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Article

The Finnish Professional Housing Market Operators' Attitudes towards Smartness—Bridging the Gap between Practitioners and Smart Building Experts

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Abstract: The real estate sector is undergoing a significant transformation. The global energy transition has greatly impacted the entire energy infrastructure, forcing the energy-consuming property sector to increase its operational efficiency. Today, the European Union (EU) enhances building smartness in real estate through regulation. However, the attitudes towards smartness in the financially significant housing market remain unclear. This study observed the attitudes and readiness of Finnish housing market operators toward smartness at the end of 2022. In total, 13 semi-structured interviews were held with housing market professionals. The analysis was further supported by categorizing the interviewees into novice practitioners and smart building experts. The research results implied that the attitudes towards smartness among novice practitioners, including real estate investors and owners, are still rather reserved compared to the control group (consisting of smart building experts). However, enhancing the attitude of real estate investors and owners is crucial to ensure a successful smart transition towards carbon neutrality in the built environment. The results of this study highlight the need for a standardized metric for building smartness. However, engaging market practitioners in developing such metrics is essential to ensure that the future standard for smartness answers the market's needs.

Keywords: building smartness; attitude towards smartness; housing market; real estate operators; smart readiness indicator; smart transition



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1. Introduction

The real estate sector is the world's largest asset class [1]. The sector is currently experiencing its most profound transformation in decades, primarily influenced by the ongoing energy crisis [2]. In particular, decarbonization targets drive structural changes in the energy system, where the building sector is one of the greatest energy consumers. Buildings alone are responsible for roughly 40% of the final energy consumption, accounting for one-third of all greenhouse gas emissions globally [3]. At the same time, in Europe, nearly 75% of the building stock is energy inefficient [4]. Thus, buildings' in-use performance must be improved while enabling buildings' participation in the energy markets to further support the larger uptake of renewables in the energy system. Such operations, where buildings are equipped with technologies that enable them to act as active energy market participants, are often called smart.

Buildings' role in the European energy markets has gained a lot of interest in recent years. Several programs, initiatives, and laws highlighting the importance of buildings in achieving carbon neutrality targets have been implemented. For instance, the European Union (EU) published the Green Deal in 2019, a roadmap and overarching vision for Europe to become climate-neutral by 2050 [5]. In this agreement, the relevance of new technologies in promoting efficient energy use is especially highlighted. Other initiatives highlighting the role of information and communication technologies (ICT) include the Fit for 55 legislative package [6] and the Renovation Wave initiative [7], both of which aim

to encourage energy improvements in the existing building stock. In the future's society, energy and smartness are intrinsically linked.

Despite the recent policies to engage buildings' role in the energy markets, the adaptation of smart technologies in the real estate sector has remained gradual. At its best, smartness in buildings provides many benefits for society, the buildings themselves, and their users. For society, the benefits include more secured energy distribution (enabled by demand-side management technologies) supporting carbon-neutral targets [6,7]. On a building level, smartness facilitates energy savings, enhances the fault detection of operational systems, reduces energy waste, and improves safety in buildings [8–10]. Finally, the occupants benefit from improved comfort and convenience, which enhances their health and well-being [8,9,11].

Today, real estate owners and investors are especially interested in the added value resulting from more secured energy distribution, enhanced operational performance, and improved customer experience, positively affecting the real estate's market value [12]. Thus, monetary benefits, such as reduced maintenance costs, improved return on investment, and competitiveness, are benefits associated with smartness [9,12]. However, real estate owners' motives to fully support the smart transition in real estate have remained unclear. For instance, the operational risks associated with smart technologies might result in demotivation [13]. Furthermore, studies showing increased electricity prices after the uptake of smarter building operations might also negatively impact real estate owners' will to invest in smartness [14]. Also, investments above the minimum requirements seem less popular in today's society.

The potential of smartness, especially in the housing markets, has attracted much interest in recent years. Recent studies have highlighted the relevance of understanding occupants' needs in moving towards smarter housing markets [15,16]. Especially from the real estate market perspective, occupants' satisfaction is the most important asset for the owners and investors. Customer satisfaction leads to decreased vacancy rates in the housing markets and decreased operational costs, as discussed by Felius et al. [17]. However, real estate operators' motives to increase smartness in the housing markets seem to be a less studied topic. Thus, this study contributes to the existing literature by increasing the market understanding of the housing operators' attitudes and readiness to enhance smartness in buildings in a highly digitalized society, i.e., Finland.

The main aim of this study is to increase the understanding of the Finnish housing market operators' attitudes towards smartness. As a secondary aim, this study observes the readiness of the operators to deploy smartness in their daily businesses. The study answers the research questions by constructing a smartness theory frame based on the widely acknowledged smart readiness indicator (SRI) scheme [7]. The empirical section consists of 13 revealing interviews with major Finnish real estate market professionals. For this study, the interviewees were further categorized into two subgroups based on their expertise in smartness. The first subgroup, i.e., novice practitioners, consists of major real estate owners and developers (7/13) operating in the Finnish housing market. The interviewed novice practitioners represented the views of professional real estate owners and developers, covering more than 60% of the Finnish housing market. The second subgroup, i.e., experienced smart building experts, consists of building automation system (BAS) specialists (4/13) and officials with smart building responsibilities (2/13). For the validity of the study, it is also important to notice that Finland is ranked as the leading country in digitalization in the EU, being also one of the ICT forerunners globally [18,19].

The authors used a three-step scale (i.e., low, moderate, and high) to interpret the operators' attitudes toward smartness from the analyzed data. The study results imply that the interviewees' interest in smartness and understanding its benefits are high or moderate (reflecting a generally positive attitude towards smartness). However, the readiness to measure smartness in buildings (and to capture the benefits in the value chain) remains low or moderate, especially among the novice practitioner subgroup (consisting of real estate owners and developers). The study results imply that the readiness to implement

smartness in the Finnish housing markets could be enhanced by introducing a conceptualized smartness theory frame, such as the SRI rating scheme. A clear concept would allow real estate owners to capitalize on smartness, positively impacting the smart transition in Europe.

The paper is divided into five sections. The second section presents the study's method, covering the theoretical framework for smartness, selection of the interviewees, data collection, and data analysis. The third section introduces the results, and the fourth section presents the discussion. The fifth section concludes the paper.

2. Research Method

This study aimed to increase the understanding of attitudes toward smartness in the Finnish housing market. Today, the phenomenon of smartness in real estate is widely researched. However, there is much uncertainty related to the underlying conceptions in the field, especially from the housing market perspective. This study analyzed data from semi-structured interviews to obtain insights into the sector operators' attitudes and readiness to deploy smartness in their daily business. The authors utilized the EU-driven SRI rating scheme as the study's theoretical frame for smartness.

2.1. Theoretical Framework for Smartness in Buildings

This study utilized the SRI rating scheme as the study's theoretical framework. In short, the SRI is a rating metric that defines smartness from the perspective of the generated benefits on the building system's overall in-use performance, occupant well-being, and energy grid reliability [7]. The smartness theory frame is illustrated in Figure 1.



Figure 1. The smartness theory frame following the SRI rating scheme, adapted from the work of Verbeke et al. [7].

Figure 1 illustrates the potential benefits generated by smart building technologies for the building itself, the occupant, and the energy grid. A more detailed description of the framework can be found in the work of Janhunen et al. [20].

Implementing the SRI rating scheme as an EU-wide standard for building smartness is expected to generate 5% higher final energy savings and mitigate up to 32 million tons of greenhouse gas [7]. However, it is unclear whether the housing market operators are interested in smartness or truly understand the benefits of such smart technologies in the market's value chain. Furthermore, it is unclear whether the real estate operators are ready, or even aware, of such a smart building rating metric.

2.2. Selection and Categorization of the Interviewees

Today, around 50% of the inhabitants in Helsinki's capital area live in rented dwellings. Thus, dwellings constitute roughly 35% of the Finnish total building stock. Of this share, roughly one-third are owned by professional investors, one-third by private investors, and one-third by municipalities and other owners [21].

For the present study, the potential professional housing market operators were first mapped and contacted. The authors contacted representatives of institutional investors; non-listed property companies; listed property companies; real estate fund managers; and foreign investors who actively invest, manage, and develop the Finnish housing

market. Furthermore, the authors identified real estate developers, BAS specialists, and public authorities (later called officials) with smart building responsibilities as essential professional groups for the study. The authors aimed to interview at least one representative from each abovementioned group.

In total, the authors contacted 23 operators. Finally, seven real estate market professionals (including real estate investors, owners, and developers), four BAS specialists, and two officials accepted the invitation. The interviewees represented various organizations whose daily operations affect the current market conditions in Finland's housing market. The interviewees held directorial or managerial roles in the organizations they represented. The number of interviewees was comprehensive, as the interviewed operators own and manage more than 60% of the Finnish housing market [21].

The interviewed operators were further categorized into two subgroups: novice practitioners and smart building experts. The smart building experts ($n = 6$) had a high knowledge of the topic, whereas the novice practitioners ($n = 7$) represented real estate market professionals with less (but some) experience in smart buildings. Figure 2 shows the operators' roles in the real estate market value chain and their expertise in smartness.

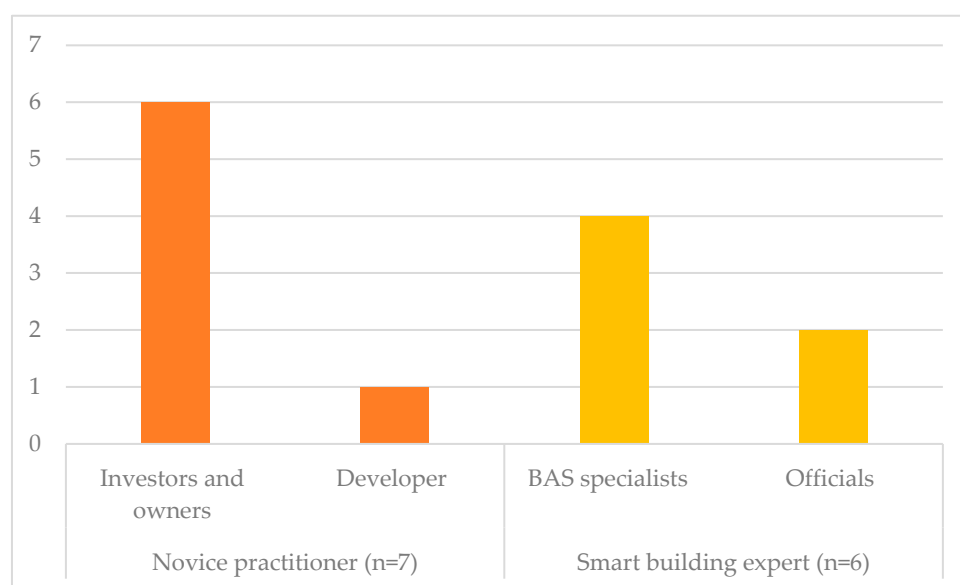


Figure 2. The number of interviewees, their roles in the housing market's value chain, and profiled expertise in smartness.

2.3. Data Collection

This study utilized the dataset of 13 semi-structured interviews to analyze the Finnish housing market operators' attitudes toward smartness. The dataset used in this study was based on the same data collected for a master's thesis study [22].

The interview data were collected at the end of 2022, and Microsoft Teams was utilized to record and transcribe the data. The language of the interviews was Finnish, and each interview took approximately one hour. The transcripts were proofread after each interview. The interview protocol (i.e., semi-structured interview) was chosen, as it was hypothesized that the interviewees' knowledge about the topic (i.e., smartness in buildings) varies [23]. The original interview dataset was narrowed down for the present study, and the accumulated dataset was formed based on the interview structure shown in Appendix A. A more detailed description of the interview protocol can be found in the thesis [22].

2.4. Data Analysis

For the present study, the interview data were re-analyzed using Atlas.ti (version 23.0.6) qualitative data analysis software in Spring 2023. The data analysis comprised two main phases. First, the dataset was coded based on the metrics set to evaluate the operators' attitudes towards smartness. The main metrics were as follows:

- Interest in (building) smartness.
- Understanding (of the benefits) of smartness.
- Readiness to measure (building) smartness.

Second, individual metrics representing the interviewees' interest in, understanding of, and readiness to measure smartness were rated. The ratings were as follows:

- Low.
- Moderate.
- High.

The criteria set for the ratings followed the authors' qualitative interpretation of the interviewees' interest, understanding, and readiness to measure smartness. Tables 1–3 present the authors' qualitative criteria for the ratings, which structured the data analysis.

Table 1. Examples of the criteria used to rate the interviewees' interest in smartness.

Rating	Qualitative Criteria
Low	The interviewee does not have interest in smartness.
Moderate	The interviewee has difficulties distinguishing the details of smartness in buildings. The interviewee generally understands the significance of smartness and is interested in being part of the development.
High	The interviewee has recognized the importance of smartness. The interviewee's organization has taken some concrete operative actions towards smartness.

Table 2. Examples of the criteria used to rate the interviewees' understanding of the benefits of smartness.

Rating	Qualitative Criteria
Low	The interviewee's understanding is limited. The interviewee has minimal experience with the theme. The interviewee's understanding of the details and benefits of smartness does not correspond with the smartness theory frame. The interviewee has a limited understanding of the role of building smartness in the energy transition.
Moderate	The interviewee has some general knowledge of smartness. The interviewee has already gained some practical experience within the theme. The interviewee's perception of smartness corresponds (at some level) with the smartness theory frame.
High	The interviewee has a solid experience in smartness. The interviewee can identify multiple functions related to smartness (in buildings). The interviewee can identify several benefits of smartness corresponding well with the smartness theory frame. The interviewee has a solid understanding of the role of building smartness in the energy transition.

Table 3. Examples of the criteria used to rate the interviewees’ readiness to measure smartness.

Rating	Qualitative Criteria
Low	The interviewee has no prior experience in measuring smartness. Measuring smartness is an entirely new topic.
Moderate	The interviewee expresses interest in applying the smartness theory frame.
High	The interviewee’s perception of smartness correlates well with the smartness theory frame. The interviewee can identify multiple technical solutions related to the smartness theory frame. The interviewee has a solid comprehension of the potential disadvantages of measuring smartness. The interviewee has practical experience in measuring smartness or using the smartness theory frame. Clear interest in the topic and a strong curiosity about the smartness theory frame or similar rating schemes.

3. Findings

The results from this study provide insights into the attitudes towards smartness in the ICT-pioneer Finnish housing market. First, the study analyzed the operators’ attitudes based on their organizations’ role in the housing market value chain. Secondly, the study aimed to understand whether the operators’ expertise in smartness reflects their attitudes.

3.1. The Finnish Housing Market Operators’ Attitudes towards Smartness

The main aim of this study was to understand the attitudes and readiness in the Finnish housing markets to implement smartness in the value chain. The results that evolved from the analyzed data were collected through semi-structured interviews. The operators’ interest in smartness, understanding of its benefits, and readiness to evaluate the smartness in buildings were rated using low, moderate, and high, as explained in the previous section. An interviewee’s attitude was considered “reserved” if any of the metrics evaluating the attitude resulted as low. Otherwise, the attitude was observed as “positive”.

The results indicated that 4 of 13 housing market operators had a reserved attitude towards smartness. These four respondents were real estate owners and investors. Table 4 presents the evolved ratings using the previously introduced metrics and the observed attitudes towards smartness.

Table 4. The interviewees’ attitudes towards smartness resulted based on the rated interest in smartness, understanding of the benefits, and readiness to measure smartness.

Interviewee	Interest	Understanding	Readiness	Attitude
Owner and investor No 1.	High	High	Low	Reserved
Owner and investor No 2.	High	High	Low	Reserved
Owner and investor No 3.	Moderate	Low	Low	Reserved
Owner and investor No 4.	High	High	Moderate	Positive
Owner and investor No 5.	High	High	Moderate	Positive
Owner and investor No 6.	Moderate	Moderate	Low	Reserved
Developer No 1.	High	High	Moderate	Positive
BAS specialist No 1.	High	High	High	Positive
BAS specialist No 2.	High	High	High	Positive
BAS specialist No 3.	High	High	Moderate	Positive
BAS specialist No 4.	High	High	Moderate	Positive
Official No 1.	High	High	High	Positive
Official No 2.	High	High	High	Positive

The research results varied slightly among the different stakeholder groups. Clearly, the officials had the most positive attitudes toward smartness, showing a high interest in, understanding of, and readiness to measure smartness. However, this finding was expected, as the officials are involved in Finland's national SRI test phase. Thus, the results that evolved from the interviews with the officials were considered a benchmark to understand the results of other participants better. A moderately positive attitude toward smartness was observed among BAS specialists, whose work is strongly related to building automation systems. Thus, smartness is already a core part of their work in general.

The most reserved attitude towards smartness appeared among real estate owners and investors. The operators exhibited a high or moderate interest in smartness. However, the understanding of the benefits of smartness in the housing market's value chain varied between low and high. Finally, the real estate owners' and investors' readiness to measure smartness in buildings was significantly lower than among other operators, resulting in a generally reserved attitude towards smartness. This finding indicates that professional real estate owners and investors still lack knowledge of the opportunities for smartness in the market value chain.

Generally, the interviewees appeared to possess a relatively high interest in smartness. Indeed, 12 out of 13 mentioned that building smartness plays a crucial role in the property sector and will be even more important in the future. The interviewees shared the opinion that the interest in smartness in the sector should increase, specifically due to the acknowledged role of buildings in future energy markets. Accordingly, the interviewees mentioned the energy transition 23 times and demand-side management 29 times. Only a few interviewees (two real estate owners and investors) stood out with moderate or low interest in smartness.

Along with interest, the overall understanding of smartness was generally high. In particular, the benefits of building smartness in the energy transition were well understood. However, some confusion arose concerning the definition of smartness or its benefits. For instance, some interviewees appeared confused by what the authors meant by "smartness." Generally, the interviewees were still able to identify possible benefits of smartness, such as energy efficiency (9/13 recognized the benefit), improved indoor climate conditions (7/13), better customer experience (4/13), demand-side management (3/13), and improved returns (3/13). However, the interviewees' understanding of smartness seemed to improve after introducing the concept using a concrete example (i.e., the smartness theory frame). After this introduction, the interviewees identified benefits in the market's value chain, like benchmarking (between properties), financial benefits, and operational improvements, including predictive maintenance, standardization, and competitive advantage.

Compared to the interviewees' interest in and understanding of building smartness, the means for measuring smartness were much less familiar. Only two officials leading the national SRI test phase in Finland and two BAS specialists with practical experience and proper knowledge on the topic seemed to be aware of the metrics in general. However, the theme among real estate investors and owners was largely unknown. Many interviewees mentioned that the topic had not been discussed within their organizations. As the results showed a great variety in the operators' readiness to measure smartness, the authors aimed to understand whether the attitudes correlate with the profiled expertise in smartness.

3.2. The Correlation between Smart Building Expertise and Attitudes towards Smartness

The results presented in Table 4 suggest that the attitude towards smartness is generally more positive than reserved in the Finnish housing market. However, as the results also showed reserved attitudes towards smartness, the study aimed to understand the linkage between the observed attitudes and profiles of expertise in smartness. Figure 3 summarizes the attitudes towards smartness by the operators' expertise in smartness.

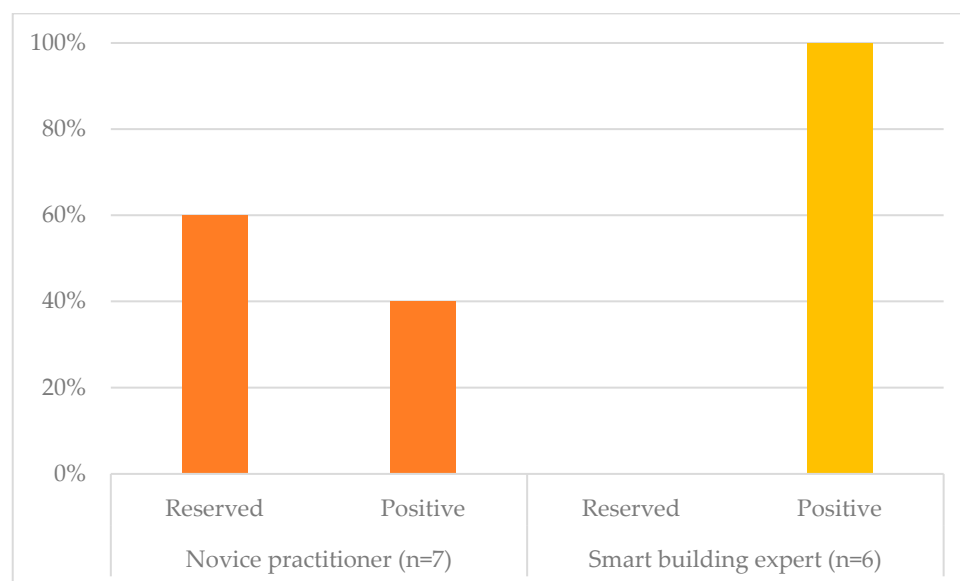


Figure 3. Novice practitioners' and smart building experts' attitudes towards smartness.

As Figure 3 shows, all smart building experts were positive toward smartness. More variety was found among the novice practitioners, where over half of the interviewed operators had reserved attitudes toward smartness. As introduced in the previous subsection, the attitude was interpreted as reserved if at least one metric measuring the attitudes was rated as low.

The analysis revealed that any experience within the theme (i.e., smartness in buildings) resulted in a generally positive attitude towards smartness. In particular, all the interviewed operators with a positive attitude towards smartness had knowledge and experience with smart building rating schemes. On the other side, the novice practitioners with reserved attitudes had no prior experience nor were interested in rating smartness in buildings. Despite this fact, and surprisingly, novice practitioners with reserved attitudes still recognized the benefits of benchmarking smartness in buildings. The finding suggests that any experience with clear smart building metrics can support gaining a more positive attitude towards smartness among real estate market operators.

Smart building specialists with positive attitudes towards smartness had already recognized the market value of benchmarking smartness. However, since smartness (as a concept) remains difficult for their customers, the operators hoped for more concrete evidence and details of smartness theory frames. Such a frame could help the specialists to promote the benefits of smartness in the market. This finding indicates that the market operators are interested in smartness, but the operators lack trusted ways to define and capitalize on smartness.

4. Discussion

The building sector is currently experiencing a transitional shift driven by the large-scale energy transition. Aligned with the EU vision, building smartness is crucial for facilitating this transition among real estate stakeholders. However, the attitudes and readiness in this sector to implement smartness in buildings remain unclear. This study examined the Finnish housing market professionals' attitudes toward smartness. The data were collected from 13 semi-structured interviews, and the data were analyzed by using the metrics of interviewees' (i) interest in smartness, (ii) understanding (its benefits), and (iii) readiness to measure smartness in daily operations. The attitudes were first analyzed based on the interviewees' organizations' roles in the market value chain. Second, the attitudes toward smartness were analyzed based on the profiled expertise. The results revealed the prevalent attitudes toward smartness in the Finnish housing sector.

The results from this study are well aligned with the current understanding of smartness in real estate. Generally, different features of smartness are acknowledged, but the definitions and perceptions of smartness vary dramatically. For instance, the results showed that the interviewees could list many of the benefits of smartness, but they were less clear about the concept of smartness (i.e., what features make a building truly smart). Specifically, the interviewees recognized that smartness could decrease operational costs and enhance user well-being. However, at the same time, their awareness of any theoretical approaches for measuring smartness in buildings was low, although benchmarking was mentioned as one key requirement to increase the attractiveness of smartness in real estate.

Generally, real estate is known for its exceptionally low rate of digitization [24], possibly reflecting real estate owners' general reluctance to adopt smartness in their building portfolios. In the actual real estate markets, operators with expertise in smartness, such as the interviewed BAS specialists, are aware of the various features of smartness in buildings. However, when it comes to novice practitioners, such as real estate investors and owners, who are expected to fund the energy improvements in buildings, understanding key requirements for smartness in buildings and concrete definitions seems vague. Improving the novice practitioners' deeper knowledge and attitudes toward smartness is crucial to supporting the smart building transition. One possible solution is a smartness theory frame, such as the SRI rating scheme, that would help concretize building smartness, rate the smartness levels in buildings, and provide a way to benchmark smart building performance in the sector. Aligned with the vision of the EU, introducing such a tool would effectively steer and accelerate investments in smartness [25].

Today, Finland is recognized as a pioneer in digitalization [18], being one of the first member states to launch a national SRI test phase. The Finnish Government considers smartness a crucial part of its globally recognized and ambitious climate policy [26]. Today, the standardization of smartness on the EU and national levels mainly focuses on larger non-residential buildings [27]. However, the housing sector should not be neglected, as most of the building stock is used for living. As this study showed, the attitude towards smartness among novice practitioners is surprisingly low. This finding indicates that the housing market operators do not yet understand the added value of smartness. However, the relevance of the residential market must be highlighted in the policy discussion to ensure that the housing market operators commit to the same targets as commercial property owners.

Based on the results of this study, introducing an evident or even mandatory tool to benchmark the current level of smartness could make a significant difference in the market. Eventually, regulations will force real estate operators to increase their understanding of smartness and the metrics used to evaluate them. However, before smartness in buildings is regulated and becomes a mandatory feature in real estate, early adopters could verify smartness in their building portfolios. Utilizing the SRI or a similar tool would, at one end, allow owners to benchmark the performance of their building portfolios and, at the other end, enhance the smart rental property owners to capitalize on the benefits (generated through smartness) of decreased energy costs, enhanced well-being, and environmental excellence [13]. Being an early adopter in the field is advisable, given the current trend toward mandatory smartness ratings for larger non-residential buildings [27].

This study provided evidence of the attitudes and readiness of the housing market towards smartness from ICT-pioneer Finland. The findings highlighted the significance of understanding the novice practitioners' readiness to adapt smartness in their building operations to support the smart transition in real estate. This study provided insights into the current attitudes in Finland; thus, the results are not directly generalizable to other European countries. Therefore, a more extensive survey on the European level should be made to map the real estate operators' interest in (building) smartness, understanding its benefits, and readiness to measure (building) smartness.

The present study was performed in Finland, as the country has been recognized as a European pioneer in ICT. Finland has also been one of the early adopters of the European

Commission-driven SRI rating scheme. Despite Finland's reputation as an ICT-savvy country, the attitudes towards smartness among the interviewed Finnish housing market practitioners were still reserved. This finding highlights the need to bridge the gap between novice practitioners and smart building experts to support the smart transition in Europe. On the EU level, the smart transition could be supported by the SRI rating scheme, which would eventually help to monetize the benefits of smartness in buildings. However, as the awareness of any metrics among the interviewed novice practitioners remained low, the study suggests that real estate market operators should be more involved in the policy discussions. Otherwise, the needs (for smartness) in the financially, environmentally, and societally important housing market are unmet.

Generally, results evolving from interviews might suffer from the interviewers' qualitative observations. However, in this study, the quality of the results was improved by using Atlas.ti data analysis software (version 23.0.6). Furthermore, the number of interviewees provided a good representation of the Finnish residential rental property market, increasing the validity of the results. Some other drawbacks of the present study include the interviewed operators' varying understanding of the concept of smartness. The term's ambiguity, however, is still a common issue in studies evaluating the market operators' views on a rather new and evolving theme. For future studies, it would be advisable to start by introducing the author's conceptualization of smartness and aim to map its recognized benefits on the operators' value chain from that perspective.

5. Conclusions

This research aimed to understand the housing market operators' attitudes and readiness toward smartness. The interviews were conducted with housing market professionals, who own and operate more than 60% of the real estate in Finland. The interviewed operators were profiled into novice practitioners and smart building experts to understand further the connection between the operators' attitudes and expertise in the theme. The results showed that among novice practitioners (consisting of real estate investors, owners, and developers), the topic of smartness is still rather unknown, reflecting a reserved attitude towards smartness. The attitudes among smart building experts (consisting of building automation system specialists and officials with smart building responsibilities) were relatively positive. However, to truly enhance the smart transition in the built environment, more emphasis should be laid on understanding the attitudes and motives of the housing market practitioners who own and manage a majority of the European building stock.

The attitudes towards smartness across the real estate market value chain could be improved by enhancing the owners' awareness of a coherent and transparent smartness theory frame. An evident rating scheme, such as the smart readiness indicator (SRI), could help bridge the gap between novice practitioners and smart building experts. According to the results of this study, the practitioners, such as real estate investors and owners, are interested in smartness but do not truly understand the underlying concept, resulting in difficulties in identifying the market benefits of smartness. In the future, smartness should be seen more as an asset than an additional compulsory cost in real estate. However, the concept of smartness is still too ambiguous for the markets, and it should be standardized before the markets can benefit from the smart transition.

To fully engage the housing market operators in the smart transition in real estate, the operators across the market value chain should be engaged in the transition. The operators could be engaged, for instance, by reviewing the needs of the market operators for smartness and developing the theoretical framework to support those needs. Today, one potential framework is the SRI rating scheme. However, it would be crucial to engage the real estate market operators in the development work of the SRI to ensure a smooth and successful adoption of the frame in the future housing market's value chain.

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tion, E.B.; supervision, S.J.; project administration, E.B.; funding acquisition, E.B. All authors have read and agreed to the published version of the manuscript.

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Abbreviations

The following abbreviations were used in the article:

BAS	Building automation specialist.
ICT	Information and communication technologies.
EU	European Union.
SRI	Smart readiness indicator.

Appendix A

Interview protocol

1. In general, how important do you think it is to improve the level of smartness for real estate?
2. Have you previously familiarized yourself with measuring the smartness of real estate?
 - a Are you familiar with the smart readiness indicator (SRI), a tool launched by the EU to measure the smart readiness of real estate?
3. Have you used, or are you planning to use, another real estate smartness measuring tool or the so-called SRI rating scheme?
4. How is measuring the smart readiness of real estate currently featured in your company’s decision-making or operations?
5. What could be the benefits of measuring real estate smartness for your company?
6. How interested are you in investing in measuring the smartness of your properties shortly?
7. What kind of services would you like to find on the market concerning measuring the smartness of real estate?
8. If measuring the properties’ smartness becomes mandatory for housing market owners in the future in the EU, what kind of opportunities and threats do you see?
9. In what way would you be interested in developing a concept that measures the smart readiness of real estate together with other operators in the field?
10. What wishes or feedback do you have for the developers of the concept of the SRI rating scheme for buildings (EU-level or national authorities)?

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