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The Perception of Smart Home Technology: A Determinant of the Transition Toward the Smart City in Casablanca

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***Abstract*— Over the past three decades, humanity has achieved considerable progress in terms of technological innovations. This transformation has significantly reshaped the urban landscape, offering territorial decision-makers a major opportunity to establish public policies and innovative strategies and benefit from these new solutions.**

Emerging from the opportunities created by the use of Information and Communication Technologies, the concept of the "Smart City" appeared in the early 21st century, with the primary objective of ensuring the sustainable and efficient management of resources while improving the quality of urban life.

To achieve these goals, the concept relies on six essential pillars: smart governance, smart citizens, smart mobility, smart economy, smart environment, and smart living. This paper indeed, focuses on smart living, particularly the Smart Home, and explores how new technologies are perceived by the residents of Casablanca, given that the city has been engaged since 2015 in its "smartization" project known as "Casablanca Smart City."

Adopting a mixed-method approach based on the exploratory sequential design, the main objective is to examine the perception of home automation; while taking into account the personal, social, and environmental challenges that influence the way individuals perceive these complex systems.

***Keywords*— Smart Home, Perception, Smart City, Casablanca Smart City**

I. INTRODUCTION

At the crossroads of global digitization, growing ecological awareness, and developing human roles within society, the "smart home" stands as one of the innovations that contributes to this objective. Considered as the technological fusion between housing and computing, the smart home can be defined as a dwelling whose various components (heating, lighting, security, etc.) can be controlled via applications. It is a home that relies primarily on connected devices and home automation systems.

In addition, a smart home is a residence equipped with ambient intelligence technology that anticipates and responds to the needs of its occupants, optimally managing their comfort and safety through actions upon the home and by establishing connections with the outside world [1]. Its purpose is to provide features related to comfort, security, and energy efficiency. Its rapid expansion has been driven by major advancements in artificial intelligence, the Internet of Things, and task automation.

However, beyond technical functionalities, the success of such systems depends on how individuals perceive and engage with them. This interplay between humans and technology raises relevant questions concerning perceptions and expectations toward these automated domestic environments.

In this context, this study aims to deeply explore the perception of smart home technology, considering the personal, social and environmental factors that shape how individuals view these complex systems. Through an analysis of existing research and emerging trends, we seek to sort out the determinants that influence how

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home automation is perceived by residents of Casablanca, addressing the following central research question: How can households in the city of Casablanca be encouraged to adopt smart technology?

To model the relationships among these various factors, we first conducted an exploratory factor analysis to construct a conceptual model and propose the hypotheses. These hypotheses were verified through confirmatory factor analysis, and the relationships between variables were measured using a multiple linear regression model.

II. Factors Affecting the Perception of Smart Home Technology

Before analyzing the adoption of smart home systems, it is essential to understand the different factors that shape how individuals perceive and evaluate these technologies. These factors can be categorized into personal, social, and environmental dimensions.

A. Personal Factors

At the individual level, perceptions of home automation are influenced by personal expectations, emotional comfort, and the relationship between humans and technology in everyday life.

1) *Enhancement of comfort and well-being:* One of the first benefits highlighted when discussing smart home technology is the notion of well-being. Individuals are increasingly seeking home automation for a simple reason: to feel better in their own homes [2]. It is often assumed that smart home systems generate "an expert comfort that combines both the anticipatory or memory capabilities of any expert system and the possibilities of immediate feedback of a self-regulated system" [3].

However, the notion of comfort is not perceived in the same way by all authors. According to [3] "comfort cannot be reduced to the management of equipment". Reference [2] emphasize that well-being depends on each individual and is sometimes completely independent of technical comfort.

*C*onsequently, discourse regarding "domotic comfort" is not limited to the production or regulation of heat, cold, and lighting [4]. Its argumentation has diversified by presenting applications affecting three different types of comfort: Material comfort; Psychological comfort; Intellectual comfort.

The ambiguous notion of comfort may constitute one of the major arguments for home automation. It encompasses multiple meanings, and by leveraging the diversity of these connotations, the industry seeks to attract its clientele.

2) Time saving: Another widely cited advantage is the ability of smart systems to simplify daily tasks and reduce time spent on domestic management. A frequently encountered argument in literature or online sources regarding smart home technology is time savings. Indeed, according to [3], "the ideology of technological progress presumes that it is measured by its ability to save time. Through the effects of ubiquity and immediacy produced by new means of communication - and which domotic interactivity will generate - such an ideology remains largely dominant in the social imaginary and serves as a common promotional argument for the sale of many technological devices"

3) *Dependence on machines and freedom:* Many authors agree that while new technologies may provide more well-being and freedom, this freedom may amount to a kind of alienation, as we transfer our capabilities to machines. The issue here is central, and many debates have addressed it.

Indeed, according to some, humans may become mere extensions of machines, experience a strong sense of dispossession and enter a dependency relationship with digital technologies. In short, we lose control over them and with it, our freedom.

However, opponents of this view argue that technology exists thanks to human agency, the homo faber who extracts from his environment and creates. Modernity would represent a movement toward liberation from natural constraints, where humans retain power [2]. Reference [5] highlights that humans delegate to computerized systems decisions and actions that relieve them in their daily lives.

4) *Reinforcement of control and security:* Certainly, technological progress has enabled significant savings in time and energy, but we are increasingly monitored and manipulated. According to [3], "surveillance traditionally implied control exercised by a recognized and easily locatable authority, whereas the development of technological networks potentially opens the door to its reappropriation by hidden and non-

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localizable powers." Some technical devices may serve as tools of indirect control. Thus, according to these authors, home automation might facilitate the return of direct control, given its potential for collecting data regarding the intensity and nature of consumption flows.

Beyond providing optimal comfort, smart home technology offers real benefits in terms of safety. With systems such as voice-recognition door locks, motion sensors, cameras, intrusion-alert notifications, remote home monitoring, etc., users can keep an eye on their home both inside and through effective alarm and video surveillance systems controllable through a smartphone or tablet.

This total connectivity allows homeowners to customize and manage their safety remotely. For example, electric shutters or gates can be programmed to close automatically at a given time, reducing risks of oversight or burglary.

B. Social Factors

No one can deny that the ultimate goal of new technologies is to bring individuals closer together and facilitate communication and social connections through their democratization of access and communication channels. Moreover, quality of life is expected to improve, as people will be able to manage their social relationships more effectively.

According to [6], "the individual would be able to weave his or her social universe according to personal preferences, optimize social contacts, and choose the moments to engage with the community." However, a "vulnerable" person might become trapped within their home, risking a loss of physical social interaction. Moreover, even family members sharing the same household may remain isolated from one another if, for instance, each individual engages separately with his/her own screen (multiple TVs, computers, etc.).

C. Environmental Factors

Smart home solutions enable more effective energy management, leading to substantial energy savings. Electricity consumption can be reduced especially in heating and cooling systems, lighting, and operation of appliances (computers, televisions, home appliances, Internet routers…).

With smart heating systems, temperature can be programmed according to occupancy and time of day, preventing energy waste and enabling more efficient use of natural heat sources (e.g., in summer, blinds may automatically lower to maintain indoor coolness).

Home automation also provides total control over the use of electrical devices, enabling significant energy savings. For instance, lighting accounts for 19% of global electricity consumption and about 6% of greenhouse gas emissions [7]. Improved control over lighting systems allows for meaningful reduction in electrical usage.

Electrical appliances on standby also consume energy, contrary to common myth. According to the French Environment and Energy Management Agency (ADEME), standby mode consumes between 300 and 500 kWh per year, amounting to around 11% of a household's electricity bill (excluding heating) in France [8]. Smart home technology proves to be an optimal solution for reducing electrical consumption and achieving energy savings that lower household expenses.

III. METHODS

This study adopts a methodological approach designed to rigorously investigate the research hypotheses and ensure the reliability and consistency of the data collected. The following explains the steps taken to gather, process, and analyze the data.

A. Exploratory Qualitative Study

This study was conducted to complement the list of variables previously identified through the literature review. We chose to carry out semi-structured individual interviews with professionals operating in various sectors involved in the "Casablanca Smart City" project, in order to obtain a global perspective, collect as much information as possible, and clearly understand the subject.

A total of nine interviews were conducted, As the interviews were conducted in French, the original interview guide was provided in its original language. Each interview lasted on average between 20 and 45 minutes. The interviews were subsequently transcribed and subjected to thematic analysis.

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We observed that among the nine participants, only one person did not wish to switch to a smart home, noting that all nine belonged to the same age group (between 25 and 35 years). However, the others appeared somewhat cautious towards new domestic technologies, while not rejecting the idea of change.

The thematic analysis generated a series of items that may influence the perception of the smart home, which are as follows: Socio-professional Category; Infrastructure; Time Saving; Energy Saving; Well-being; Sociability; Dependence; Freedom; Personality; Security; Cost; Health; Age.

B. Research Hypotheses and Conceptual Model

In light of the results of the qualitative analysis and the literature review, we formulated the following hypotheses, which will be tested through the quantitative study:

- **Hypothesis 1:** There is a direct and positive relationship between Behavioral Aspects and the perception of smart home.
- **Hypothesis 2:** There is a direct and positive relationship between Perceived Security and the perception of smart home.
- **Hypothesis 3:** There is a direct and positive relationship between Usage and the perception of smart home.
- **Hypothesis 4:** There is a direct and positive relationship between Perceived Control and the perception of smart home.

Our methodological choice is grounded in Churchill's (1979) paradigm. We followed three main steps for the adaptation of our measurement scale: the definition of the construct, the exploratory phase, and the confirmatory phase. Each of these steps involves a set of procedures that we adapted to the objectives of our research.

C. Sampling and Data Collection

Our study focuses on the factors influencing the perception of home automation among Casablanca residents. Regarding the sample size, (the population is estimated at 3.19 million) we opted for a non-probabilistic approach, specifically convenience sampling combined with voluntary participation. This approach ensures the reliability, honesty, and objectivity of the respondents' perspectives, as they participated willingly in the survey.

A total of 233 responses were collected.

The survey was developed in electronic format in French and shared across various social media platforms. It is composed of four sections:

- The first section helps participants familiarize with the concept and differentiates who have prior experience and knowledge about home automation;
- The second section focuses on the intention to install connected or smart devices;
- The third section addresses behavioral aspects;
- The final section assesses the participants' sociodemographic profile.

The types of questions used include: Multiple-choice questions and Attitude scales.

D. Factor Analysis and Scale Validation

To ensure the construct validity:

- Data are considered factorable if the KMO measure ranges between 0.3 and 0.7;
- An item is deemed to explain sufficient variance when its communality exceeds 0.5;
- For unidimensional factor analysis, the cumulative variance explained by the factors of a construct is considered sufficient when it exceeds 50%;
- An item is considered strongly correlated with a component when its factor loading exceeds 0.7; items moderately correlated with multiple components and not strongly correlated with any single component are removed (Discriminant Validity).

Regarding reliability: A construct is considered reliable when Cronbach's Alpha exceeds 0.6.

E. Data analysis methods

To ensure the validity of the proposed hypotheses, we opted for a multiple linear regression model, which allows for a quantifiable assessment of the impact of several independent variables on a dependent variable.

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To apply this method, we calculated the mean of each construct in order to include them in the analysis. This resulted in the following explanatory variables: Behavioral_Aspects, Perceived_Security, Usage, and Perceived_Control, which were tested against the dependent variable: Perception_Smart_Home.

All statistical analyses, including descriptive statistics and regression tests, were performed using SPSS software.

IV. Results and Discussion

The study's findings are presented, highlighting the factors influencing the perception of smart home technologies. Statistical results, including reliability, validity, and regression analyses, are interpreted in light of existing literature.

A. Reliability and Validity Tests Result

- The KMO indices (0.696; 0.735; 0.665; 0.632) between 0.3 and 0.7, indicating that the data are factorable and supporting the results of this factor analysis.
- All items have communalities above 0.5, and are therefore retained for the subsequent factor analysis.
- The results indicate that the extracted factors explain more than 50% of the variance (73.266%; 78.702%; 75.595%; 67.161%).
- The component matrix shows that all items have factor loadings ≥ 0.7 and are strongly correlated with a single component.
- According to the results of this analysis. all constructs (Behavioral Aspects. Perceived Security. Usage. Perceived Control) are valid.
- Cronbach's alpha for all constructs exceeds 0.6, indicating acceptable reliability.
- Based on these results, all constructs (Behavioral Aspects, Perceived Security, Usage, Perceived Control) are considered reliable.

B. Hypothesis Testing

1) Constructs and Retained Items

Independent Variables

Behavioral Aspects (5-point Likert scale: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

- Based on the description of a smart home, do you imagine using all these features daily?
- After reading the description, do you imagine changing your usual habits or behaviors to use all the smart home features efficiently?
- Based on the description, do you imagine using smart home tools in your daily life at home?

Perceived Security (5-point Likert scale)

- I would feel that my privacy is protected in my smart home.
- I feel secure using connected tools.
- The smart home has adequate security features.

Usage (5-point Likert scale)

- Using smart home features this way will allow me to make many decisions independently.
- I would have significant input on what happens in my living space.
- I would have more control over the functioning of my home.

Perceived Control (5-point Likert scale)

- Regarding smart home technologies, I would feel:
  - Powerless
  - Helpless
  - Aggressive

Dependent Variable: Perception of Smart Home

- How would you rate this experience overall? (5-point Likert scale)

2) Correlation Analysis

All Pearson correlation coefficients are moderate and do not approach ±0.9, indicating no risk of multicollinearity among the explanatory variables. Therefore, the variables measure distinct aspects.

3) Regression Analysis

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- *Using* the "Enter" method in SPSS, all independent variables were included in the regression model.
- The multiple correlation coefficient (R = 0.563) indicates a moderate relationship between the dependent variable (perception of smart home) and the predictors.
- The Durbin-Watson statistic (1.804) is close to the ideal value of 2, suggesting independence of residuals.
- The ANOVA significance is 0.000, which is below the alpha threshold of 0.05, indicating that the model is statistically significant.

The results suggest that Behavioral Aspects, Usage, Perceived Control, and Perceived Security directly influence residents' perception of smart home technologies. The regression model can be expressed as follows:

Perception of Smart Home = 1.619 + 0.047Behavioral Aspects +0.531Usage + 0.006Perceived Control −0.007Perceived Security

Following the results of the quantitative study, we draw the following conclusions:

- **Hypothesis 1 is confirmed:** There exists a direct and positive relationship between Behavioral Aspects and the perception of smart home technology;
- **Hypothesis 2 is rejected:** There exists a direct and negative relationship between Perceived Security and the perception of smart home technology;
- **Hypothesis 3 is confirmed:** There exists a direct and positive relationship between Usage and the perception of smart home technology;
- **Hypothesis 4 is confirmed:** There exists a direct and positive relationship between Perceived Control and the perception of smart home technology.

V. CONCLUSION

Currently, the city of Casablanca, in partnership with various organizations, is attempting through different initiatives to make the city increasingly intelligent and connected. This technological transformation undoubtedly requires strong infrastructure and substantial investment, but above all, the engagement and adherence of citizens.

The results of this study have enabled us to gain a clearer understanding of the smart home concept. We developed a conceptual model that tests the impact of various factors (independent variables) on the perception of smart homes by the citizens of Casablanca (dependent variables). The established findings confirm the influence of these factors on smart home perception and make it possible to answer the overarching research question: "Which factors influence the perception of smart homes among the citizens of Casablanca?" It is now appropriate to synthesize the contributions as well as the limitations and perspectives of this research.

Regarding the theoretical contributions of our research, we contribute to the enrichment of the existing literature, given the scarcity of studies on this topic. Concerning managerial contributions, the findings of this research may be used both by companies, real estate developers, or investors interested in smart home technologies, as well as by those responsible for the Smart City project in Casablanca, with the objective of focusing and investing more in the most essential and impactful factors.

This study faces methodological and conceptual limitations. Methodologically, the quantitative survey relies on a non-representative sample largely composed of students, which does not fully reflect the diversity of Internet users in Casablanca, and responses may be affected by social desirability bias. Conceptually, the model is limited by the small number of variables considered and by focusing on perceived attitudes rather than actual behaviors. These limitations suggest future research directions, including incorporating variables related to the intensity of technology use and testing the model in different contexts, such as across geographic areas or with other technological products.

REFERENCES

[1] Aldrich. F. K. *Smart Homes: Past. Present and Future.* In R. Harper (Ed.). Inside the Smart Home. London: Springer. 2003.

[2] Duss. R.. & Salamolard. L. (2005). *La Domotique: La Maison du Futur.* Anthropologie culturelle et sociale: Recherche. La société.

[3] Amphoux. P.. Jaccoud. C.. & Perrinjaquet. R. (1989). *Dictionnaire critique de la domotique.* Lausanne: EPFL.

ISSN: 2961-6611

Proceedings of Book Series PBS - Vol 30, pp.66-73 **Emerging Approaches in Modern Business**

[4] Amphoux. P. (1990). *Vers une théorie des trois conforts.* Annuaire 90. Département d'architecture de l'EPFL. 27–30. https://hal.archives-ouvertes.fr/hal-01561140
[5] Rigaut. P. (2001). *Au-delà du virtuel : exploration sociologique de la cyberculture.* Paris: l'Harmattan.
[6] Berthoud. G.. Ischy. F.. & Simioni. O. (2002). *La société de l'information : la nouvelle frontière ?* Lausanne: Institut d'anthropologie et de sociologie.
[7] https://www.syndicat-eclairage.com/presentation/les-chiffres-clefs/
[8] https://ekwateur.fr/blog/ma-consommation-d-energie/appareils-electriques-en-veille-eteint-consomment-beaucoup/

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