged the recommendation of using Sri Lankan culture-based videos to instruct how to use the appliances. We are yet to study the effect of this recommendation, which could be future research.

Future recommendations such as using distinct centralized control for all appliances, integrating IoT devices and AI to learn guests' preferences, and automatically controlling appliances. Overall, our findings open the door to a series of innovations in the hotel industry. This signifies that the effectiveness of cognitive ergonomics is more about influencing what individuals think and comprehend, rather than merely facilitating actions. The ability to understand intuitively how to operate the appliances should be of utmost importance.

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