

The Acceptance of Smart Home Technologies: A Literature Review of Benefits and Barriers Perceived by Users

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ABSTRACT

The advancement of home automation technologies allowed the integration of systems for smart home implementation in the civil construction sector. However, the smart home's dissemination depends on factors that can enhance or hinder users' acceptance of smart home technologies. The article aims to identify the benefits and barriers users perceive that can interfere with implementing smart home technologies. The methodology utilized a systematic literature review using 122 articles in journals indexed in Scopus, Web of Science, Science Direct, IEEE, and Scielo scientific databases to gather barriers and benefits to smart home implementation. The literature mentions the benefits in the environmental, financial, and psychological categories as the main factors that potentiate the dissemination of smart home technologies. On the other hand, the barriers classified into the technological, ethical, and human categories have the major effect of hindering smart home implementation.

Keywords: Benefits, Barriers, Smart home technologies, Adoption, Acceptance

INTRODUCTION

Transforming traditional products and services into smart ones triggers technologies that allow communication among devices and other systems (Gram-Hanssen & Darby, 2018). Such technologies enabled the emergence of smart homes, which became central themes in recent discussions on technology, politics, and innovation (Furszyfer Del Rio et al., 2020). Moreover, the smart home system has been

reaching new markets recently due to increased digital resource availability (Guhr et al., 2020) or the improvement in resident comfort and quality of life (Liu, 2021).

Smart homes are a broad and relevant research topic with different subjects, research gaps, and emerging benefits, but also challenges for all participants in the smart home market (Guhr et al., 2020). Over time, all homes will have some automation, such as the temperature, lighting, and air humidity monitoring items (Shah & Mishra, 2016), items for controlling the individual opening and closing of windows (Kim et al., 2014), security system items (Bhatt & Verma, 2015), alarm, temperature, schedule, and lighting management items (Lee et al., 2014), comfort items related to appliance integration (Ghaffarianhoseini et al., 2013), thermal comfort items (Daum et al., 2011), and energy management item such as smart meters (Fettermann et al., 2021; Gumz & Fettermann, 2023). In addition, integrating these types of automation configures the network of connections necessary to characterize a smart home (Marikyan et al., 2019).

The success of implementing a smart home and its full use tends to present high complexity (Fettermann et al., 2020; Furszyfer Del Rio et al., 2020). The literature mentions various factors for users' acceptance of smart home technology (Dong et al., 2017; Guhr et al., 2020; Gumz & Fettermann, 2021; ; Gumz et al., 2022; Marikyan et al., 2019). Just as for other products, for the smart home market to fully develop, it is relevant to understand the preferences and needs of customers (de Campos et al., 2021; Echeveste et al., 2017; Fettermann et al., 2017; Peña-Montoya et al., 2020). This paper seeks to answer the following question:

What factors interfere with users' acceptance of smart home technology? From this question, this paper aims to identify the benefits promoted by smart homes and the barriers to the smart home adoption process. This work is structured in six sections. The first is this introduction to the theme, presenting the article's objective. The second section presents concepts and approaches to smart homes that have been discussed in the literature. The third section presents how the systematic literature review procedures were carried out (Kitchenham, 2004) to gather information from the literature. The results are divided into two parts, shown in this paper's fourth and fifth sections. A quantitative analysis of the study portfolio is carried out in the fourth section. Finally, the following section discusses the benefits of smart homes and the barriers to adopting them, both identified in the study portfolio.

THEORETICAL BACKGROUND

Review of Smart Home Approaches

The literature has reported various definitions to characterize a smart home (Marikyan et al., 2019). The definition that stands out defines smart homes as residences equipped with a high-technology network connecting sensors, domestic devices,

appliances, and resources that may be monitored, accessed, or controlled remotely and provide services that respond to the needs of the residents (Balta-Ozkan et al., 2013b). This definition emphasizes technology as the main characteristic of smart homes and that, through such technology, it is possible to meet user needs. However, some authors define smart homes as domestic environments that meet the needs of senior citizens and vulnerable users at a reasonable cost (Chan et al., 2008). In addition, this definition emphasizes the possibility of smart homes providing health care to their users. Following this same line of more specific definitions, other authors have emphasized different residence, population, or technology characteristics to define a smart home. The literature also brings other definitions to smart homes, such as focused on energy management (Schieweck et al., 2018), focused on the user's quality of life (Pal et al., 2018), services to support, assist, and monitor domestic activities (Friedewald et al., 2005), and user expectations regarding intelligent appliances (Coskun et al., 2018), among others.

Categories of Smart Home Approaches

Upon analyzing these different smart home definitions presented in the literature, (Marikyan et al., 2019) identified patterns among such definitions. These patterns allowed for the characterization of four categories of approaches to smart home definitions: (i) generalist approach, (ii) technological approach, (iii) service approach, and (iv) user needs approach.

The generalist approach is typically used by studies that present a systematic review of the literature on the smart home theme or studies with a theoretical context about the theme (Chan et al., 2008; Edwards & Grinter, 2001; Friedewald et al., 2005; Mocrii et al., 2018; Nascimento et al., 2022b). A more recent concept for smart homes reports smart homes as intelligent devices and sensors integrated into an intelligent system, offering management, monitoring, support, and response services and encompassing a range of economic, social, health-related, emotional, sustainability, and security benefits (Marikyan et al., 2019). This article uses the concept proposed by Marikyan et al. (2019) due to its broad and comprehensive vision of smart home technologies. This concept proves comprehensive, including, beyond the technological characteristics, financial, psychological, and health-related characteristics.

The technological approach covers studies on technological automation capacity through integrated systems, sensors, and objects (Chan et al., 2008; Coskun et al., 2018; Park et al., 2014). The definition of smart homes as one of the areas of the Internet of Things (IoT) in which physical devices provide electronic connectivity among sensors, software, and the network within a home (Alaa et al., 2017), represents a technological approach to smart homes to study IoT applications.

The services approach represents the types of services that smart homes may offer, emphasizing characteristics such as energy management, control and monitoring of smart home objects, support and assistance for activities in the residences, and scenario anticipation and feedback supporting users to make decisions (Chan et al., 2009; Ehrenhard et al., 2014; Sanguinetti et al., 2018; Wilson et al., 2015). Defining a smart home as a set of technologies that, through services, provide network environments oriented towards the human being, connecting equipment and applications in a home (Park et al., 2014), the authors use the services approach to identify the decisive factors in the process of adopting smart homes.

The approach regarding user needs presents a group of definitions that stimulate the potential of smart home services. This approach aims to offer and improve user comfort by promoting quality of life, health care, security, user emotional state, efficient cost for users, and sustainability as a user's way of living (Arthanat et al., 2020; Mehrabian et al., 2015; Mocrii et al., 2018; Nascimento et al., 2022a). The design of a smart home must overcome the physical environment for residents to be safe. It must be a place where an intelligent technological system operates to satisfy people's desires for comfort, security, pleasure, and happiness (Eom & Paek, 2006). This definition presented an approach aimed toward user needs and was applied in a study analyzing the acceptance by users of digital residential services (Eom & Paek, 2006).

Beyond the approaches among the different smart home definitions, an analysis was carried out to overview the literature on the smart home adoption theme. Furthermore, other studies have mentioned the residential automation trend as a growing phenomenon of the management of communication technologies in habitational constructions (Bhatt & Verma, 2015), with this residential automation being presented as a technological option in terms of communication and information for the evolution of smart home development (Ghaffarianhoseini et al., 2013) and a clear manifestation in residential construction through computing (Lee et al., 2014).

Most of the literature about smart homes focuses on some smart home characteristics, such as the technology (Kim et al., 2017; Maswadi et al., 2020), residential objects or items (Nicholls & Strengers, 2019; Xu et al., 2015), energy systems (Ji & Chan, 2019; Sanguinetti et al., 2018), and health care (Birchley et al., 2017; Lee & Kim, 2020). A smaller and more recent portion of the literature has analyzed smart homes from the user perspective (Shin et al., 2018; Shuhaiber & Mashal, 2019). Furthermore, few theoretical studies are presented that discuss the benefits (Sovacool & Furszyfer Del Rio, 2020), barriers (Balta-Ozkan et al., 2013a), and services (Yang et al., 2017) of smart homes or investigate the factors related to smart home acceptance (Mamonov & Benbunan-Fich, 2020). Hence, the literature reveals that users'

acceptance of smart homes is a recent and developing theme that allows its unfolding into various areas of science, including engineering.

RESEARCH METHODOLOGY

Systematic reviews have been used to identify studies addressing smart home adoption (Chan et al., 2009; Marikyan et al., 2019; Sepasgozar et al., 2020). This systematic literature review used the procedure proposed by (Kitchenham, 2004) for mapping the state-of-the-art about users' acceptance of smart homes. The method proposed by Kitchenham (2004) was initially developed in Systems Engineering but presents a disseminated application in other areas of engineering, such as project management (Musawir et al., 2020), industrial engineering (Fettermann & Echeveste, 2014; Kang et al., 2020; Silva et al., 2020), and artificial intelligence (Spolaôr et al., 2020). The systematic review process proposed by (Kitchenham, 2004) consists of three main phases: planning the review, conducting the search, and reporting on the review.

The review planning phase presents the review protocol. First, a sample of literature reviews about smart homes (e.g., Balta-Ozkan et al., 2013a; Kim et al., 2017; Marikyan et al., 2019; Sanguinetti et al., 2018; Shin et al., 2018; Shuhaiber & Mashal, 2019) raised a list of keywords often used in the literature. This first search also revealed two thematic axes for the keywords: "smart home" and "user." Thus, the search utilized the following keywords for each axis: (1) smart home - Smart home; Smart house; Intelligent home; Intelligent house; (2) user - adopt*; accept*. The databases used for the search were Scopus, Web of Science, Science Direct, IEEE, and Scielo. Table 1 displays the search strategy and the keyword combinations utilized.

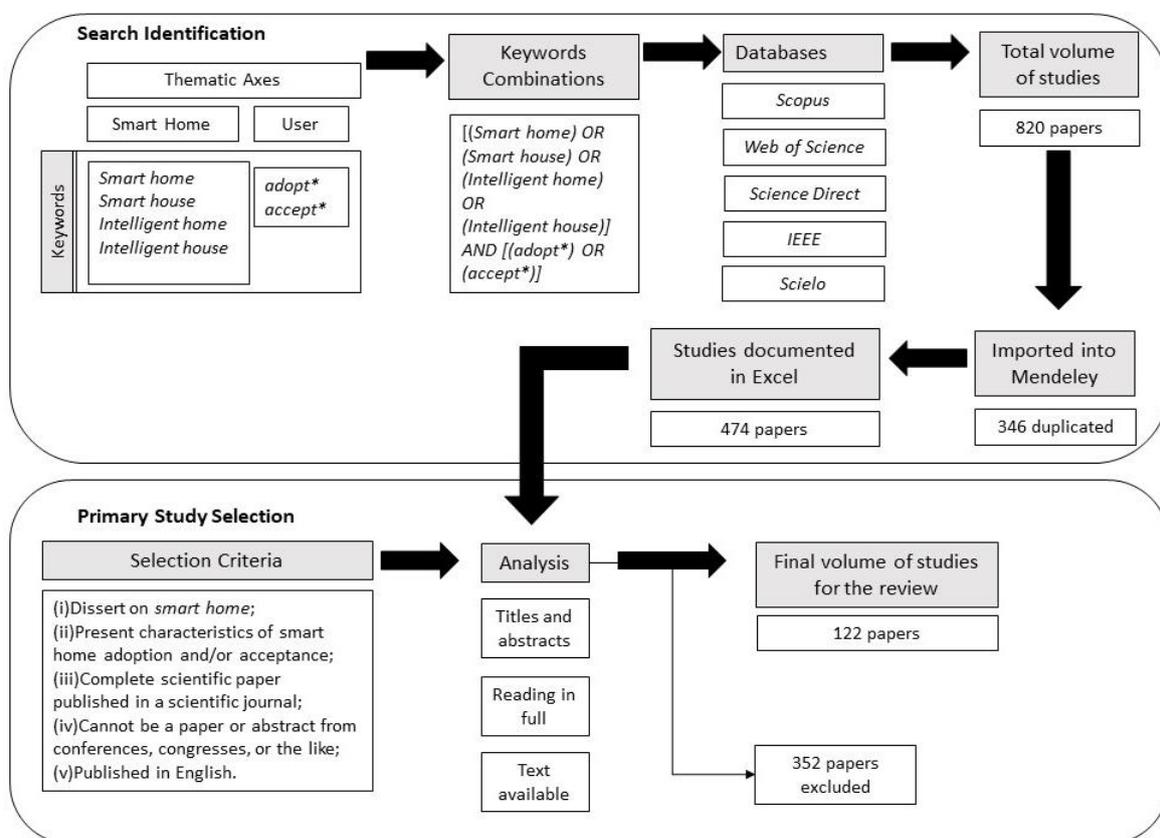
Table 1 Strategy for Searching the Databases

| | Thematic Axes | | Combinations | Database |
|----------|--------------------------|----------------|---|----------------|
| | Smart Home | User | | |
| Keywords | <i>Smart home</i> | <i>Adopt*</i> | (“ <i>Smart home</i> ” OR “ <i>Smart house</i> ” OR “ <i>Intelligent home</i> ” OR “ <i>Intelligent house</i> ”) AND (“ <i>adopt*</i> ” OR “ <i>accept*</i> ”) | Scopus |
| | <i>Smart house</i> | <i>Accept*</i> | | Web of Science |
| | <i>Intelligent home</i> | | | IEEE |
| | <i>Intelligent house</i> | | | Scielo |

After the definitions of keywords (Table 1), the method utilized the following inclusion and exclusion criteria to include papers in the portfolio of studies: (i) the study had to address the smart home theme; (ii) the study had to present characteristics or factors pertinent to the adoption and/or acceptance of smart homes; (iii) the study had to be a complete scientific paper published in a peer-reviewed scientific journal; (iv) the study could not be a paper or abstract published in conferences, congresses, or the

like; (v) the study had to be published in English in journals indexed in the Scopus, Web of Science, and Science Direct databases. The search also included the Scielo and IEEE databases. The Scielo database indexes many Latin American journals, and IEEE covers many journals on electric and electronic subjects essential to smart home technologies. Once the review protocol was defined, a search was conducted in August 2020, returning 820 papers. A sample of fifty studies was analyzed, and the studies presented good adherence to the investigation, validating the keywords proposed. The search conduction phase reports the procedures used to identify the search, select the primary studies, and extract, monitor, and synthesize data, as shown in Figure 1.

Figure 1 Search Conduction Phase of the Review Process



The search with the keywords and terms utilized the fields of title, abstract, and keywords of the papers published in the databases, considering only publications in scientific journals until 2020. The search returned 820 documents that were imported into Mendeley®. In order to obtain 474 papers, the software directly excluded 346 duplicate publications and publications from conferences, books, and book chapters. The information on the 474 papers was exported to an electronic spreadsheet (Excel®) to control the next steps' execution. The selection criteria defined in the review protocol were used to analyze the titles, abstracts, and full texts. After this analysis, 351 papers

were excluded for not meeting the criteria; therefore, 122 articles were included in the final portfolio of studies for developing the review. The papers that did not meet the criteria in the protocol of the planning process for this review were considered out of scope, i.e., all articles that did not address the adoption or acceptance of smart homes in their contents were excluded. An electronic spreadsheet was elaborated in Excel® as a form to store the information obtained through reading the papers. Hence, it is possible to synthesize the data, the next activity of the systematic review, and provide the required information for the bibliometric and content analyses.

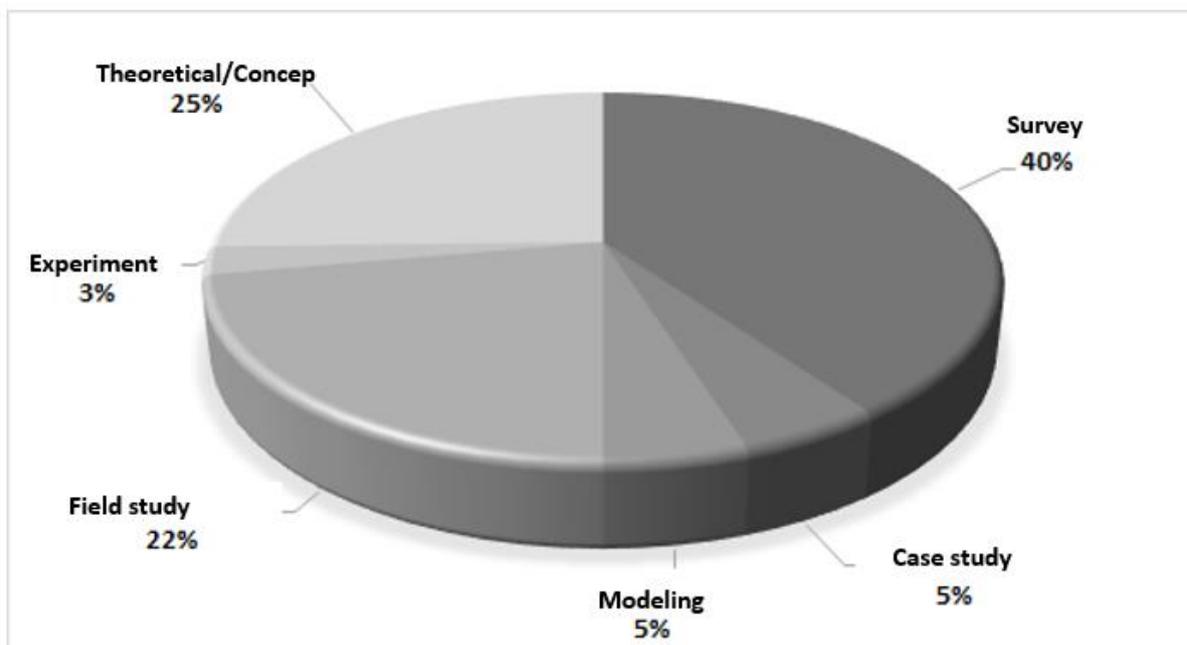
The literature review results are organized into two sections in the review reporting phase. The first section presents a quantitative synthesis of the literature on the theme, denominated a bibliometric analysis, in which various variables were considered, such as research institutions, journals, and countries of the studies. The second section presents a report and qualitative analysis of the content presented in the 122 papers integrated into this review based on the characteristics of such papers.

RESULTS AND ANALYSIS

Quantitative Analysis

The study portfolio comprises 122 papers, of which 31 are theoretical studies presented through a systematic review or conceptual model, and the other 91 are empirical. Remarkable research by Filippini (1997) compiles the research methods used in operations management. Through the typology of research methods proposed by Filippini (1997), Figure 2 presents the distribution of the research methods used in the smart home literature.

Figure 2 *Research Methods Utilized in the Portfolio of Articles about Smart Home*



The portfolio is also analyzed according to the distribution frequency of the journals in which the papers were published. Figure 3 displays the distribution of the 122 articles in the portfolio among the journals.

Figure 3 *More Frequent Journals in the Portfolio of Articles about Smart Home*

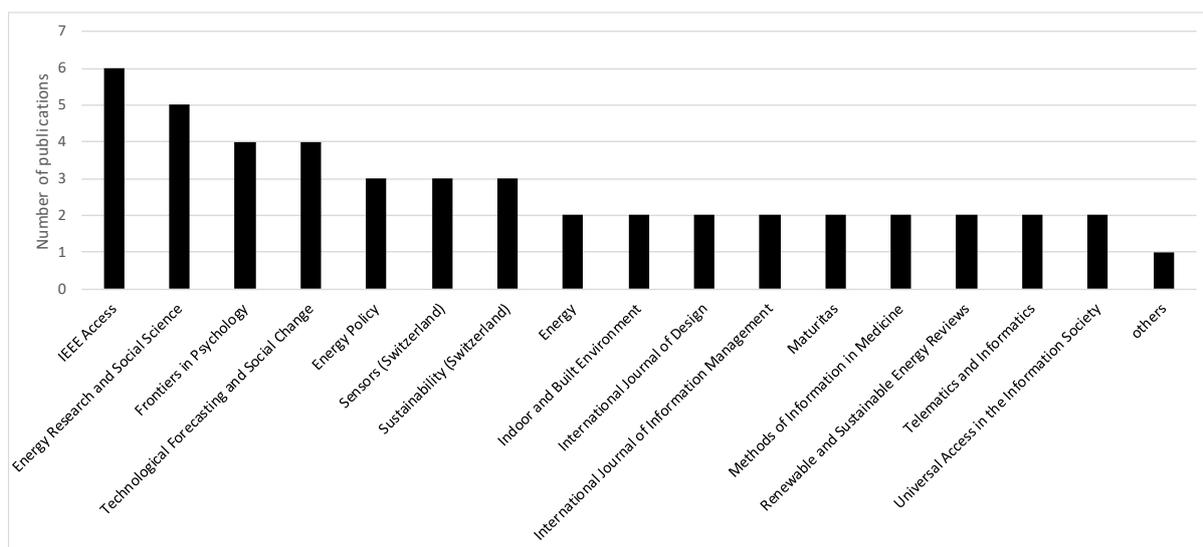


Table 2 reveals that the research theme is multidisciplinary as a result of the variety of fields covered by the journals, such as Engineering, Energy, Social Sciences, Psychology, Business, Management and Accounting, Environmental Science, Physics,

Electrical Engineering, Mathematics, Medicine, Health professions, and Computer Science (Table 2). Of the 91 journals with published papers in the portfolio, 75 present only one article in the bibliometric analysis. The journals with the highest frequencies represent less than 20% of the identified. The Energy and Social Sciences fields have the highest number of journals, with three each. Engineering stands out for the highest absolute frequency in the IEEE Access journal. In this last journal, it was possible to find studies that presented systematic literature reviews on monitoring technologies in smart homes based on the Internet of Things (IoT) (Maswadi et al., 2020).

Another result of the bibliometric analysis is related to the location of the researchers and the places where the empirical studies about the research theme were carried out. Table 3 displays the distribution of the research institutions of the authors in the portfolio among 34 countries on five continents. Some papers were elaborated in partnership with more than one author from different institutions, with such institutions often being located in other countries. The numbers in Table 3 consider the host institutions of each author in the articles.

Table 2 *Characteristics of the Journals Identified in the Search and Classification according to the Scopus Database*

| Journal | Absolute frequency | Area(s) | SJR |
|--|---------------------------|---------------------------------------|------------|
| <i>IEEE Access</i> | 6 | Engineering | 0.775 |
| <i>Energy Research and Social Science</i> | 5 | Energy and Social Sciences | 2.205 |
| <i>Frontiers in Psychology</i> | 4 | Psychology | 0.914 |
| <i>Technological Forecasting and Social Change</i> | 4 | Business, Management, and Accounting | 1.815 |
| <i>Energy Policy</i> | 3 | Energy and Environmental Science | 2.168 |
| <i>Sensors</i> | 3 | Physics and Electric Engineering | 0.653 |
| <i>Sustainability</i> | 3 | Social Sciences | 0.581 |
| <i>Energy</i> | 2 | Mathematics and Environmental Science | 2.166 |
| <i>Indoor and Built Environment</i> | 2 | Medicine | 0.43 |
| <i>International Journal of Design</i> | 2 | Business, Management, and Accounting | 0.72 |
| <i>International Journal of Information Management</i> | 2 | Social Sciences | 2.881 |
| <i>Journal of Applied Gerontology</i> | 2 | Medicine | 0.898 |
| <i>Maturitas</i> | 2 | Medicine | 1.189 |
| <i>Methods of Information in Medicine</i> | 2 | Health professions | 0.588 |
| <i>Renewable and Sustainable Energy Reviews</i> | 2 | Energy | 3.632 |
| <i>Telematics and Informatics</i> | 2 | Computer Science | 1.441 |
| <i>Universal Access in the Information Society</i> | 2 | Computer Science | 0.486 |

Table 3 *Countries and Continents of the Authors' Institutions*

| Continent | Country | No. of papers | Frequency |
|-----------------|----------------------|---------------|-----------|
| Europe (40.1%) | UK | 19 | 11.7% |
| | Germany | 9 | 5.6% |
| | Italy | 6 | 3.7% |
| | France | 6 | 3.7% |
| | Finland | 4 | 2.5% |
| | Sweden | 4 | 2.5% |
| | The Netherlands | 4 | 2.5% |
| | Spain | 2 | 1.2% |
| | Czech Republic | 2 | 1.2% |
| | Denmark | 2 | 1.2% |
| | Austria | 2 | 1.2% |
| | Poland | 2 | 1.2% |
| | Slovenia | 1 | 0.6% |
| | Bulgaria | 1 | 0.6% |
| | Greece | 1 | 0.6% |
| Asia (33.3%) | Korea | 16 | 9.9% |
| | China | 8 | 4.9% |
| | Malaysia | 4 | 2.5% |
| | Taiwan | 4 | 2.5% |
| | Thailand | 4 | 2.5% |
| | Jordan | 3 | 1.9% |
| | Japan | 2 | 1.2% |
| | Iran | 2 | 1.2% |
| | Turkey | 2 | 1.2% |
| | United Arab Emirates | 2 | 1.2% |
| | Singapore | 2 | 1.2% |
| | Israel | 2 | 1.2% |
| | Saudi Arabia | 2 | 1.2% |
| | India | 1 | 0.6% |
| America (20.4%) | USA | 27 | 16.7% |
| | Canada | 4 | 2.5% |
| | Brazil | 2 | 1.2% |
| Oceania (6%) | Australia | 9 | 5.6% |
| Africa (1%) | Morocco | 1 | 0.6% |

Europe has the most outstanding expressiveness, corresponding to 40.1% of the authors' host institutions in the papers in this portfolio. Among the various countries, the United Kingdom is the host country with the most significant number of papers, representing 11.7% of the total. The Asian continent also has representation as the host of the researchers on the theme, reaching 33.3% of the host research institutions of the researchers. Despite being a continent with fewer studies on the theme relative to Europe and Asia, America has the most significant representative, the United States, with 16.7% of the studies on the theme in the portfolio.

Qualitative Analysis

The results achieved in this paper are presented through a qualitative analysis of the study portfolio. This content analysis allowed for the identification of the factors perceived by users as contributing to their acceptance of smart home technologies.

Perceived Benefits

The literature has presented factors that lead to users' acceptance of smart homes. Part of such factors has been discussed in the literature as potential and perceived benefits that smart homes may offer as advantages to users (Friedewald et al., 2005). The benefits provided by smart homes can also be divided into four different groups: (i) environmental benefits; (ii) financial benefits; (iii) psychological benefits; and (iv) health-related benefits (Marikyan et al., 2019).

The environmental benefits that smart homes promote to users may be classified as short- or long-term. Among the short-term environmental benefits, energy use reduction, feedback on energy consumption, and suggestions on how to use energy efficiently in a home were mentioned (Bhati et al., 2017; Nilsson et al., 2018). Long-term environmental benefits include environmental sustainability and carbon emission reduction (Kerber et al., 2023; Schill et al., 2019).

The financial benefits enable obtaining lower expenses with routine home activities and access to health due to lower costs with virtual medical consults or promoting sustainable consumption (Rajagopal et al., 2019; Schieweck et al., 2018).

Among the psychological benefits, the possibility of promoting entertainment, allowing virtual interactions, creating well-being, and improving people's comfort at home was mentioned (Yang et al., 2017).

Relative to the health-related benefits, one may mention the greater accessibility and availability of home care, the security that the user may have at home, the social connection and communication with the environment outside the home, the possibility of detecting life-threatening events, the reduction of medical errors, and the well-being of aging and vulnerable people (Courtney, 2008; Rialle et al., 2008).

In light of this approach to the benefits that smart homes may offer users, through the four benefit groups proposed in the literature (Marikyan et al., 2019), this work reports the frequency with which the benefits are presented in the studies that compose the portfolio of this review (Table 4). In addition, this analysis observed that the same paper might offer more than one type of benefit.

Table 4 *Potential Benefits and Those Perceived by Users in the Adoption of Smart Homes*

| Benefits | Frequency in the literature | Advantages | Frequency in the literature |
|---------------|-----------------------------|--|-----------------------------|
| Health | 62 | Accessibility and availability of care | 23 |
| | | User security | 33 |
| | | Social connectivity and communication | 17 |
| | | Life-threatening event detection | 7 |
| | | Medical error reduction | 12 |
| | | Well-being of aging and vulnerable people | 22 |
| Environmental | 45 | Energy use reduction | 31 |
| | | Feedback on consumption | 18 |
| | | Suggestions on how to use energy efficiently | 15 |
| | | Environmental sustainability | 14 |
| | | Carbon emissions reduction | 3 |
| Financial | 21 | Lower virtual consult costs | 11 |
| | | Healthcare accessibility | 12 |
| | | Sustainable consumption | 1 |
| Psychological | 55 | Entertainment | 21 |
| | | Virtual interaction | 6 |
| | | Overcoming the feeling of isolation | 4 |
| | | Well-being and comfort | 30 |
| | | Social inclusion | 12 |
| | | Labor saving | 6 |
| | | Home office | 1 |

Barriers to Smart Home Adoption

The adoption by users and diffusion on the smart homes market has presented slowly, despite the potential benefits offered (Balta-Ozkan et al., 2013b). Moreover, the better acceptance of smart homes depends on some factors (Guhr et al., 2020) that are the

possible barriers that may hamper the implementation of smart homes (Marikyan et al., 2019).

The recent literature on smart homes from the user perspective indicates that the main barriers to the adoption of smart homes may be categorized as follows: (i) technological; (ii) financial, ethical, and legal; (iii) related to the lack of knowledge and psychological resistance (Marikyan et al., 2019). Table 5 displays the barriers identified in the study portfolio's papers. This work utilized the categorization of barriers to adopting smart homes proposed by Marikyan et al. (2019) to analyze the portfolios' studies. The technological barrier group includes security, usability, invasion of privacy, reliability, complexity, and interoperability. Technology suitability has been considered one of the essential factors in developing smart homes (Balta-Ozkan et al., 2013a). Some studies on smart home adoption have increased the focus on technology resources that may represent threats to users and influence the perception of the technology in the adoption process (Heinz et al., 2013).

Table 5 *Barriers to Adopting Smart Homes*

| Barriers | Frequency in the literature | Factors | Frequency in the literature |
|--|-----------------------------|--|-----------------------------|
| Technological | 72 | Security | 36 |
| | | Usability | 22 |
| | | Invasion of privacy | 48 |
| | | Reliability | 22 |
| | | Complexity (Interoperability) | 24 |
| | | Technological transition | 6 |
| Financial, ethical, and legal | 43 | Price | 16 |
| | | Installation cost | 16 |
| | | Repair and maintenance cost | 9 |
| | | Concern with undue use of private data | 24 |
| | | Senior citizen and patient consent | 6 |
| | | Lack of legal conduct | 6 |
| | | Regulatory conflicts | 8 |
| Knowledge gap and psychological resistance | 23 | Human barrier | 13 |
| | | Resistance to the use of innovative technology | 5 |
| | | Lack of prior knowledge or experience | 8 |
| | | Social beliefs | 5 |

Another group of barriers analyzed in this work involves financial, ethical, and legal factors. The financial barriers are related to the technology's price and the installation, repair, and maintenance costs, which may demotivate users to adopt smart homes (Balta-Ozkan et al., 2014; Mamonov & Koufaris, 2020). The ethical barriers are related to the data security and privacy factor due to the ability of smart homes to collect and store private data on their users (Jacobsson et al., 2016; Yang et al., 2017). Finally, the barriers related to the legislation refer to a lack of conduct or laws regulating the use of technology in smart homes (Wong & Leung, 2016).

The last barrier group depicts smart home users' lack of prior knowledge and psychological resistance. Since smart home technologies are emerging, users must be fully aware of their functions and potential risks and benefits (Marikyan et al., 2019). As a result of the low perception of the utility, the users feel a loss of control over the technology, i.e., a loss of control of one's own home, which may generate resistance to accepting smart homes (Schieweck et al., 2018). The lack of prior knowledge of smart home technologies may hamper the diffusion of smart homes on the market, as shown in the studies by (Meeks et al., 1992; Tonkin et al., 2018).

Final Considerations

To determine the advantages of smart homes and the obstacles to their adoption, this paper used a systematic literature review based on the method proposed by Kitchenham (2004).

The health-related benefits have been the most frequently mentioned in the literature. Such benefits present the possibility of monitoring smart home users, such as senior citizens, through motion sensors and cameras, among other technologies. This monitoring enables fast communication with relatives or physicians when necessary or generates a data history that allows a more assertive diagnosis of possible diseases. The environmental benefits have been among the most motivating for users concerned with the environment and sustainability because smart homes make it possible to manage the home's energy by controlling the use of domestic appliances so as to avoid waste and obtain more efficient use of the home's energy,

The results showed that technological barriers determine the smart home adoption process. The complexity of the technology may be a decisive factor in the perception of usability by the user. Another issue associated with technology is security, i.e., the concern of users relative to invasion of privacy and data theft.

The article also presents contributions to the academic environment and practical applications. For academia, this article adds to the current literature through a systematic literature review, a discussion on the acceptance of smart homes by users, and identifying the benefits of smart homes and the barriers to their adoption. For

practical applications, the companies related to smart home technologies, be they construction, information technology, or automation companies, among others, may obtain, in this work, strategic guidance to gain potential customers as future smart home users. The article provides a reliable background on the benefits and barriers faced during smart home implementation. However, each smart home implementations case could have different barriers and benefits. Thus, analyzing specific smart home implementation is a valuable topic suggestion for future research.

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