

Exploring the Adoption of Smart Home Technology Based on the Internet of Things in Mauritius

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Abstract

This paper aims to investigate the levels of awareness, usage, and adoption of Internet of Things-based smart home technology among households in Mauritius, exploring the influencing factors behind its adoption and assessing its impacts on overall home efficiency. A conceptual framework derived from the unified theory of acceptance and use of technology 2 adoption model guided this study. A survey comprising closed-ended questions was administered via Google Forms, collecting a total of 279 responses over two months. The data were analyzed using IBM Statistical Package for the Social Sciences V25.0. The results reveal significant statistics regarding the awareness levels, usage frequency, and application scale of smart home technology among Mauritian households. Key predictor variables, including trust, social influence, and performance expectancy, were identified as pivotal factors strongly influencing the adoption of smart home technology. Additionally, the analysis highlights the correlation between these factors and behavioural intention. This study contributes to the understanding of smart home technology adoption in Mauritius by providing empirical data and insights into user perceptions and behaviour. It underscores the critical role of trust and social influences in technology adoption, filling a gap in existing literature.

Categories: Consumer Behavior, Marketing and Market Issues in Business, Sustainable Marketing

Keywords: smart home technology, internet of things, mauritius, utaut2, technology

Introduction

Smart home technology (SHT) is a technology based on Internet of Things (IoT). IoT can be used to refer to the internetworking of physical objects and devices, such as connected cars and autonomous driving [1,2]; ubiquitous home control [3]; and IoT-based smart homes [4]. As the number of Internet users continues to grow, it is not surprising that Internet use will change and evolve in new ways, particularly with the advent of Web 4.0 [5].

This innovation has become increasingly popular in Mauritius in recent years. With advancements in technology and the availability of high-speed Internet connection around the world, many people are turning to smart home devices to make their homes more comfortable, efficient, and secure. The digital technology uptake in homes has become a common practice [6,7]. IoT has immense potential in Mauritius. As a small nation with limited resources, Mauritius faces many challenges related to energy consumption, transportation, and waste management. By using this technology, Mauritius can improve its infrastructure and enhance its sustainability efforts. The concept of IoT is not novel in Mauritius, and the country has witnessed some IoT implementations in recent years. However, the adoption of IoT in the country is still relatively low and slow, and it is not yet widespread in most sectors.

Despite the potential benefits of SHT, there is limited understanding of its adoption and usage among residents in Mauritius. It is unclear to what extent individuals are aware of and willing to use such technology, and what factors may influence their decisions to adopt or reject it. This study aims to investigate the awareness and usage of SHT in Mauritius and identify the barriers and enablers to its adoption.

There have been limited studies undertaken on SHT in Mauritius, primarily due to factors like insufficient interest, restricted technological infrastructure, and a lack of market demand. The aim of this research is to study and understand the awareness, usage, and acceptance of SHT in Mauritius. The study will involve a survey of households to determine their level of awareness of SHT and their current usage of IoT-enabled devices.

Moreover, the study will also explore the factors that influence consumers' decision to adopt or reject such technology. Some of the factors include price value (PV), social influence (SI), perceived benefits, and

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the associated security risks and vulnerabilities.

The outcomes of this study can be used to identify any barriers or challenges and highlight areas where improvements can be made to the technology adoption and its applications. This study can also provide insightful information to implement good marketing strategies and policies for the smart home market.

Conducting research on the adoption of SHT in Mauritius holds significant potential for gaining valuable insights, particularly considering the limited existing research on this topic. The study uses a scaled-down version of the most recent technology adoption model, namely the unified theory of acceptance and use of technology 2 (UTAUT2) model. The final conceptual framework of this work includes additional independent variables such as trust and perceived security risks (PSR). Trust and PSR play a pivotal role in technology adoption but are often excluded from studies involving innovation and technology. This research, furthermore, assesses the mediation effect of trust in the final proposed model.

Research Method

Some academic studies have been conducted regarding usage, awareness, and adoption of SHTs. These studies have explored various aspects of SHT, such as user behaviour, user preferences, user satisfaction, barriers to adoption, and the impact of these technologies. Such research has been scant in the Mauritian context, but in other countries, there have been much more contribution in this field of research.

The success or failure of a technology is heavily influenced by how widely it is adopted. Technology adoption models are used to understand and predict user acceptance and adoption of modern technologies. These models offer a methodological framework for researchers and practitioners to examine the factors that have an impact on individual's intention to use and adopt a particular technology. There are several technology adoption models that have been devised to understand and explain use adoption of technology. Some of the most referenced models are technology acceptance model (TAM), extended TAM, UTAUT, and UTAUT2 and the innovation diffusion theory.

The extended UTAUT2 is a theoretical model, which is used to explain and forecast how people accept and use innovative technology. UTAUT2 is a more recent version of the original UTAUT model and includes additional elements that can impact technology adoption. The model proposes seven key factors that can impact an individual's choice to adopt and use a recent technology [8]. UTAUT2 has been used as a reference model to build the conceptual framework for this study. The variables that have been used in the proposed model are performance expectancy (PE), SI, and PV.

Hypothesis development

Behavioural Intention

Behavioural intention (BI) is frequently a measure of attitudes, beliefs, and behaviours [9]. BI is a critical predictor of actual behaviour, because it usually precedes the actual execution of the behaviour. BI is commonly utilised in multiple fields such as marketing, technology adoption, psychology, and social sciences to forecast and comprehend human behaviour [10]. Studies consistently indicate that individuals are more inclined to adopt technologies that are user-friendly and easily accessible [11].

Performance Expectancy

PE, in the context of this study, is the extent to which a person believes that using smart home devices will enhance his work efficiency or simplify tasks [12]. Users expect that IoT devices integrated into their home will enhance performance and safety by providing real-time monitoring, instant alerts, and remote-control capabilities. Gøthesen et al. [13] found that PE is a crucial factor contributing to the acceptance of SHT in Germany. Hence, this study proposes that there is a direct positive relationship between PE and the intention to use SHT (BI). Accordingly,

Hypothesis 1: There is a direct positive relationship between PE and BI.

Price Value

According to Venkatesh et al. [8], PV refers to how much a person feels that the advantages of using SHT are greater than its expenses. This includes device cost, installation cost, and subscription fees. Customers will evaluate the worthiness of investing in these devices based on their advantages and expenses.

PV defines how much value the SHT can bring as compared to the price being paid to obtain the smart home devices in exchange. This variable is not an indication of how much costly or expensive the SHT is. The research [12] demonstrated empirical evidence that underscores the importance of PV in the adoption of SHT in Norway. Hence, the relationship between PV and BI is expected to be positive and related.

Therefore,

Hypothesis 2: PV positively affects BI.

Trust

Schilke et al. [14] interpret the trust theory as a concept that explains how trust is established and preserved among groups or individuals. It is based on the notion that trust is a dynamic process that evolves over time through repeated interactions and experiences. Trust theory is crucial in technology adoption and acceptance since people are more inclined to adopt modern technologies when they trust both the technology and the entities associated with it. Conversely, individuals are less likely to adopt an innovative technology if they do not trust it, according to a study by Tammy et al. [15]. Shuhaiber et al. [16] study the relationship of SI, PSR, and trust with respect to SHT. Therefore,

Hypothesis 3: There is a direct positive relationship between trust and BI.

Social Influence

Venkatesh et al. [8] mention in their paper that SI is the extent by which an individual is encouraged to use a particular technology by the people who are important to him. It is possible that a person is influenced to use a technology by his friends or colleagues, who may discuss the benefits of automation and the energy efficiency in their homes.

Building on the works of scholars such as [17,18], this study positions SI as a crucial factor driving users' willingness to engage with smart technologies. Chen et al. [19] found that SI and environmental awareness, both key components of identity, play a leading role in the adoption of energy-efficient practices in smart homes, including studies by Wu and Ho [20] and Chan et al. [21]. This research further highlights the critical impact of motivational factors in shaping users' behaviours toward adopting smart technology.

Furthermore, according to Cheng et al. [22], online customer reviews also have an important impact on consumers' choices when making purchases. The research studies the SI's impact on readers' perceptions of online reviews. Salomon and Müller [12] also offer substantiation that SI influences the adoption of SHT in Germany.

Hence, it is believed that individuals' trust and opinions are influenced by the social pressure due to friends and colleagues or online reviews and ratings. This study will also investigate the mediation effect of trust on the relationship between SI and BI. Accordingly,

Hypothesis 4: Trust is positively affected by SI.

Hypothesis 5: There is a positive relationship between SI and BI.

Hypothesis 6: Trust has a positive mediation effect on the relationship between SI and BI.

Perceived Security Risks

Despite the various advantages that IoT-based SHT can offer, there are also apprehensions about potential security hazards. These risks encompass issues relating to physical security, system security, and third-party access.

To mitigate these concerns, manufacturers of SHT must take measures to improve the security and privacy features of their products. Additionally, users should take precautions to secure their networks and devices, such as regularly updating their software and using robust passwords. However, not all SHT users possess the technical knowledge required to protect themselves against potential privacy breaches. Furthermore, some may still be hesitant to adopt SHT due to its perceived risks related to privacy and security, according to Schilke et al. [14]. Klobas et al. [23] explore the impact of PSR on the intention to use smart home devices.

This study proposes that there is an inverse relationship between PSR and trust and between PSR and BI. This study also suggests that trust has a negative mediation effect on the relationship between PSR and BI. Therefore,

Hypothesis 7: PSR negatively affects trust on SHT.

Hypothesis 8: There is a negative relationship between PSR and BI.

Hypothesis 9: Trust has a negative mediation effect on the relationship between PSR and BI.

Proposed model

The final conceptual model is presented in Figure 1.

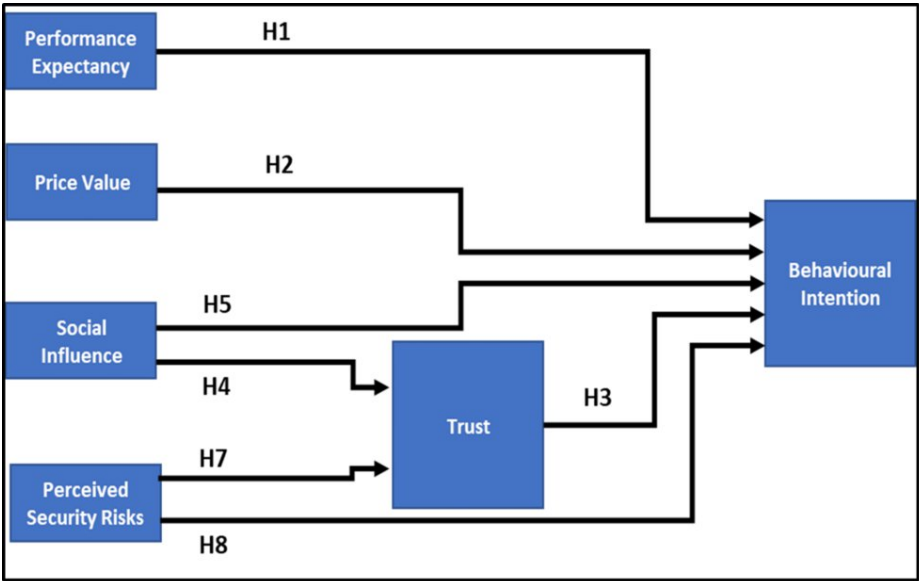


FIGURE 1: Proposed conceptual model

Mediation analysis

A mediation analysis is also conducted to investigate trust as a mediating factor for the relationship between

- SI and BI (Hypothesis 6)
- PSR and BI (Hypothesis 9)

A survey-based research strategy is, therefore, the most suitable to collect primary data. As this study aims to comprehend the present trends in SHT in Mauritius, the research adopts a cross-sectional time horizon. SHT in Mauritius is still in an early stage of maturity. A longitudinal study would be more useful in a later phase when the technology has adequately matured, and the newer perception would be interesting and relevant to study.

It is crucial to involve individuals, both those familiar and unfamiliar with IoT and SHTs in the sample.

As per Statistics Mauritius Annual Report 2023/2024 [24], as of 1 July 2023, the population of the Republic of Mauritius, including islands of Mauritius and Rodrigues, was estimated at 1,261,041, with 6,22,991 males and 6,38,050 females. This study employs probability sampling methods. This approach enables to draw statistical conclusions about the entire population using the data collected from the sample. With regard to Table 3, the estimated number of residents in the Republic of Mauritius, according to Statistics Mauritius, is 1,261,041. With a 95% level of certainty and a margin of error of 6%, the recommended sample size calculated is 279 respondents as ideal sample size, according to Qualtrics online sample size calculator [25]. The survey questionnaire was created using Google Forms application. Questions were derived from existing research surveys, like those conducted by Iqbal and Idrees [26]. Respondents were explicitly informed that the questionnaire guarantees complete anonymity and that the responses will be used exclusively for the study, ensuring honest and unbiased participation. A pilot test of the survey was done with five participants to detect the shortcomings, reduce ambiguities, and to make sure that the objectives of the questionnaire are thoroughly understood.

The survey questionnaire was made up of questions related to perception and adoption of SHT, which required the respondents to select answers based on the Likert scale. Cronbach's alpha test was employed to evaluate the consistency of the responses for each of the questions. Since the Cronbach's alpha value for each construct exceeded the 0.7 threshold, the online questionnaire demonstrated sufficient reliability and consistency, making it suitable for continued investigation.

“Google Forms” was employed to generate the questionnaire, which was subsequently shared to all the participants via email using a publicly accessible web link. Additionally, certain individuals were reached out through other online platforms such as WhatsApp and Instagram. Snowball sampling method was also used wherein a few participants were asked to share the questionnaire among their friends and families. This method was useful in achieving a considerable number of responses. The survey was exclusively targeted to individuals residing in Mauritius.

The data collection process spanned approximately two months. To guarantee unbiased data gathering, information was gathered from all the districts of Mauritius. A total of 279 responses were obtained through probability and snowball sampling methodology.

Results

Descriptive analysis

The survey revealed that 57% of respondents were males and 43% were females, with a majority aged 25-39 years, indicating a strong interest in technology among young adults. Millennials, known for their tech-savviness, were notably enthusiastic, though older adults may face digital challenges [27]. Urban residents comprised 40.8%, while 59.2% were from rural areas. Past studies, including [28], have found that high skill levels are associated with smart home adoption. Similarly, the current study also reported that 80.6% of participants hold technical qualifications. Of the respondents, 84.2% were employed, 84.6% had household incomes over Rs 25,000, and 57.3% owned their homes. Nearly all had Wi-Fi (99%), meeting key prerequisites for SHT integration, with 58% already owning smart devices.

Inferential analysis

H1: There is a direct positive relationship between PE and BI.

	Correlations	PE	BI
PE	Pearson Correlation	1	0.550**
	Sig. (2-tailed)		.000
	N	279	279
BI	Pearson Correlation	0.550**	1
	Sig. (2-tailed)	.000	
	N	279	279

TABLE 1: Pearson correlation for hypothesis 1

**Correlation is significant at 0.01 level (2-tailed).

PE, Performance Expectancy; BI, Behavioural Intention

The Person correlation (R-value) being equal to 0.550 demonstrates that there is a positive relationship between PE and BI (Table 1). The analysis also notes a significance (P-value) of less than 0.05. From the survey data, most of the respondents agreed that PE positively influences the BI to accept SHT. Hence, H1 is accepted.

H2: There is a direct positive effect on the relationship between the PV of SHT and BI.

	Correlations	PV	BI
PV	Pearson Correlation	1	0.358**
	Sig. (2-tailed)		0
	N	279	279
BI	Pearson Correlation	0.358**	1
	Sig. (2-tailed)	0	
	N	279	279

TABLE 2: Pearson correlation for hypothesis 2

**Correlation is significant at 0.01 level (2-tailed).

PV, Price Value; BI, Behavioural Intention

Table 2 depicts a significant P-value of less than 0.05, which means that the relationship between PV and BI is statistically significant. Moreover, the R-value being 0.358 means that there is a moderate positive relationship between PV and BI. Hence, H2 is accepted.

The reason behind the moderate positive relationship is that many of the participants may not be familiar with the PV of smart home devices, and most of them chose neutral (3) on the Likert scale question regarding the affordability of IoT smart home devices.

H3: There is a direct positive relationship between trust and the intention to use SHT.

	Correlations	Trust	BI
Trust	Pearson Correlation	1	0.607**
	Sig. (2-tailed)		.000
	N	279	279
BI	Pearson Correlation	0.607**	1
	Sig. (2-tailed)	.000	
	N	279	279

TABLE 3: Pearson correlation for hypothesis 3

**Correlation is significant at 0.01 level (2-tailed).

BI, Behavioural Intention

The Pearson correlation (R-value) being equal to 0.607 shows that there is a positive relationship between trust and BI (Table 3). Given a P-value of less than 0.05, the relationship between the two variables is statistically significant. Hence, H3 is accepted.

Trust plays a pivotal role in influencing users to adopt a technology. While the survey indicated that a considerable number of participants remained neutral when expressing their opinion on the trustworthiness of SHT, there were more respondents who perceived the technology as trustworthy than those who did not. In terms of the willingness to use smart home devices if they trust the technology, most of the responses were positive, and the graph was positively skewed.

H4: There is a direct positive relationship between SI and trust.

	Correlations	SI	Trust
SI	Pearson Correlation	1	0.604**
	Sig. (2-tailed)		0
	N	279	279
Trust	Pearson Correlation	0.604**	1
	Sig. (2-tailed)	0	
	N	279	279

TABLE 4: Pearson correlation for hypothesis 4

**Correlation is significant at 0.01 level (2-tailed).

SI, Social Influence

As illustrated in Table 4, the relationship between SI and trust is statistically significant since the P-value is less than 0.05. It can also be noted that the R-value is 0.604, meaning that there is a positive relationship between the two variables. Hence, H4 is accepted.

H5: There is a direct positive relationship between SI and BI.

	Correlations	SI	BI
SI	Pearson Correlation	1	0.580**
	Sig. (2-tailed)		.000
	N	279	279
BI	Pearson Correlation	0.580**	1
	Sig. (2-tailed)	.000	
	N	279	279

TABLE 5: Pearson correlation for hypothesis 5

**Correlation is significant at 0.01 level (2-tailed).

SI, Social Influence; BI, Behavioural Intention

From the Pearson correlation analysis test conducted between SI and BI, illustrated in Table 5, it can be noted that there is a positive relationship between the two variables, with an R-value of 0.580. The relationship is statistically significant since the P-value is less than 0.05. Hence, H5 is accepted.

The survey consisted of four questions about SI, focusing on how people and online reviews may affect SHT adoption. Two questions pertain to the impact of individuals on SHT, while the other two are associated with the influence of online reviews on the adoption of the technology. The results show that the participants are inclined to be influenced from social interaction in trusting and adopting SHT.

H7: There is a direct negative relationship between PSR and trust.

	Correlations	PSR	Trust
PSR	Pearson Correlation	1	-0.433**
	Sig. (2-tailed)		0
	N	279	279
Trust	Pearson Correlation	-0.433**	1
	Sig. (2-tailed)	0	
	N	279	279

TABLE 6: Pearson correlation for hypothesis 7

**Correlation is significant at 0.01 level (2-tailed).

PSR, Perceived Security Risks

The Person correlation (R-value) being equal to -0.433 shows that there is a moderate negative relationship between PSR and trust (Table 6). Given a P-value of less than 0.05, the relationship between the two variables is statistically significant. Hence, H7 is also accepted.

H8: There is a direct negative relationship between PSR and BI.

	Correlations	PSR	BI
PSR	Pearson Correlation	1	-0.327**
	Sig. (2-tailed)		0
	N	279	279
BI	Pearson Correlation	-0.327**	1
	Sig. (2-tailed)	0	
	N	279	279

TABLE 7: Pearson correlation for hypothesis 8

**Correlation is significant at 0.01 level (2-tailed).

PSR, Perceived Security Risks; BI, Behavioural Intention

The relationship between PSR and BI is negative, with an R-value of -0.327, as demonstrated by the correlation analysis in Table 7. The relationship is statistically significant since the P-value is less than 0.05. Hence, H8 is supported.

Sobel Test

The Sobel test is then used to evaluate the significance of the mediation effect. The advantages of the Sobel test are that it is easy and straightforward to implement, and it is a widely accepted method for testing the significance of mediation effects. The Sobel test is conducted using an online tool called Quantpsy.

H6: Trust has a positive mediation effect on the relationship between SI and BI.

Coefficients ^a						
Model		B	Coefficients Std Error	Standardised Coefficients Beta	t	Sig
1	(Constant)	1.432	0.193		7.407	0.000
	SI	0.612	0.053	0.58	11.845	0.000

TABLE 8: Linear regression of total effect between SI and BI for hypothesis 6

^aDependent Variable: BI

SI, Social Influence; BI, Behavioural Intention

A linear regression between SI and BI is performed to obtain the total effect between the two variables (Table 8). The total effect between the two variables will determine if the mediation analysis is relevant and can be performed.

The unstandardised coefficients beta for the effect between SI and BI is 0.612. Since the total effect is statistically significant (Sig. < 0.05), it is, therefore, possible to conduct a mediation analysis (Table 8).

Direct effect between SI and trust: A linear regression between SI and trust is performed in Table 9.

Coefficients ^a						
Model		B	Coefficients Std Error	Standardised Coefficients Beta	t	Sig
1	(Constant)	1.309	0.194		6.74	0.000
	SI	0.655	0.052	0.604	12.629	0.000

TABLE 9: Linear regression of direct effect between SI and trust for hypothesis 6

^aDependent Variable: Trust

SI, Social Influence

The effect of SI on trust is statistically significant as the P-value is less than 0.05 (0.000). The unstandardised coefficient beta is 0.655, with a standard error of 0.052.

Direct effect between trust and BI - b (where b is the relationship between trust and BI) and direct effect between SI and BI - c (where c is the relationship between SI and BI).

A multiple regression is performed to determine the direct effect between trust and BI - b.

Coefficients ^a						
Model		B	Coefficients Std Error	Standardised Coefficients Beta	t	Sig
1	(Constant)	0.918	0.192		4.78	0.000
	SI	0.354	0.06	0.336	5.937	0.000
	Trust	0.393	0.055	0.404	7.138	0.000

TABLE 10: Multiple linear regression of direct effect between trust, SI, and BI for hypothesis 6

^aDependent Variable: BI

BI, Behavioural Intention; SI, Social Influence

Referring to Table 10, the relationship between trust and BI is statistically significant, with a P-value of less than 0.05 (0.000). The unstandardised coefficient beta is 0.393, and the standard error is 0.055.

The effect of SI on BI is also statistically significant, with a P-value of less than 0.05. The unstandardised coefficient beta is 0.354, and the standard error is 0.060.

Sobel Test

Estimating the indirect effect between X and Y for statistical significance: To assess whether trust has a significant influence on the relationship between SI and BI, a Sobel test was performed.

The unstandardised coefficients and standard errors of "a" and "b" are illustrated in Table 11. The table provides the resulting test statistics, standard error, and P-value.

			Coefficients ^a		
Dimension SI and BI	Input:		T-Statistics	Std. Error	P-Value
a	0.655	Sobel test	6.215088	0.041418	0
b	0.393				
S _a	0.052				
S _b	0.055				

TABLE 11: Sobel test results for hypothesis 6

Extract of Sobel test from SPSS

The test results indicate a test statistic of 6.215, with a standard error of 0.0414. The P-value of 0 signifies a strong statistical significance. This supports the robustness of the findings and suggests a meaningful relationship between the variables.

Notation	Unstandardised Coefficients Beta	Standard Error	Standardised Coefficients Beta	t	Sig.
T	0.612	0.052	0.58	11.845	0.000
a	0.655	0.052	0.604	12.629	0.000
b	0.393	0.055	0.404	7.138	0.000
c	0.354	0.06	0.336	5.937	0.000
a*b	(0.655*0.393) =0.2574	0.0414	(0.604*0.404)=0.244	6.215	0.000

TABLE 12: Mediation analysis summary for hypothesis 6

Parameters:

X: Social Influence

Y: Behavioural Intention

M: Trust

T: Total effect between SI and BI for hypothesis 6 (refer to Table 8)

a: the relationship between SI and trust

b: the relationship between trust and BI

c: the relationship between SI and BI

Referring to Table 12, the Sobel test indicates that the indirect effect between SI and BI via trust is statistically significant since P-value is less than 0.05.

The unstandardised coefficient beta of the indirect effect between SI and BI is equal to $a*b = 0.655*0.393 = 0.2574$. This value is referred to as the point effect and is the estimate of the indirect effect between SI and BI through trust at a P-value of 0.000. This implies that trust has a positive mediation effect on the relationship between SI and BI.

Additionally, we noted that the direct effect between SI and BI is also statistically significant, which implies that there is only a partial mediation effect of trust on the relationship between SI and BI. Hence, H5 is accepted.

Total effect of PSR on BI: A linear regression between PSR and BI is performed to obtain the total effect between the two variables. The total effect between the two variables will determine if the mediation analysis is relevant and can be performed (Table 13).

Coefficients ^a						
Model		Unstandardised B	Coefficients Std Error	Standardised Coefficients Beta	t	Sig
1	(Constant)	4.513	0.152		29.767	0.000
	PSR	-0.276	0.049	-0.327	-5.751	0.000

TABLE 13: Linear regression of total effect between PSR and BI for hypothesis 9

^aDependent Variable: BI

BI, Behavioural Intention; PSR, Perceived Security Risks

The unstandardised coefficients beta for the effect between PSR and BI is -0.279, with a standard error of 0.049. Since the total effect of PSR on BI is statistically significant (Sig. < 0.05), it is, therefore, possible to conduct a mediation analysis.

Direct effect between PSR and trust: A linear regression between PSR and trust is performed. Referring to Table 14, the effect of PSR on BI is statistically significant as the P-value is less than 0.05 (0.000). The unstandardised coefficient beta is -0.380, with a standard error of 0.048.

Coefficients ^a						
Model		B	Coefficients Std Error	Standardised Coefficients Beta	t	Sig
1	(Constant)	4.849	0.149		32.653	0.000
	PSR	-0.38	0.048	-0.433	-7.99	0.000

TABLE 14: Linear regression of direct effect between PSR and trust for hypothesis 9

^aDependent Variable: Trust

PSR, Perceived Security Risks

A multiple regression is performed to determine:

- 1) The direct effect between trust and BI - b
- 2) The direct effect between PSR and BI - c

Coefficients ^a						
Model		B	Coefficients Std Error	Standardised Coefficients Beta	t	Sig
1	(Constant)	1.809	0.28		6.457	0.000
	PSR	-0.67	0.045	-0.079	-1.49	0.137
	Trust	0.558	0.051	0.573	10.832	-

TABLE 15: Multiple linear regressions of direct effect between trust, PSR, and BI for hypothesis 9

^aDependent Variable: BI

BI, Behavioural Intention; PSR, Perceived Security Risks

The relationship between trust and BI is statistically significant, with a P-value of less than 0.05. The unstandardised coefficient beta is 0.558, and the standard error is 0.051.

As illustrated in Table 15, the effect of PSR on BI is statistically insignificant, with a P-value more than 0.05 (0.137). The unstandardised coefficient beta is -0.067, and the standard error is 0.045.

Sobel Test

Estimating the indirect effect between X and Y for statistical significance: To assess whether trust has a significant influence on the relationship between PSR and BI, a Sobel test is conducted. The unstandardised coefficient and the standard error of "a" and "b" and the resulting test statistics, standard error, and P-value are illustrated in Table 16.

Coefficients ^a					
Dimension PSR and BI	Input:		T- Statistics	Std Error	P-Value
a	0.38	Sobel test	-6.41378	0.03306	0
b	0.558				
S _a	0.048				
S _b	0.051				

TABLE 16: Sobel test for hypothesis 9

Extract of Sobel test from SPSS

PSR, Perceived Security Risks; BI, Behavioural Intention; SPSS, Statistical Package for the Social Sciences

Mediation Analysis Summary

Referring to Table 17, the Sobel test indicates that the indirect effect between PSR and BI via trust (a*b) is statistically significant. The unstandardised coefficient beta of the indirect effect between PSR and BI is calculated as a*b = -0.380 × 0.558 = -0.212. This value, also known as the point effect, is the estimate of the indirect effect between PSR and BI through trust at a P-value of 0. This implies that trust has a negative mediation effect on the relationship between PSR and BI.

Additionally, it was noted that the direct effect between PSR and BI is statistically insignificant (P-value = 0.137), which implies that there is a full mediation effect on the relationship between PSR and BI. This suggests that the relationship between the independent variable PSR and the dependent variable BI only exists via the mediator variable. Hence, H1 is accepted.

Notation	Unstandardised Coefficients Beta	Standard Error	Standardised Coefficients Beta		Sig.
T	-0.279	0.049	-0.327	-5.751	0.000
a	-0.38	0.048	-0.433	-7.99	0.000
b	0.558	0.051	0.573	10.832	0.000
c	-0.067	0.045	-0.079	-1.49	0.137
a*b	-0.212		-0.248		0.000
	(-0.380*0.558)		(-0.433*0.573)		

TABLE 17: Mediation analysis summary for hypothesis 9

Parameters:

X: Perceived Security Risk

Y: Behavioural Intention

M: Perceived Trust

T: Total effect between PSR and BI for hypothesis 9 (refer to Table 13)

a: the relationship between PSR and trust

b: the relationship between trust and BI

c: the relationship between PSR and BI

Hypothesis testing

Hypothesis testing has been done to explore the consumers’ BI towards SHT in Mauritius.

Part I: Hypothesis testing using multiple regression analysis

One of the objectives of this study is to identify the factors influencing or that have influenced the Mauritius population in adopting IoT-based SHT. To assess the impact of independent variables such as PE, PV, SI, PSR, and trust on BI, a regression analysis is conducted to test the relationship between the dependent and all the independent variables.

	Model Summary			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.706 ^a	0.499	0.49	0.55343

TABLE 18: Model summary

^aPredictors: (Constant), Trust, PV, PSR, PE, SI

PV, Price Value; PSR, Perceived Security Risks; PE, Performance Expectancy; SI, Social Influence

The subsequent tables show the results of the regression analysis performed using Statistical Package for the Social Sciences, incorporating all the aforementioned factors in the context of IoT adoption in Mauritius.

Table 18 provides a summary of the regression model, which assesses the goodness of fit of the data. In simpler terms, it measures how well the model aligns with the observed data. The coefficient of determination, denoted by the R-squared value, is 0.499, meaning that the model explains 49.9% of the

variation in the dependent variable. Therefore, the model does not explain 50.1% of the variances in support of BI to adopt SHT. Additionally, with a correlation coefficient (R) of 0.706, this indicates a positive relationship between the outcome variable and all the predictor variables.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	83.326	5	16.665	54.411	0.000 ^b
	Residual	83.615	273	0.306		
	Total	166.941	278			

TABLE 19: ANOVA table

^aDependent Variable: BI

^bPredictors: (Constant), Trust, PV, PSR, PE, SI

ANOVA, Analysis of Variance; df, Degrees of Freedom; BI, Behavioural Intention; PV, Price Value; PSR, Perceived Security Risks; PE, Performance Expectancy; SI, Social Influence

From Table 19, the P-value was found to be less than 0.05, which implies that the overall model and the variables are statistically significant.

Coefficients ^a						
Model		Unstandardised B	Coefficients Std Error	Standardised Coefficients Beta	t	Sig
1	(Constant)	0.839	0.299		2.809	0.005
	PE	0.288	0.054	0.303	5.347	0
	PV	-0.046	0.058	-0.042	-0.791	0.43
	SI	0.266	0.06	0.252	4.408	0
	PSR	-0.6	0.041	-0.071	-1.462	0.145
	T	0.286	0.057	0.294	4.978	0

TABLE 20: Table of coefficients

^aDependent Variable: BI

PE, Performance Expectancy; BI, Behavioural Intention; PV, Price Value; SI, Social Influence; PSR, Perceived Security Risks; T, Total Effect

Table 20 shows the coefficients of the multiple linear regression. The result shows that the model has accepted three predicting variables out of five as being statistically significant.

The predicting variables are illustrated in Table 21.

Item #	Predicting Variable	Unstandardised Coefficient Beta	P-Value	Statistical Significance
1	Performance Expectancy	0.288	0.000	Significant
2	Trust	0.286	0.000	Significant
3	Social Influence	0.266	0.000	Significant
4	Perceived Security Risks	-0.060	0.145	Not significant
5	Price Value	-0.046	0.430	Not significant

TABLE 21: Results of multiple linear regression analysis

Note: Unstandardised coefficient is used in the table because unlike standardised coefficients, which are unitless, unstandardised coefficients have units and "real-life" scale. It represents the amount of change in a dependent variable due to a change of one unit of independent variable.

Referring to Table 21, the independent variables, namely, PSR and PV, do not have a significant statistical contribution to the overall model. It can also be noted that PE is the strongest determinant of the BI to adopt SHT as compared to the other variables.

Table 21 can be interpreted as follows:

- With one unit increase in PE, the BI increases by 0.288.
- With one unit increase in Trust, the BI increases by 0.286.
- With one unit increase in SI, the BI increases by 0.266.
- With one unit increase in PSR, the BI decreases by 0.06.
- With one unit increase in PV, the BI decreases by 0.046.

Relationship

$$BI = 0.839 + (0.288*PE + 0.286*T + 0.266*SI - 0.06*PSR - 0.046*PV)$$

Part II: Hypothesis testing using linear regression for individual predictor variable

Linear regression analyses are performed to evaluate the relationship between the dependent and independent variables, according to the hypothesis path in Table 22.

Hypothesis	Hypothesis Path	R	R ²	Standard Coefficient Beta	Sig. Value (P)	Outcome
H1	PE → BI	0.55	0.302	0.55	0	Supported
H2	PV → BI	0.358	0.128	0.358	0	Supported
H3	Trust → BI	0.607	0.368	0.607	0	Supported
H4	SI → Trust	0.604	0.365	0.604	0	Supported
H5	SI → BI	0.58	0.336	0.58	0	Supported
H7	PSR → Trust	0.433	0.187	-0.433	0	Supported
H8	PSR → BI	0.327	0.107	-0.327	0	Supported

TABLE 22: Linear regression for individual predictor variable

PE, Performance Expectancy; BI, Behavioural Intention; PV, Price Value; SI, Social Influence; PSR, Perceived Security Risks

Note: Standard coefficient has been used in the table because it allows researchers to compare the relative magnitude of the effects of different variables in the model. The different variables have equal standard deviations despite having different units of measurement.

The R (squared) value determines the proportion of the variance in the dependent variable that can be explained by the independent variables. Likewise, it can be noted from Table 22 that 30.2% of variation in BI is explained by PE, 12.8% by PV, 36.8% by trust, 33.6% by SI, and 10.7% by PSR. Concerning trust, 36.5% of variance is explained by SI and 18.7% by PSR.

It can also be noted that the standard coefficient beta values are positive and moderately strong for hypotheses 1, 2, 3, 4, and 5. On the other hand, the standard coefficient beta values for hypotheses 7 and 8 are negative but moderately strong as well.

Discussion

Starting with the nine hypotheses as developed in the Hypothesis Development section, their validity has been assessed from the survey data as presented in this section. The results obtained from the inferential analysis are summarised in Table 23 and Figure 2.

Item #	Hypothesis Testing	Beta Value	Significance Value (P)	Outcome
1	H1: There is a direct positive relationship between Performance Expectancy and Behavioural Intention	0.550	0.000	H1 is accepted
2	H2: There is a direct positive relationship between Price Value and Behavioural Intention	0.358	0.000	H2 is accepted
3	H3: There is a direct positive relationship between Trust and Behavioural Intention	0.607	0.000	H3 is accepted
4	H4: There is a direct positive relationship between Social Influence and Trust	0.604	0.000	H4 is accepted
5	H5: There is a direct positive relationship between Social Influence and Behavioural Intention	0.580	0.000	H5 is accepted
6	H7: There is a direct negative relationship between Perceived Security Risks and Trust	-0.433	0.000	H7 is accepted
7	H8: There is a direct negative relationship between Perceived Security Risks and Behavioural Intention	-0.327	0.000	H8 is accepted

TABLE 23: Summary of inferential analysis

Conceptual model with results

Figure 2 shows the relationship and strength between the different variables in the conceptual model.

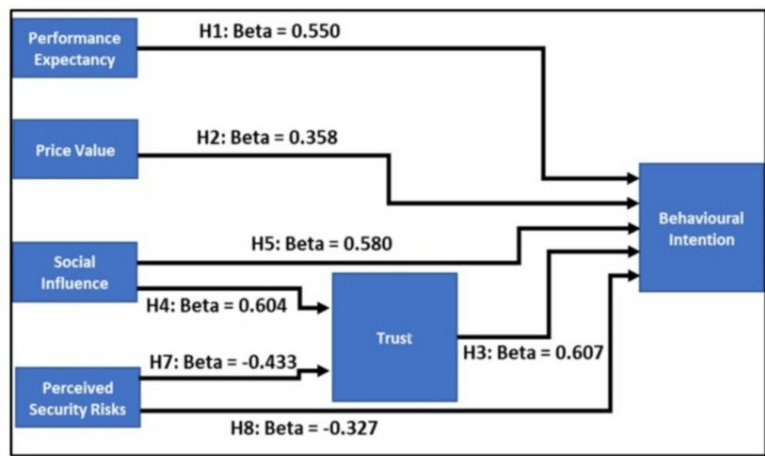


FIGURE 2: Final model with results

Direct Relationships

Table 23 and Figure 2 show a summary of the seven hypotheses, which have been tested under both Pearson correlation and linear regression analyses. All the hypotheses were accepted, but with varying degree of significance, strength, and correlation (either positive or negative). We can note as per the results that trust has the strongest influence on BI, followed by SI and PE. This implies that for most consumers in Mauritius, it is crucial for them to trust a technology before adopting it. It can also be inferred that trust is built through positive SI.

It can also be inferred that PV also has a positive relationship with BI, but with lesser degree of strength. This can be explained by the fact that the overall population of the survey may not be familiar with the PV of smart home devices. An alternative theory could be that smart home devices in the Mauritian market might be of Chinese origin, offering affordability and reliability, while there may exist other smart home devices, which have a higher brand value, resulting in higher costs. It is important to note that this research does not account for the factor of brand value.

A negative correlation between PSR and BI was also observed from the results. The relationship between the two variables was less strong as well. This can be explained by the fact that the overall population of this study may not be familiar with the security risks and vulnerabilities associated with SHT.

Moreover, it is noteworthy that there is a strong positive relationship between SI and trust. This demonstrates that the participants in this study show a high reliance in online reviews and ratings and people's recommendations as far as SHT is concerned.

It is evident from the results that there is a negative relationship between PSR and trust. This suggests that security risks associated with SHT do not favour trust in the contributors of this survey. It is worth mentioning that the correlation strength between the two elements is weak. This could be attributed to the overall population's potential lack of awareness regarding the security risks and vulnerabilities associated with SHT.

It is equally important to point out that when testing using multiple regression analysis of the whole model including all the predictors and outcome variables altogether, the model has accepted only three predicting variables out of five as being statistically significant, namely, PE, trust, and SI. The independent variables, namely, PSR and PV, do not have a significant statistical contribution to the overall model. This can also be explained because of the respondents not being familiar with the PV and the potential security risks associated with SHT.

Item #	Mediation Testing	Point Effect Value	Mediation Effect	Significance Value (P)	Outcome
1	H6: Trust has a positive mediation effect on the relationship between Social Influence and Behavioural Intention	0.2574	Partial	0	H6 is accepted
2	H9: Trust has a negative mediation effect on the relationship between Perceived Security Risks and Behavioural Intention	-0.212	Full	0	H9 is accepted

TABLE 24: Summary of mediation analysis

Table 24 shows a summary of the remaining two hypotheses, which have been tested under the mediation analysis and Sobel test.

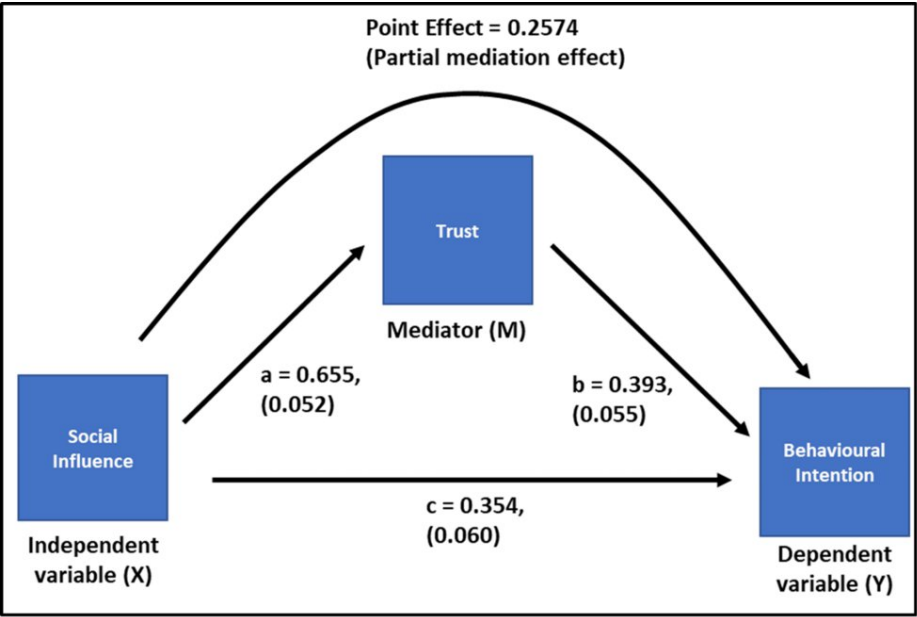


FIGURE 3: Mediation analysis result (point effect) for hypothesis 6

Figure 3 shows the mediation analyses:

a) Mediation analysis for SI and BI with trust as mediator.

The direct, indirect, and total relationships between the two variables are significant. This means that there is only a partial positive mediation effect on the relationship between SI and BI. This indicates that both the statements given below are true:

- The relationship between SI and BI is significant and can exist as such.
- The relationship between SI and BI also exists via the mediator variable trust.

b) Mediation analysis between PSR and BI with trust as mediator.

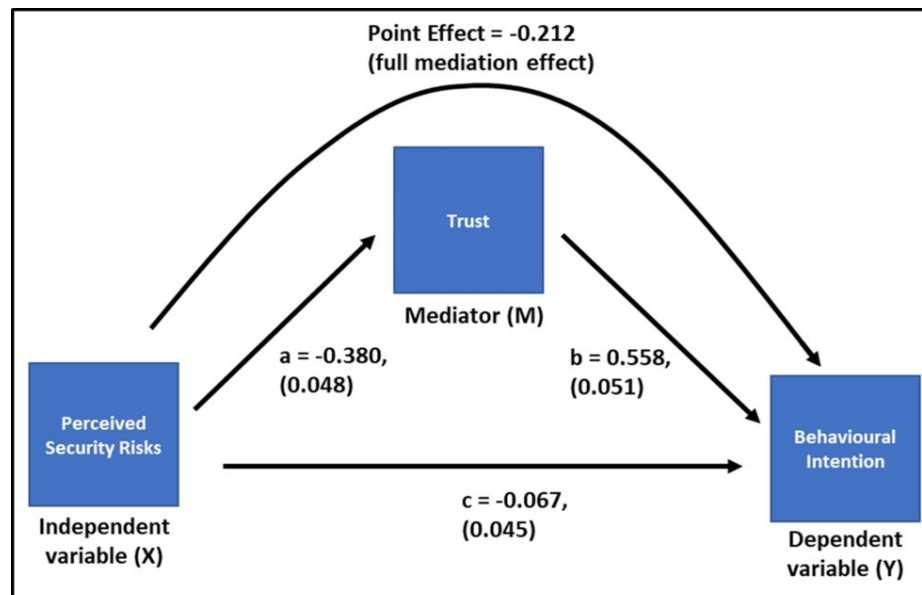


FIGURE 4: Mediation analysis result (point effect) for hypothesis 9

The indirect and total relationships between the two variables are significant. However, the direct relationship between the two variables is statistically insignificant. This implies that the mediator trust has a full negative mediation effect on the relationship between PSR and BI. In simple terms, the relationship between PSR and BI only exists via the mediator variable - trust (Figure 4).

Study Limitations

The main challenge in this study is the access constraints to online questionnaire by elderly respondents above 60 years. This population segment was represented to a smaller extent in the survey (2.9%) when the actual percentage in Mauritius is 17.4%, according to Statistics Mauritius. Additionally, the population segment below 18 years represented in this study is 3.9%, although, according to Statistics Mauritius, this value is significantly higher. This discrepancy is attributed to restricted access across all population segments.

Another limitation in this research study is the small sample size of 279 participants, with a margin error of 6% from a total population of 1,261,041. The results of the research might not be accurate and reliable if the sample size is too small or if the participants do not represent the entire Mauritian population adequately. A diverse and accurately represented sample is crucial for deriving meaningful and applicable conclusions.

Another challenge encountered during the survey stage arises from a subset of participants who might be excluded from the study due to their unfamiliarity with completing online questionnaires. It has also been noted that some participants are not very fluent with regard to technology and therefore are not able to respond to questions on SHT or IoT, which are still new concepts in Mauritius.

Recommendations

This work has contributed to understanding the possibilities and potential impacts SHT can provide to the Mauritian society. One of the main applications of IoT smart home is the possibility to use energy and water in a more efficient and optimised way. This can be profitable both for the end user and the utility company in the long term. Based on the research, it was noted that trust is the most prominent factor in BI of SHT. The use and promotion of smart devices to optimise on energy and water usage in public buildings such as hospitals, schools, police stations, hotels, and so on can instil the trust factor in the Mauritian society. The results of this study have highlighted the positive impact of social influence on the adoption of SHT. The implementation of awareness programmes can contribute to BI to effective technology adoption, thus encouraging the population to embrace new advancements.

The study conducted in this report is based on the current situation in Mauritius. The results of this study are applicable for a limited duration, specifically up to two to three years. Conducting a longitudinal study on the same research would be beneficial to gain a deeper understanding of the trends and the potential evolution on consumers' BI.

It has also been noted from the multiple regression analysis that the relationship between price value and BI is moderately significant. Other construct variables such as brand aspect, cost, and perceived reliability could also be tested to make the model more accurate. This could be implemented as future work.

Conclusions

This study examined the awareness, usage, and adoption determinants of SHT in Mauritius, focusing on PE, PV, SI, PSR, and trust. The results indicate that while 81% of respondents are aware of SHT, only 58% currently utilize such devices. Home security emerged as the primary driver for adoption, followed by lighting control, appliance management, and entertainment. Trust was identified as the most significant determinant influencing BI, with SI and PE also exerting considerable effects. Conversely, PSR negatively impacted trust and BI, emphasising security concerns as a substantial barrier to adoption. Additionally, trust was found to mediate the influence of both SI and PSR on BI, highlighting its critical role in mitigating adoption challenges. These findings contribute to the wider discourse on technology adoption by reinforcing the pivotal role of trust and security in shaping consumer behaviours. For policymakers and technology developers, the results highlight the necessity of enhancing security features and ensuring transparent privacy protocols to alleviate consumer concerns. Moreover, initiatives aimed at promoting the social and functional benefits of SHT, such as targeted awareness campaigns, could strengthen SI and PE, thereby encouraging greater adoption. These insights are crucial for advancing the diffusion of SHTs in emerging economies.

For industry stakeholders, the findings of the study emphasize the importance of trust-building strategies. Companies should prioritize the development of robust security frameworks and communicate clearly about data protection measures to enhance consumer confidence. Marketing strategies should highlight both the security assurances and functional benefits of SHTs, directly addressing prevalent concerns. Leveraging SI through partnerships with community leaders or influencers can further encourage adoption of such technologies. Additionally, ensuring that these smart products are user-friendly and meet consumer expectations for reliability and ease of use can significantly enhance market penetration. Future research could adopt longitudinal designs to track changes in trust and security perceptions over time. Exploring demographic differences and cultural influences on SHT adoption within Mauritius would provide deeper insights. Comparative studies involving other developing countries could also help identify contextual factors that shape adoption behaviours, contributing to a broader understanding of global adoption trends. Furthermore, integrating qualitative approaches could enrich the analysis by capturing a more interesting consumer experiences and perceptions regarding SHT adoption.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

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