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Critical Success Factors Influencing the Behavioral Intention to Adopt Smart Home Technologies

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ABSTRACT Drawing from established models of technology acceptance, this study presents a comprehensive model that explores the influence of both Innovation-related and Citizen-related factors. Furthermore, it examines how trust in IoT technology moderates the relationship between innovation-related factors and intention to adopt smart home technologies (SHTs). Data were collected from 401 participants and analyzed using Smart PLS. The results revealed that citizen-related factors generally have a positive and significant influence on behavioral intention to adopt smart home technologies, with the exception of perceived security risk and service quality. On the other hand, innovation-related factors had a significant overall effect. Moreover, trust was found to moderate the relationship between citizen-related factors (such as compatibility and complexity) and the adoption of smart home technologies. This suggests that improving trust in (SHTs) providers and focusing on technological advancements are crucial for promoting acceptance of smart home technologies. To conclude, this research contributes to a deeper understanding of IoT acceptance among Jordanians, particularly regarding smart-home technologies. It provides insights for decision-makers to prioritize technological improvements and foster trust in service offerings, ultimately driving the adoption of SHTs in Jordan.

INDEX TERMS Adoption of smart home technologies (SHTs). Behavioral Intention. Citizen-related factors. Innovation-related factors. Internet of Things (IoT). Trust .

I. INTRODUCTION

Researchers define the Internet of Things (IoT) as a system of tangible items furnished with sensors linked to sharing crucial information independently (Alraja et al., 2019). The IoT is the primary digital network that allows distant users to engage with interconnected multimedia technologies (Khan et al., 2022). In recent years, the IoT has experienced substantial growth and is now attracting significant attention from various stakeholders, such as policymakers, practitioners, innovators, and academics (Zhang and Navimipour, 2022). IoT generates crucial details and opportunities that providers can employ to improve and optimize their services for users. IoT technologies are gaining considerable interest and have numerous applications in various areas (Kalia, 2022). Furthermore, the potential societal and economic effects of IoT have expanded in tandem with the major changes introduced.

The IoT and intelligent technologies facilitate the creation of robust, inventive, and beneficial IoT applications. For instance, smart residences strive to enhance users' standard of living and meet their requirements by linking sensors, intelligent technologies, and appliances that are remotely managed and accessible via mobile devices or personal computers to a communication network (Augusto and Nugent, 2006). Smart home technologies (SHTs) have yet to be rapidly adopted, despite their ability to impact our daily lives and their huge market potential. Currently, smart home technologies are in their initial phases of advancement, experiencing limited acceptance, particularly in developing countries (Nuseir et al., 2022).

LivingTech, UrSmarthouse, 3V, and Smartline are Jordanian firms that supply smart-home products. However, for Jordanians, the smart home concept is considered a modern term far from their daily lives. For many Jordanians, smart home applications are considered luxury, a display of wealth, and a way to boost one's sense of self-importance. As a result, Jordanians have adopted smart home technologies (Mashal and Shuhaiber, 2018).

LivingTech stated that they had completed more than 100 smart-home projects. However, the popularity of smart homes is expected to grow in the country in the near future. The feasibility of smart houses and smart technologies is contingent upon various elements such as societal receptiveness, necessitating thorough investigation and clarification.

Governments have realized the importance of formulating policies and regulatory frameworks regarding the IoT, recognizing its substantial business potential (Chatterjee, 2020). The anticipation is that, as IoT becomes more prevalent among users, it will fundamentally transform the business landscape and models. Consequently, the adoption of IoT by users plays a crucial role in enhancing business vitality and desirability to further improve smart-home applications (Padmanaban et al, 2023). This enhancement can be achieved through various means, one of which involves strengthening users' understanding of IoT. Improving users' awareness of IoT is also expected to effectively encourage their utilization of the available IoT technologies (Aldossari and Sidorova, 2020).

With the potential increase in the use of IoT, security and privacy concerns are growing, and this trend is expected to continue (Mahmoud, et al., 2015). Users are concerned about the inadequate security of their personal information, especially because their technologies may be monitored by unauthorized outsiders. This emphasizes the need for IoT security and privacy measures and calls for the development of a satisfactory IoT ecosystem that considers the availability of appropriate strategies, policies, and regulations to protect security and privacy measurements (Hassija et al., 2019). Gao and Bai (2014) found that customers' behavioral intention to adopt IoT is influenced by their trust in the technology. Furthermore, consumers' enthusiasm for engaging with IoT is affected by perceived psychological impacts, while their evaluation and acceptance of IoT helps counterbalance perceived privacy concerns.

Various studies have examined users' general experiences with IoT using experience theory and TAM. Nonetheless, identifying user acceptance of IoT technologies has received limited attention (Aldossari and Sidorova, 2020). This research aims to enhance the existing research by incorporating supplementary variables to offer a more complete understanding of users' inclination to adopt (IoT) technology, specifically in relation to (SHTs).

Furthermore, to attract potential IoT users, IoT service providers may promote their service quality, accuracy, and other attributes by enhancing the quality of the information displayed on their platforms (Karahoca et al., 2017). IoT providers should actively communicate information regarding the advantages of the IoT. This would increase the likelihood of users intending to utilize the IoT. Other factors such as social influence are also important and have been incorporated into the presented model. Research suggests that marketers should consider how social influences affect customer acceptance of IoT technology. Consequently, IoT professionals should identify and engage early adopters and encourage them to utilize IoT services as role models for broader adoption in the future. It is apparent that a range of factors contribute to shaping users' attitudes toward IoT technology.

Consequently, the aim of this research is to present how innovation-related factors (perceived service quality, Perceived Security Risk, Perceived Complexity, and Perceived compatibility) and citizen-related factors (technological innovativeness, social influence, and familiarity) affect behavioral intention to adopt smart home technologies (SHTs). In addition, this study examines the moderating effect of trust in IoT on the connection between citizen-related factors and citizens' behavioral intention to adopt smart home technologies.

II. Literature Review and Theoretical framework

A smart home refers to a cyber-physical system that employs sensors and intelligent devices linked via an internal home network and managed by this network to oversee the environment (Fang et al., 2020). Mobile phones act as a bridge connecting users to smart home products and service providers (Shuhaiber and Mashal, 2019). Smart homes encompass technologies across security, health, communication, convenience, comfort, and energy efficiency and are categorized as lifestyle assistance (Balta-Ozkan et al., 2014). Despite their myriad benefits, smart homes are still in their nascent stage of adoption.

A. FACTORS INFLUENCING THE ADOPTION OF IOT-SMART HOME TECHNOLOGIES

Innovation-related factors

Perceived Security Risk. The security of information handled in IoT environments is a major problem (Gøthesen et al., 2023; Gao and Bai, 2014; Weber, 2015). Albalawi and Joshi (2018) explored the connection between security and trust as well as a system-level design solution that could provide IoT security and flexibility. They proposed organizing functional elements into a security function group to provide privacy management and secure system functioning. According to Klobas et al. (2019), the impact of security risk perceptions on decisions regarding adoption of (SHTs) remains largely unexplored. To delve into the importance of security risks, specifically within the Jordanian context, the following hypothesis is proposed:

H1a: Perceived Security Risk has a significant negative influence on behavioral intention to use smart home technologies (SHTs).

Perceived service quality. The assessment of overall quality and satisfaction with smart home technologies and systems, known as perceived service quality, is driven by a variety of factors, including smart home services and the technology's overall usability, reliability, and functionality (Padmanaban et al., 2023; İnaç and Ekmekçi, 2023). Once users are satisfied with the services, it is assumed that they share their opinions on social sites, which could positively influence the intentions of other possible users (Balog et al., 2023; Balog et al., 2019). Many studies have highlighted the significance of service quality in decision making and operational processes (Minovski et al., 2020). A service's quality level depends on its ability to meet the expectations of its users. Responsiveness, reliability, and assurance are crucial in Internet-based services. Accordingly, we propose the following hypotheses:

H1b: Perceived service quality has a significant positive influence on behavioral intention to use (SHTs).

Perceived Complexity. Complexity is also discussed in terms of unfamiliarity, novelty, or lack of knowledge, which may lead to uncertainty and unpredictable behavior (Beale et al., 2023; (Laukkanen, 2016; Nikou, 2019). Christiansen et al. (2022) revealed that perceived complexity involves challenges associated with acquiring, implementing, and understanding e-innovation. Complexity is viewed as a "use barrier" that leads user to resist innovation. Complexity, as argued by several studies, can negatively affect innovation adoption in the service industry (Laukkanen, 2016; Nikou, 2019). Thus, we suggested:

H1c: Perceived complexity has a significant positive influence on behavioral intention to use (SHTs).

Perceived Compatibility. The extent to which potential adopters view new technologies as aligned with their values, experiences, and desires is termed perceived compatibility (Pillai et al., 2022; Rogers, 2003). Numerous studies have highlighted the substantial impact of compatibility on user acceptance of new technologies, such as artificial intelligence and other advancements (e.g., Padmanaban et al., 2023; Hoang and Nguyen, 2022; Mondego and Gide, 2022). This research argues that the user adoption of IoT services within the smart home environment will involve challenging the well-established values, experiences, and lifestyles of users, as IoT applications are expected to impose many changes on user experience and daily lifestyle. Thus, we suggested:

H1d: Perceived compatibility has a significant positive influence on behavioral intention to use (SHTs).

Citizen -related factors

Technological innovativeness. Innovation diffusion theory (IDT) states that personal differences such as innovativeness affect the way people accept innovations. Technological innovativeness might be viewed as an innovative idea that encompasses a series of actions designed to cultivate methods for promoting innovation (Hasan et al., 2017). Numerous studies have shown that innovativeness impacts technological adoption (Miltgen et al., 2013; Agarwal and Karahanna, 2000). Technological innovativeness is a subset of the general concept of innovation used in a particular field of emerging technologies (Alkawsie et al., 2021). More precisely, technological innovativeness describes the way of life of potential users, who are the first to discover, utilize, and test new technology-based products and services. Experts in this field concur that users' choices to adopt products or services are significantly influenced by their level of technological creativity (Hirzallah and Alshurideh, 2023; Basarir-Ozel et al., 2022). The innovativeness of users in a particular sector, such as technical goods, is also considered a favorable factor supporting users' attitudes and behavior toward innovation. Therefore, we propose the following hypotheses:
H2a: Technological innovativeness has a significantly positive influence on behavioral intention to adopt (SHTs).

Social influence. As per Aldossari and Sidorova (2020), social impact refers to how significant people such as family, friends, peers, social networks, and mass media affect an individual's perceptions and decisions about SHTs as a new technology. It gauges how the beliefs and opinions of others influence users' attitudes and behaviors toward a specific technology (Shuhaiber et al., 2023; Li et al., 2021; Vrain and Wilson, 2021). Additionally, Gøthesen et al. (2023) noted that social influence operates through verbal recommendations (word of mouth), online reviews, and social media networks, which can shape the perceptions and attitudes of family members, friends, colleagues, and acquaintances towards new technologies such as IoT. Given the collectivist nature of the Jordanian context, social influence is anticipated to have a significant influence on adoption (SHTs). Consequently, we propose the following hypothesis is put forth:

H2b: Social influence has a significant positive influence on behavioral intention to adopt (SHTs).

Familiarity

Familiarity pertains to understanding, exposure, and expertise in smart home technologies and how they can be applied to everyday tasks, particularly among individuals who are not currently using them (Aldossari and Sidorova, 2020). Additionally, Strielkowski et al. (2022) found that trust in smart home systems increases with age and expertise in these technologies. Familiarizing users with features related to smart home technology, as stated by Li et al. (2021), could improve product acceptance, usage, and adoption (Li et al., 2021). To test this proposition within the Jordanian context. Thus we proposed:

H2c: Familiarity with smart home technologies has a significant positive impact on behavioral intention to adopt (SHTs).

Innovation related factors and Trust in IoT

In the context of Internet technology, trust can be defined as a strong belief in the capacity of a particular entity to function independently, consistently, and securely (Abera et al., 2016). Lin (2011) indicated that increasing consumer trust reduces risk and uncertainty, and improves safety perception. Trust in IoT financial services is important for its adoption. Trust is defined as the users' assurance of the dependability and credibility of IoT services. Therefore, we included trust as one of the pivotal factors influencing attitudes toward IoT adoption in our research model. Thus we propose:

H3a: Perceived security risk has a negative influence on trust in IoT technology.
H3b: Perceived service quality has a positive influence on trust in IoT technology.
H3c: Perceived complexity has a negative influence on the trust in IoT technology.
H3d: Perceived compatibility has a positive influence on the trust in IoT technology.

Trust and the Behavioral intention to adopt IoT- SHTs

Behavioral intention assesses how inclined an individual is to engage in a specific activity, indicating their readiness and willingness to engage in that behavior. Top of Form Within the context of the TAM framework, behavioral intention is considered a crucial indicator of acceptance; higher levels of behavioral intention suggest a greater likelihood of technology acceptance (Prayoga and Abraham, 2016). Moreover, Lafontaine et al. (2020) discovered that the majority of IoT users hold a favorable view of using IoT technologies and perceive the information provided to them to be of high quality. Positive attitudes towards IoT are more likely to lead to adoption. (et al., 2021). Thus, we proposed:
Top of Form
H4: Trust in IoT technology has a positive impact on behavioral intention towards SHTs.

The moderation effect of trust in IoT in the relationship between innovation-related factors and Behavioral intention to adopt IoT-smart home technologies

The selection of trust as a moderating factor arises from its crucial role in navigating the different aspects of adopting technology. Trust can reinforce the perceived usefulness of technology, which is linked to compatibility and familiarity. Furthermore, placing trust in technology may enhance security risk management and alleviate the complexity associated with IoT and smart home technologies, thereby fostering user awareness and potential experience. As a result, the user anticipates a positive behavioral intention. Hence, this study proposes that trust in IoT plays a moderating role in the connection between innovation-related factors and the behavioral intention to adopt smart home technologies. Thus we proposed:

H5a: Trust in IoT moderates the connection between perceived security risk and behavioral intention to adopt SHTs.

H5b: Trust in IoT moderates the connection between perceived security service quality and behavioral intention to adopt SHTs.

H5c: Trust in IoT moderates the connection between perceived complexity and behavioral intention to adopt SHTs.

H5d: Trust in IoT moderates the connection between perceived compatibility and behavioral intention to adopt SHTs.

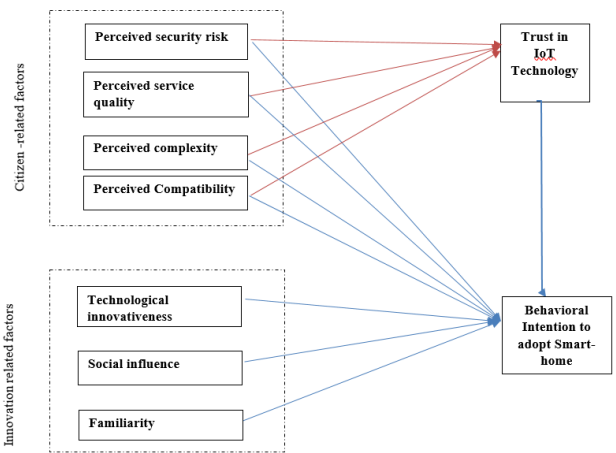

FIGURE 1. The proposed model for IoT-Smart Home Technologies

III. Methodology and data analysis

A. Research design

The research presented herein embraces a positivist stance to formulate hypotheses and establish a solid set of assumptions. This approach facilitates a thorough examination and statistical confirmation of the proposed methodology. The choice of positivist methodology was driven by its emphasis on the empirical examination of concepts (Orlikowski and Baroudi, 2019). This study employed a quantitative methodology, utilizing a survey technique typically used in

information systems (IS) research. The survey was distributed to residents in Jordan using a non-random purposive selection approach. This method of non-probability sampling guarantees that participants have the necessary skills and can be deemed trustworthy. The selected sample consisted of people with expertise in smart home Internet of Things (IoT) technology.

B. Designing Instruments and Data Collection

A survey instrument was developed to assess Jordanian individuals towards their adoption of SHTs. The questionnaire was developed to evaluate respondents' attitudes toward the components delineated in the model. According to the model and studies, these factors influence citizens' decisions to adopt the smart IoT. A filter question was used to target only citizens who have experience using smart IoT applications. This study focuses on citizens in Jordan who have experience using smart home technologies. Purposive sampling was chosen as the sampling strategy, which enabled the selection of participants with appropriate abilities for the study. Table 1 presents the respondents' demographics. The respondents included 401 citizens. The majority of those in the sample were between the ages of 18 and 25 (56.4%), with females being the majority (61.3%), and holding a bachelor's degree (71.8%).

This survey was distributed to over 500 citizens, of whom 401 provided complete data for subsequent analyses.

C. Measurement Model

The reliability of the measurement construct was assessed using Cronbach's alpha and composite reliability (CR) (Hair et al., 2019). Validity refers to the degree to which a tool or instrument accurately assesses what it claims to assess and measure its intended variables (Hair, 2019). Cronbach's alpha values varied between 0.729 and 0.840, and the CR values ranged from 0.832 to 0.899. These results suggest that the constructs have robust internal reliability. In addition, the AVE score, which represents the retrieved average variance, offers further support for convergent validity, as shown in Table 1.

Demographic Variables		Frequency	Percentage
Gender	Female	246	61.3
	Male	155	38.6
Age	18-25 Years	226	56.4
	26-33 Years	49	12.2
	34-41 Years	55	13.7
	42-49 Years	47	11.7
	50 and more	24	6
Education	Diploma or less	21	5.2
	Bachelor's	288	71.8
	Master	46	11.5
	PhD	46	11.5
Location	North Jordan	225	56.1
	Middle	44	11
	South	132	32.9
Average Monthly Income	Less than 1000 JD	310	77.3
	1000-2000 JD	74	18.5
	Above 2000 JD	17	4.2
	Total	401	100

TABLE 1. The respondents' demographics

TABLE 2. Measurement Model Assessment

Construct	Variable	Cronbach's Alpha	CR	AVE
Innovation related factors	Perceived security risk	0.836	0.878	0.709
	Perceived service quality	0.834	0.899	0.748
	Perceived complexity	0.736	0.849	0.653
	compatibility	0.698	0.832	0.624
Citizen -related factors	Technological innovativeness	0.731	0.832	0.557
	Social influence	0.763	0.850	0.586
	Familiarity	0.729	0.846	0.647
	Government rules and regulations			
Trust in Technology		0.788	0.862	0.611
Behavioral Intention to adopt Smart-home technologies		0.840	0.878	0.475

TABLE 3: Discriminant Validity–- Fornell-Larcker criterion

	Technological Innovativeness	Familiarity	Intention to adopt	Perceived Compatibility	Perceived Complexity	Perceived Security Risk	Perceived Service Quality	Social Influence	Trust in Technology
Technological Innovativeness	0.746								
Familiarity	0.380	0.804							
Intention to adopt	0.592	0.439	0.689						
Perceived Compatibility	0.381	0.453	0.496	0.790					
Perceived Complexity	0.440	0.317	0.562	0.356	0.808				
Perceived Security Risk	0.019	0.058	0.032	0.045	-0.027	0.842			
Perceived Service Quality	0.044	0.128	0.022	0.097	0.048	-0.220	0.865		
Social Influence	0.461	0.365	0.659	0.434	0.563	0.014	0.044	0.766	
Trust in Technology	0.279	0.459	0.406	0.446	0.323	0.020	0.147	0.331	0.781

Each construct had good convergent validity, as seen by its AVE values of 0.51–0.73. Discriminant validity is achieved when a construct's square root AVE exceeds its correlation with other constructs (Farrell and Rudd, 2009). The results are presented in Table 3.

According to table 4, it is remarkable that the independent factors successfully accounted for 56.6% of the variation in the intention to adopt. Whereas explained 23.4 % of variation in trust in IOT technology.

Table 4. Goodness of model fit

	R Square	R Square Adjusted
Intention to adopt	0.570	0.566
Trust in Technology	0.241	0.234

D. Structural equation modelling - Hypotheses Testing

Direct Effect

Table 5 presents the results of the direct effects model, including the path coefficient (β), standard deviation (Std), T-value (T), and P-value (P). The T test was used to determine whether there was a statistically significant influence of the independent variable on the dependent variable. A T test with a p-value below 0.05 indicates a statistically significant impact of the independent variables as the dependent variable. R-square measures the extent to which the independent variables can account for the variance in the dependent variable. An R-square value exceeding 0.5 indicates a high level of model fit quality. Table 5 summarizes the results of the direct effect hypothesis testing.

TABLE 5: Path Coefficient of Direct Effect Model

		Path coefficients	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Supported for model
H1a	Perceived Security Risk -> Intention to adopt	0.004	0.008	0.530	0.596	Rejected
H1b	Perceived Service Quality -> Intention to adopt	0.014	0.008	1.772	0.077	Rejected
H1c	Perceived Complexity -> Intention to adopt	0.024	0.011	2.205	0.027	Supported
H1d	Perceived Compatibility -> Intention to adopt	0.047	0.019	2.486	0.013	Supported
H2a	Technological Innovativeness -> Intention to adopt	0.318	0.041	7.754	0.000	Supported
H2b	Social Influence -> Intention to adopt	0.433	0.042	10.362	0.000	Supported
H2c	Familiarity -> Intention to adopt	0.102	0.047	2.186	0.029	Supported
H3a	Perceived Security Risk -> Trust in Technology	0.033	0.060	0.547	0.585	Rejected
H3b	Perceived Service Quality -> Trust in Technology	0.109	0.052	2.098	0.036	Supported
H3c	Perceived Complexity -> Trust in Technology	0.188	0.056	3.365	0.001	Supported
H3d	Perceived Compatibility -> Trust in Technology	0.367	0.057	6.401	0.000	Supported
H4	Trust in Technology -> Intention to adopt	0.127	0.042	3.005	0.003	Supported

The initial four hypotheses explored how innovation-related factors affect Jordanian citizens' behavioral intention to adopt SHTs. The findings revealed that perceived security risk and perceived service quality had a negligible influence on the intention to adopt SHTs (β= 0.004, T=0.530, p =0.596) and (β=0.014, T=1.772, p-value = 0.077), respectively. Thus, H1a and H1b were rejected. The influence of perceived complexity and compatibility on behavioral intention to adopt smart home devices was deemed significant, as indicated by (β= 0.024, T=2.205, p-value =0.027) and (β= 0.047, T=2.486, p =0.013), respectively, leading to affirmation of H1c and H1d.

The second main hypothesis examines the influence of citizen-related factors on the behavioral intention to adopt SHTs among people in Jordan. This research revealed a substantial impact of technological innovativeness, social influence, and familiarity on the behavioral intention to use smart home technologies (β= 0.318, T=7.754, p =0.000), (β= 0.433, T=10.362, p-value =0.000), and (β= 0.102, T=2.186, p-value =0.029), respectively, thus supporting H2a, H2b, and H2c.

The third main hypothesis examines the influence of perceived security risk, perceived service quality, perceived complexity, and perceived compatibility on trust in IoT technology. It was found that perceived security risk had no impact on trust in IoT technology (β= 0.033, T=0.547, p-value=0.585); therefore, H3a was rejected. On the other hand, the findings suggest that perceived service quality, perceived complexity, and perceived compatibility positively and significantly influence the level of trust in IoT technology (β= 0.109, T=2.098, p =0.036), (β= 0.188, T=3.365, p-value=0.001), and (β= 0.367, T=6.401, p-value=0.000), thus supporting H3b, H3c, and H3d. Furthermore, the influence of trust in IoT technology on intention to adopt SHTs was determined to be considerable (β= 0.127, T=3.005, p-value=0.003); therefore, H4 was supported.

E. Moderating Effect of Trust in IoT Technology

The findings on the moderating influence of trust in IoT technology on the association between innovation-related factors and behavioral intention to adopt smart home technologies are presented in Table 6.

The researcher examined how trust in IoT technology moderates the relationship between innovation-related factors and the behavioral intention to adopt SHTs. The results show that trust in IoT technology has no moderating effect on the association between perceived security risk, perceived service quality, and the intention to adopt smart home technologies

(β= 0.004, T-value= 0.530, p-value = 0.596 > 0.05); (β= 0.014, T-value=1.772, p-value = 0.077 > 0.05), thus rejecting H5a and H5b. However, the moderation investigation revealed that trust in IoT technology moderates the association between perceived complexity and perceived compatibility (β= 0.024, T-value= 2.205, p-value = 0.027 <0.05), (β= 0.047, T-value= 2.486, p = 0.013 <0.05), thus supporting H5c and Hd.

TABLE 6. Paths coefficient

		Path coefficients	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Supported for model
H5a	Perceived Security Risk -> Trust in Technology -> Intention to adopt	0.004	0.003	0.008	0.530	0.596	Rejected
H5b	Perceived Service Quality -> Trust in Technology -> Intention to adopt	0.014	0.013	0.008	1.772	0.077	Rejected
H5c	Perceived Complexity -> Trust in Technology -> Intention to adopt	0.024	0.024	0.011	2.205	0.027	Supported
H5d	Perceived Compatibility -> Trust in Technology -> Intention to adopt	0.047	0.047	0.019	2.486	0.013	Supported

IV. Discussion and Conclusion

As the world rapidly embraces the Internet of Things (IoT), artificial intelligence, and other modern technologies to cater to consumer demands and expectations, top corporations are increasingly introducing smart homes, which are a key component of IoT services (Shin et al., 2018). Nevertheless, the proliferation of smart houses has fallen short of its initial projections, necessitating an examination of smart homes from a demand perspective (Shin et al., 2018). Accordingly, this study specifically analyzes the influence of citizen-related factors, such as perceived security risk, service quality, compatibility, and complexity, as well as innovation-related factors, including familiarity, social influence, and innovativeness, as potential determinants of the adoption of smart home technologies (SHTs). This study also examined the moderating role of trust in the connection between citizen-related variables and acceptance of smart homes among Jordanian citizens. The change in R2 indicates that 57% of the variation in the intention to adopt smart homes can be addressed by the proposed variables.

The data analysis showed that service quality did not have a significant impact on the intention to adopt (β = 0.014, p= 0.077). This finding contradicts our hypothesis and the evidence from several studies that have demonstrated the positive influence of perceived usefulness, benefits, and relative advantage of (SHTs) on individuals' intention to adopt such technologies, as indicated by their perceived usefulness, benefits, and relative advantage (Basarir-Ozel et al., 2022; Kim et al., 2017; Rhee et al., 2022; Shin et al., 2018); However, our findings align with those of Yang et al. (2018), who observed that perceived automation did not have any significant impact on adoption intention, although they did find that perceived controllability, interconnectivity, and reliability had substantial effects. Our results indicate that the factors affecting the adoption of smart home services can vary depending on the user characteristics. Further examination is required to explore the potential moderating factors that modify the suggested associations.

Similarly, our results indicate that perceived security risks do not affect people's intent to adopt smart-home technologies (β = 0.004, p=0.596). Despite contradicting the findings of past research (Hubert et al., 2019; Nascimento et al., 2022; Schuster and Habibipour, 2022) which indicated that perceived risk hinders users' intention to use SHTs, this is consistent with the results of Bao et al. (2014). Bao et al. investigated the elements affecting the adoption of mobile smart homes in China and discovered that the perceived risk related to technology security did not have a notable effect. These results also support Kapoor et al. 's(2015) findings in the context of interbank mobile payment service adoption among Indian citizens. One potential reason for this outcome may be that SHTs are relatively recent technologies within Jordanian society, and no significant security breaches have been reported among the general population. Consequently, consumers perceive these technologies as safe and secure. Another potential extension could be the positive reception that Jordanians have towards technology. A study conducted by Ghorayeb et al. (2021) demonstrated that individuals who have previously used smart house monitoring technology exhibit growing acceptance of the technology over time and with usage. Furthermore, users express fewer privacy concerns than individuals who do not utilize smart home systems. The conflicting results on the influence of perceived risk on adoption, as discussed by Slade et al. (2015), hold significant theoretical value and require further study.

In addition, contrary to our initial predictions, the present study revealed that complexity had a significant positive effect on adoption intention rather than a negative one (β =0.024, p=0.027). This outcome contrasts the conclusions drawn from other studies (Hubert et al., 2019; Maswadi et al., 2022; Nikou, 2019; Rhee et al., 2022; Shin et al., 2018) that have identified a significant and positive influence of ease of use, which is the opposite of complexity, on one's intention to use such SHTs. Basarir-Ozel et al. (2022) performed thematic analysis using

data collected from 13 SHT specialists. The study found that the presence of complexity, characterized by inconsistent user experience, usability issues, and the requirement for time-consuming programming, hinders adoption. Nevertheless, our findings align with the results of a meta-analysis published by (Arts et al., 2011), which concluded that complexity promotes people's intentions to adopt innovation, but hinders their actual adoption behavior. Researchers attributed this unexpected outcome to several factors. First, users are prone to underestimating the negative impact of complexity and overestimating the ease of use of innovation (Wood and Moreau, 2006). Second, they tend to place a higher value on innovation features, which raises its complexity, while giving less importance to usability before actually using it (Thompson et al., 2005). Finally, consumers often associate complexity with novelty and progress rather than considering their cost implications (Arts et al., 2011).

Regarding perceived compatibility, the results of our study align with our predictions, indicating that compatibility has a beneficial influence on Jordanian users' intentions to use SHTs (β=0.047, p=0.013). Marikyan et al. (2019) highlighted the significance of compatibility in influencing a user's impression of the value of the technology. This finding aligns with the conclusions of previous studies. For instance, Marikyan et al. (2019) discovered that one of the obstacles to the adoption of SHTs is the absence of compatibility, which manifests as a mismatch in terms of technology, aesthetics, and routines between customers and various types of SHTs. Similarly, Shin et al. (2018) emphasized the significance of compatibility as a crucial determinant of the intention to embrace smart services. They highlight the need to evaluate the interoperability of these services with different home products and external services. Similarly, studies conducted by Bao et al. (2014), Hubert et al. (2019), and Nikou (2019) emphasized the significance of compatibility as a crucial element for adoption. These findings provide significant evidence that compatibility plays a crucial role in the market for SHTs. Experts stress the significance of collaboration between technology providers and service operators to bridge the divide between client requirements and preferences, and the offerings of SHTs (Shin et al., 2018). In general, customers desire goods that enhance and streamline their lives without significantly altering their existing environments and lifestyles (Hubert et al., 2019). In other words, the first step towards fostering compatibility across SHTs and between SHTs and other facets of customers' lives involves embracing universal standards and gaining a deeper understanding of the unique demands of different customer groups.

The current study also found that the adoption of SHTs is positively influenced by innovativeness (β=0.318, p=0.000), which aligns with the hypothesis and the existing literature. Nikou (2019) and Basarir-Ozel et al. (2022) identified consumer technology innovativeness as a major determinant of the adoption of SHTs. Studies conducted by Al-Obthani and Ameen (2019), Setiawan et al. (2021), and Slade et al. (2015) demonstrated that technological innovativeness has a significant impact on consumers' behavioral intent to adopt remote mobile payments, fintech, and smart government. A separate investigation conducted by Hwang (2014) revealed that innovativeness positively affects the stated level of enjoyment, perceived ease of use, and perceived utility of ERP systems. The substantial influence of innovativeness suggests that individuals with a strong inclination to experiment with and investigate novel technologies are likely to embrace them. (Slade et al., 2015) emphasize that individual characteristics, which are often overlooked in current theoretical models of technological acceptance, are indeed significant factors to consider in this context. These findings also indicate the need to enhance public awareness of SHTs to encourage individuals with high levels of innovativeness to experiment with them.

Not surprisingly, the data analysis showed a significant and favorable impact of social influence on the intention to adopt SHTs (β=0.433, p=0.000). This result suggests that an individual's use of SHTs can affect how others in their social networks perceive these technologies. Previous studies have established that social influence has a substantial impact on a person's ability to adopt new technologies in general (Venkatesh et al., 2003). Regarding the usage of SHTs, numerous scholarly works have supported the correlation (Aldossari and Sidorova, 2020; Ghorayeb et al., 2021; Nascimento et al., 2022).

According to a study conducted by Mashal and Shuhaiber (2018), individuals in Jordan tend to be greatly influenced by ideas and advice from important people in their social circles. This impact has demonstrated significant strength within the framework of (SHTs). Utilizing social media and other technologies to create communities of SHTs' users to enhance positive publicity and knowledge of these technologies is expected to increase the rate of adoption. Furthermore, it is imperative to address the issues and obstacles faced by consumers when using gadgets to mitigate negative feedback.

Regarding familiarity, analysis of the data revealed a notable positive impact on the intention to adopt (β = 0.102, p=0.029). This discovery has been extensively supported in research, such as in the context of IoT-driven healthcare (Alraja et al., 2019) and intelligent services (Al-Musawi et al., 2021). The literature conducted by Maswadi et al. (2022) and Mashal and Shuhaiber (2018) showed a favorable correlation between technology awareness and the inclination to utilize smart home technologies in Saudi Arabia and Jordan, respectively. According to Maswadi et al. (2022), individuals who possess knowledge and awareness of technology exhibit reduced levels of technical uncertainty and reluctance. Undoubtedly, a lack of familiarity with smart home devices and their functionalities has been identified as a significant obstacle to their widespread adoption (Li et al., 2021). Ghorayeb et al. (2021) revealed that individuals who had prior experience with smart home-monitoring equipment had a gradual increase in their level of acceptance as they continued to use it. These findings suggest that vendors of smart home technologies should provide customers with easily accessible information and personalized lessons to enhance their familiarity with the technologies and their usage. Furthermore, offering consumers the opportunity to try

SHTs prior to purchase appears to be a reasonable option, as research has shown that trialability plays an essential role in the decision to adopt because it enhances the perception of utility (Nikou, 2019).

Finally, the empirical results revealed that trust plays a moderating role in the influence of both compatibility and complexity on adoption. This suggests that compatibility and complexity enhance adoption intention by increasing trust in the SHTs. This outcome draws the focus of participants in the SHTs industry to evaluate and adjust the compatibility and complexity of their solutions to enhance consumers' trust and confidence in the technology if they want to accelerate and promote consumers' willingness to adopt the technologies.

Empirical evidence from the study showed a moderating role of trust in the effect of both compatibility and complexity on adoption, indicating that compatibility and complexity promote adoption intention by maximizing trust in SHTs. This result directs the attention of participants in the SHTs business towards assessing and modifying the compatibility and complexity of their solutions. The objective is to improve consumers' trust and confidence in the technology, thereby increasing their inclination to adopt the technology at a faster pace.

V. Limitations, and future studies

A research model was developed and evaluated using the available literature to investigate the main factors that affect the adoption of smart home technologies in Jordan. Examination of survey data obtained from a subset of Jordanian individuals revealed that perceived compatibility, complexity, social impact, familiarity, and technological innovativeness are significant factors influencing the intention to adopt. No statistically significant impact was observed for the perceived security or service quality. Trust was identified as a determinant of the association between compatibility, complexity, and adoption intention.

These results offer valuable guidance for technology suppliers, emphasizing the significance of building user-friendly solutions that are interoperable with other customers' gadgets and devices. Furthermore, providing adequate training and support to end users proves beneficial in familiarizing individuals with the technology and enhancing their willingness to adopt it. Furthermore, promoting the dissemination of individuals' experiences with technology is beneficial.

Similar to other research investigations, this study had a number of limitations. First, this study examined the adoption of various types of SHTs without distinguishing between different technological types. Different categories of technology may attract different demographics. This limitation should be addressed in future studies. Furthermore, this study examined perceived risk and perceived service quality as first-order constructs, while a limited number of studies have analyzed them as second-order constructs and identified varying effects for the individual dimensions of these constructs. Analyzing the two variables as higher-level variables could enhance comprehension at the dimension level. Furthermore, this study was cross-sectional. A longitudinal study would yield a broader understanding of how the correlations among the analyzed variables evolve over time.

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