Retrofitting strata property - a tool supporting long-term retrofit strategy

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Abstract. Strata property - ownership of apartments or townhouses consisting of private and commonly owned building components and areas - was established in Switzerland in 1965 and since has become very popular. But, well-needed retrofit work of these buildings is often postponed and long-term retrofit strategies are rarely considered. However, the low retrofit rate must increase to meet the global energy goals. Interviews and workshops with relevant actors showed that missing financial means are not the key issues for the low retrofit rate. Major challenges arise from a broad set of issues, such as difficult processes, unclear responsibility, insufficient communication, missing building information or underestimation of the commonly owned building components. “Luzerner Toolbox” provides eight folders that address the key clusters of challenges. Central to this toolbox are Excel-based tools, which transform accurate technical and financial information into a visual format. An ample diagram illustrates the remaining lifetime of the building parts and a graph relates upcoming retrofit costs and the annual payments into the contingency reserve fund with a forecast of the contingency reserve fund. As such, these tools assists in scheduling appropriate retrofit measures and establishing a balanced financial planning. But, various actors have reported that the retrofit timetable is too complex to be used in management firms. Feasibility studies and further research of their specific needs and work processes are needed to refine the tool accordingly. In a further study, interviews with management firms and architects are conducted to determine the key factors of a useful tool.

1. Introduction

In Switzerland, strata property – apartments or townhouses that consist of private and commonly owned spaces and building parts – was established in 1965 and since has become very popular. In canton Zurich for example, strata property has become an important form of home ownership. Between 1990 and 2014, strata property increased from 4.5% to almost 15% of the total number of apartments while the share of single-family houses remained stable at about 17% [1]. The reason for the success of strata property might be found in the low interest rates along with the increasing property prices. This situation allowed to purchase this limited form of home ownership at an affordable price. And, strata property owners profit from the various advantages of home ownership, such as independency from landlords, investment of capital or freedom to design their own home according to their needs and wishes.

When buying strata property, owners often do not consider the challenges deriving from the building, the organization or the corporation. They focus on their new (privately owned) property. As members of the corporation they are – in collaboration with the other owners – also responsible for the commonly owned spaces or building parts. The commonly owned property, which includes facade, roofs, windows,
elevators, underground parking lots or outdoor spaces account for more than half of the property [2]. And, it has to be maintained and retrofitted periodically, until the building reaches the end of life. Missing financial means - which was believed to be the key problem – is not the only reason for the low retrofit rates or postponed retrofit measures of strata property [3]. Major problems arise from a broad set of issues, such as difficult processes, unclear responsibility and communication, missing information on the building and its physical state or underestimation of the commonly owned areas.

Other countries report analogous challenges in retrofitting or dissolving strata property. However, due to the different laws in place, they manifest in different management issues and legal problems [4, 5]. Do to the long lifecycle of buildings, the challenges in Switzerland arise in the retrofit of buildings rather than the dissolving of buildings. As buildings get older and owners change, it gets more and more difficult to find majorities for well needed retrofit measures. The reasons are multifaceted: overall goal of the strata property isn’t defined, there’s not enough money into the contingency retrofit fund and the inhomogeneous strata property corporation is not willing to pay well needed retrofit measures with extraordinary payments. This leads to the fact, that the effort to manage strata property becomes more and more difficult and unprofitable, the older a buildings gets. As a consequence, management firms more and more withdraw from managing strata property as experienced employees that are skilled to handle the multi-faceted decision-making processes can rarely be found.

Over time, these multifaceted challenges may negatively influence the success story of strata property in Switzerland. Even more, the low (energetic) retrofit rate of the growing number of strata property works against the Swiss federal energy strategy 2050 [6], which assigned the energetic retrofit of the building stock to be one of three key actions. Statistical numbers show that the Swiss building stock still consume about 45% of the total primary energy consumption [6] and, the retrofit rate of the building enclosures remained at about 1% [7]. If the federal goal will be met, both, the energy consumption of the buildings and the low retrofit rate of the buildings have to be increased.

Considering the intrinsic challenges, management of strata property may no longer be seen as the purely administrative task of the commissioned management firms. Strata property corporations will be forced to set up comprehensive management structures, which include all relevant actors and pursues distinct long-term strategies for the maintenance and retrofit of strata property. To do so, property managers and owners must become aware of the multifaceted challenges. And, they must have user-oriented guidelines and tools that enable to set up long-term strategies for the operation, maintenance and retrofit of strata property. Finally, owners must get comprehensive information to take well founded decisions, which help to preserve (or increase) the value of their property and, to improve the energetic performance as asked by the federal energy strategy.

2. Challenges in retrofitting and managing strata property

The research project “long-term strategies for the retrofit of strata property” [8] invested the key challenges of strata property in Switzerland and developed user-oriented guidelines and tools to support long-term strategies for the maintenance and retrofit of strata property. The research based on interviews with relevant experts in planning, building, retrofitting and managing strata property, financial and legal experts, and members of associations as well as workshops with strata property owners.

The interviews with the experts and the workshops with owners of strata property confirmed the results of preliminary work [3]. Challenges are not only found in the retrofit of strata property. They are multifaceted and for example arise from missing information on the building and its physical state at time of purchase, owners underestimating the share of the commonly owned building parts and spaces, insufficient reserves in the contingency reserve funds, lack of knowhow referring to maintenance and retrofit, difficult decision-taking processes, little willingness of the inhomogeneous corporation to approve long-term retrofit strategies, unclear responsibilities and mandates of management firms or little interest of strata property managers to take on the responsibility for technical management.

Figure 1 shows that the key challenges and milestones related to maintenance and retrofit of strata property includes the entire lifecycle of a building as well as all key actors [9]. To structure further work, the challenges were assembled in six superior clusters, which encompass “planning and building”,

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“establishment and purchase”, “management and operation”, “retrofit”, “strata property corporation” and, “cancellation” of strata property. The key challenges of the six clusters are discussed in [10].

Figure 1. Scheme of the lifecycle of a strata property with challenges in maintenance and retrofit

3. Guidelines and tools for owners, corporations and managements

The interviews and workshops with key actors showed [8], that interdisciplinary work is necessary to overcome the multi-faceted challenges as shown in Figure 1. This means, that property managers—who mostly have a commercial background—need to collaborate with building professionals to manage the needs of technical management. However, this is only possible, if owners attach importance to that work and in consequence, assign the respective mandate and pay for it.

“Luzerner Toolbox” (Lucerne toolbox) [11] consists of 8 folders, which cover the most critical challenges assigned to the management of strata property. They provide useful background information and hands-on tools to manage long-term retrofit strategies of strata property. Folder 1, “Information for strata property”, provides basic information on the challenges of strata property. Folder 2, “Optimized maintenance process for strata property”, summarizes the key aspects of an optimized maintenance process. The visualization of the lifecycle includes milestones and decisions to be taken by different actors. Folder 3, “Tools for retrofit planning”, explains the intention of the three Excel based tools as well as their use and function. Folder 4, “Exemplary rules and goals for strata property”, provides guidelines and exemplary paragraphs that help to establish long-term retrofit planning in the regulations. Folder 5, “Specifications for the management of strata property”, gives examples on how to stipulate the technical and administrative mandate. Folder 6, “Communication and conflict management in strata property”, describes typical decision taking processes and provides guidelines on how to prevent and overcome conflicts. Folder 7, “Incentives for the retrofit of strata property”, displays potential incentives that might be considered when retrofitting building and infrastructure. Folder 8, “Planning and design recommendations for strata property”, provides guidelines for the planning and design of strata property, aiming at easing maintenance and retrofit as well as avoiding conflicts among owners.
3.1. Tools for the retrofit planning
Folder 3, “Tools for retrofit planning” [11], addresses owners and management firms as well as planners and architects. The three Excel based tools, “Tool A – retrofit timetable”, “Tool B – forecast of contingency reserve fund” and, “Tool C – overview over retrofit measures” are designed to foster the planning and communication of long-term retrofit strategies.

The information, which is implemented into of “Tool A – retrofit timetable” and “Tool B – forecast of the contingency reserve fund”, provides the base for the “Forecast of contingency retrofit fund” (Figure 2). It gives a graphic overview of the annual payments into the contingency reserve fund (blue line) as well as the relation between retrofit costs (black columns) and the long-term forecast of the contingency reserve fund (red line). If retrofits would be done as recommended by the retrofit timetable in Figure 2, the annual payments would not be sufficient without the three extraordinary payments.

This graph (Figure 2) is the core part of Folder 3, as it allows to displays all relevant information in a well-understandable, visual form. Even more, the graphic overview allows planners and architects or property managers to simulate and communicate consequences of different retrofit strategies or varying financing models. This helps strata property owners to make up their mind and to take well-founded decisions on how to maintain the common parts of the property.

Once the information is implemented, the tools should be actualised on a regularly bases. This might include an inspection of the building and critical building parts to determine the remaining lifetime. Being informed of the retrofit schedule as well as upcoming retrofit measures and the respective costs allows property managers to regularly communicate this issue. It also allows to take enough time for the complex decision taking process. Furthermore, clear and understandable information provides confidence and fosters strata property corporations to set up a long-term vision for the retrofit strategies.

Figure 2. Forecast of contingency retrofit fund

3.2. Retrofit timetable (Tool A)
The retrofit timetable [12] bases on average retrofit costs published by Swiss Centre for Building Realisation [13] and the expected, average lifetime of building parts published by Swiss Homeowners Association [14]. The structure follows the Code for Building Costs [15].

The header of the retrofit timetable [12] includes year of construction, year of first retrofit timetable, year of current investigation and, average increase of building costs (Figure 3). Within a row, column 1 shows the code of the building part followed by its name, year of construction and respective building costs, the average lifetime of the building part or an estimation of the remaining lifetime as well as the year of retrofit or replacement and respective costs.
The entry information in the header and the information on the building parts (column 1 to 8) generate the necessary annual provisions needed to retrofit or replace a building part at the given time (column 9). The total of the average annual costs for the retrofit of the single building parts is shown at the bottom of the table. The remaining lifetime of the building parts is illustrated in an ample diagram on the right hand side of the entry mask. The colours of the ample diagram indicate how urgently a building part should be renovated or replaced. Green colour means, the renovation is not expected in the next 10 years. Yellow and orange indicate that a building part will have to be renovated or replaced in about 5 – 10 years and 2 – 4 years, respectively. Red colour means that the average lifetime is one year or less and an on-site check is strongly recommended.

The tool allows to work on different levels of detail. Level 1 (Figure 3) shows the primary building parts or spatial units (e.g. windows, staircase), whereas the respective ample displays the subordinate building part with the shortest remaining lifetime. This level of detail is only to be used to communicate rough first overview. Level 2 consists of subordinate building parts (e.g. windows of apartments, windows of staircase, etc.) and Level 3 splits the building part or spatial unit up in further sub-items (e.g. wooden windows of apartments in upper floors, wood-metal windows in apartments of ground floor or double-glazed windows of staircase, etc.). It is recommended to work on Level 2 or 3. The more detailed the entry information is, the more accurate is the information on the remaining lifetime of the building parts and the respective costs for retrofit or replacement.

**Figure 3.** Tool A – Entry mask for data referring to the retrofit timetable

If the initial building costs are not available and it is not clear what physical state the building and its building parts have, it is not possible to fill in the retrofit timetable. In order to get reliable information, it is recommended to mandate building professional with the setup of the renovation timetable.
3.3. Forecast contingency retrofit fund

The forecast of the contingency retrofit fund [12] requires basic information on the building (year of construction, insurance value, owner quotas) and financial information, such as first year of investigation and respective balance of contingency retrofit fund, current year of investigation, year with first payment and annual payment into the contingency retrofit fund, interest rates on the reserves in the contingency fund as well as minimal or maximal balance of the contingency retrofit fund. The forecast of the contingency retrofit fund table (Figure 4) transforms and displays the information relevant long-term strategies for the retrofit of strata property. These are the annual payment into the contingency retrofit fund (column 3), extraordinary payments (column 4), the average annual retrofit costs (column 10) and the development of the contingency retrofit fund (column 11).

![Figure 4. Tool B – Entry mask referring to the contingency retrofit fund](image)

3.4. Suitable packages of retrofit measures

According to the ample diagram of “Tool A – retrofit timetable” (Figure 3), planners and architects can set up suitable retrofit packages, which can be realised in accordance to the timetable. All the relevant information, such as a preview of upcoming renovation periods along with respective retrofit measures and retrofit costs, current state of planning as well as state of decisions and required quorum, can be documented in “Tool C - overview of retrofit measures” [16]. The exemplary structure is meant to support the communication with the strata property corporation and to plan the complex decision making process. Furthermore, it supports owners in coordinating private retrofit work with the common one. Regular update is necessary to keep the tool up to date and reliable.

4. Implementation of tools

Feedbacks of experts and strata property owners have shown, that the tools of folder 3 “Tools for retrofit planning” are of great interest for the planning of long-term retrofit strategies. However, they state that the handling of “Tool A – retrofit timetable” is too complex. It is assumed that this feedback bears two major barriers. First, the detailed information, which has to be compiled and entered into the tool, requires in-depth knowhow on maintenance and retrofit. Second, the implementation of the broad set of data is time consuming. And, the compilation and entry of the data is not covered by the mandate. Thus, it is necessary to do further work on the role of the management firms as well as on the optimisation of the retrofit timetable.

Research on the role of management firms on energetic retrofit has shown [17] that management firms have a great impact on the renovation of strata property. They often initiate and accompany retrofit
measures. In doing so, they evaluate the needs of the corporation, call the experts (e.g. architects) and establish the contact among the relevant actors. Also, they must inform the strata property corporation and, withstand the high expectations of the owners. However, management firms cannot cope with all these requirements. This role goes beyond their core business and, it would require additional organisational and financial effort. For these tasks, they only have a vague or no mandate at all.

“Tool A – retrofit timetable” is based on the work environment of planners and architects. And, it is meant to provide accurate information for setting up long-term strategies for strata property. A reduction of the level of detail has direct impact on the accuracy of the information. Other tools, such as “Stratus” [18] or “Cost Planning for Retrofit” [19] rely on the insurance value or the construction costs of the building, the major building parts as well as rough values for its lifecycle and the respective building costs. As such, they generate a fast overview over the critical building parts and the cost for retrofit. But, this information does not consider the design and construction of the building, nor to the actual state of the building parts. It may only be used for a fast and rough overview of the major building parts. Also, it is not clear, how the privately and commonly owned parts of the building are split. Considering these facts, the new research project will have to get insight into the work processes of planners and property managers and evaluate the appropriate level of accuracy before the tool is overworked accordingly.

5. Discussion
Research has shown, that there is in-depth disciplinary knowhow on how to retrofit building and to calculate the respective retrofit costs as well as to achieve long-term maintenance and retrofit strategies. But, the problem lies in inadequate mandates, inflexible processes and the way key actors collaborate and communicate. A closer collaboration between planners, management firms and the strata property corporation would generate multiple benefits. Within this core team of experts, planners or architects would have a mandate for the technical issues, such as the periodic evaluation of the state of the building, the set-up and maintenance of the retrofit timetable, the overview of the retrofit measures and assist, if necessary, with the technical management. Management firms would be in charge of the administrative and technical mandate and, the corporation board would represent the interests of the strata property corporation. Together, the core team could set up recommendations for the long-term retrofit strategy of the strata property. They also inform the corporation on the strategies and the current state of planning. This approach can help to establish a broad support of the retrofit strategies and to avoid precipitate actions as well as uncoordinated and costly retrofit measures. But, this process can only be initiated, if the strata property corporation sees the benefits and approves the mandates.

Given the fact that processes and mandates are adapted, “Tool A – retrofit timetable”, must not be simplified, but, set up a connection between the work environment of planners and architect and the one of the property management firms.

6. Outlook
As property prices rise, the popularity of strata property will further increase in Switzerland. But, the increasing demand of strata property bears the risk that more and more existing multi-family houses are sold to strata property corporations. As these buildings are not planned for strata property and have passed a good part of the lifecycle, special attention has to be given to proper management and communication. Major retrofit – along with major costs – will most probably come up in only a couple of years. At that time the challenges and the effects of discordant strata property will no more be limited to the actors involved.

Considering the growing issue, it might become necessary that the intrinsic challenges are addressed by a broader circle of actors, such as banks, home owner associations or the federation. Banks might consider alternative financing models for strata property owners that cannot increase the mortgage. The strata property association could provide guidelines and exemplary regulations that help strata property corporations to establish long-term retrofit planning in the regulations or, they could intensify further education of strata property owners or property managers. And, last but not least, federal laws and provisions could enforce appropriate and prompt retrofit.
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