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Reutilizing Japan's vacant house: exploring motivations, concerns, and technical adjustments for a sustainable future

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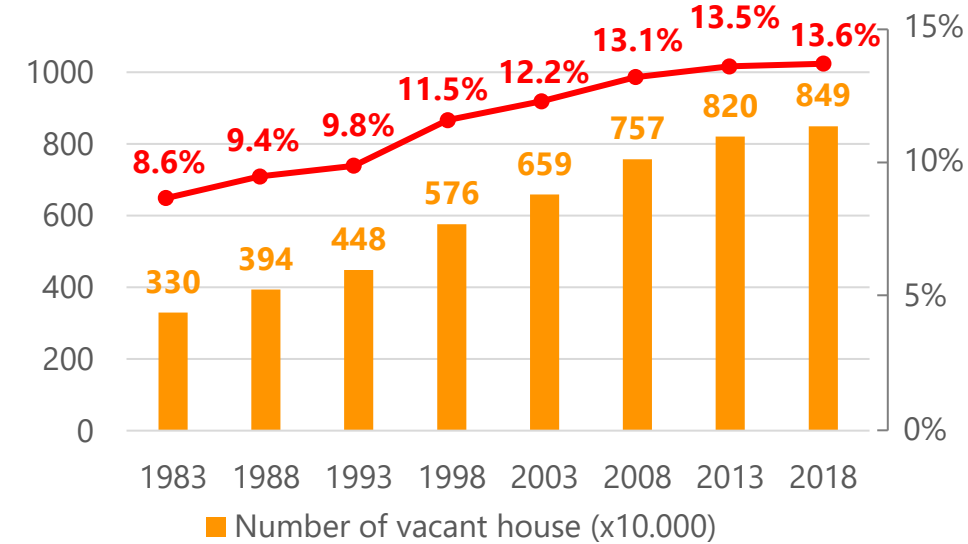
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"Building Low Carbon Future: Decarbonizing with Impact"



Introduction

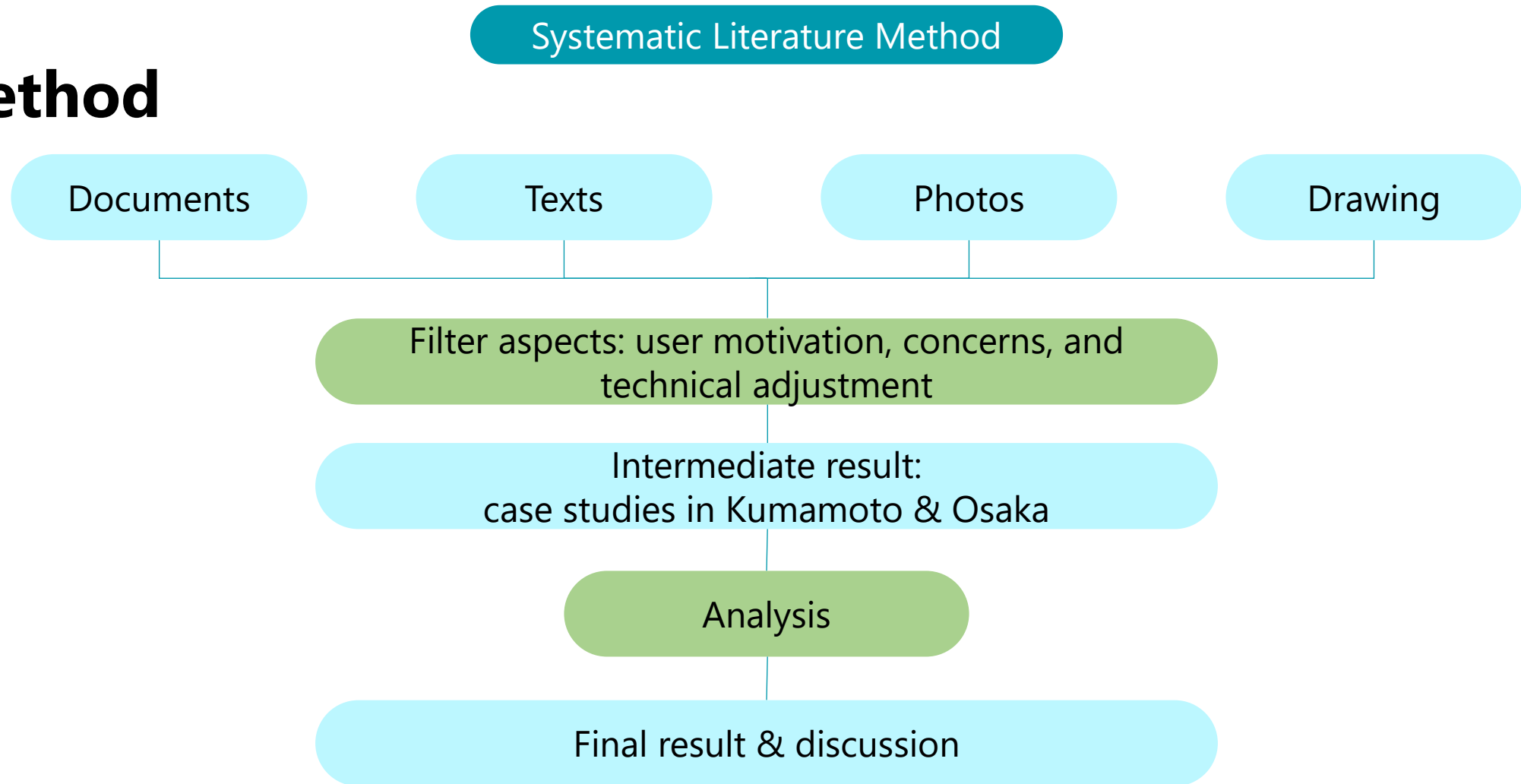
- A number of developed nations, including Australia (9.8% as of 2016), Japan (13.6% as of 2018), and the US (11.1% as of 2019), have already encountered significant house vacancy rates (1).
- In 2018, Japan had 8.49 million *akiya* (vacant house), represents 13.6% of housing units. By 2033, it's projected to reach 30.5%, resulting in one in three houses being vacant (2)(3)(4)(5).
- Japan's increasing *akiya* is influenced by demographic changes, financial burden, and new housing development, causing issues like vandalism, fire risk, collapse, and crime (6)(7)(8)(9)(10)(11).
- One of the most prominent and sustainable way to tackle the issue is by reusing *akiya*.

Number and rate of vacant house in Japan (3)



Images source : (12)

Method



Result and Discussion

- The cost of renovating a 111-year-old house, which can be less than in other younger cases.
- the average building age before reuse is around 40 years old suggests that there is a significant potential for reutilizing older buildings in a sustainable and cost-effective manner.

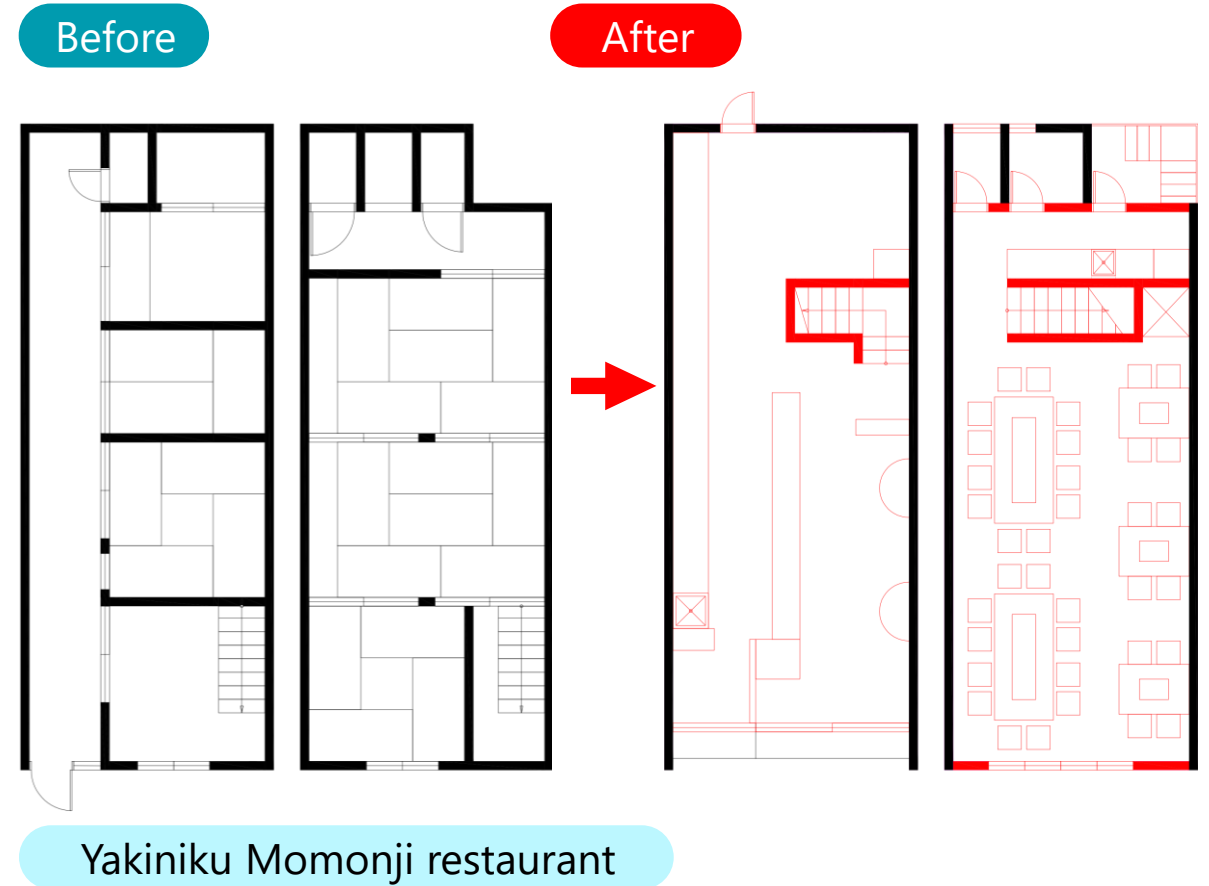
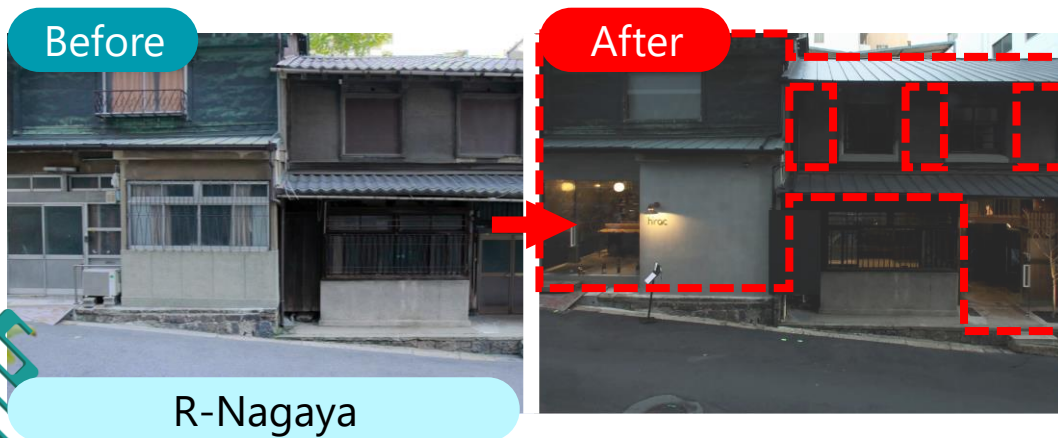
Overview of case studies (13)(14)

| Project | Type | Location | Building age | Status | Floor area (m ²) | Construction cost* |
|-----------------------------|----------------|----------|--------------|----------------------------------|------------------------------|---------------------------------|
| K residence | Detached house | Kumamoto | 111 | Renovation | 165 | ± ¥11 million (\$75.714,55) |
| N residence | Detached house | Kumamoto | 41 | Renovation | 85,9 | ± ¥16 million (\$110.130,26) |
| S residence | Detached house | Kumamoto | 45 | Renovation | 96,12 | ± ¥12 million (\$82.597,69) |
| U residence | Detached house | Kumamoto | 48 | Renovation | 77 | ± ¥4,5 million (\$30.974,13) |
| Ryodonoka house | Detached house | Osaka | 39 | Repurpose to group house | 127,98 | ± ¥20 million (\$137.662,82) |
| Yakiniku Momonji restaurant | Detached house | Osaka | 43 | Repurpose to restaurant | 88,28 | ± ¥800.000 (\$5.506,51) |
| R-Nagaya | Row house | Osaka | 87 | Repurpose to hostel & restaurant | 203,41 | ± ¥20 million (\$137.662,82) |
| Teranishiya Abeno | Row house | Osaka | 72 | Repurpose to restaurant | 362 | ± ¥15million (\$103.247,12) |

*Dollar rate ¥1 = \$0.0069 (currency rate on 12th January 2024)

Result and Discussion





Analyzing selected aspects from the case studies (13)(14)(15)(16)



Result and Discussion





Identified selected aspects from the case studies (13)(14)(15)(16)

- Most user attracted *akiya* because of affordable price and strategic location factors.
- The necessity of making decisions help, a comfortable, and secure living environment make insulation, structural safety, and professional advice the most common concerns.

| Project | User motivation | User concern | Technical adjustment | Selected image |
|-------------|--|--|--|---|
| K residence | <ul style="list-style-type: none"> - Near parent's house - Affordable price | <ul style="list-style-type: none"> - The large room makes the house cold in winter | <ul style="list-style-type: none"> - Exposing ceiling - Covering wall and floor with plywood - Moving kitchen from North to South - Structural improvement |  |
| N residence | <ul style="list-style-type: none"> - Suitable floor area - Strategic location - Nice view - Affordable price | <ul style="list-style-type: none"> - Interior was dark - Insulation quality - Collecting all inputs from member of family before construction | <ul style="list-style-type: none"> - Exposing ceiling - Indirect lighting - Covering wall for insulation and modern look |  |
| S residence | <ul style="list-style-type: none"> - Strategic location - Reasonable price - Friendly neighborhood | <ul style="list-style-type: none"> - Structural safety - Insulation quality - Damaged part due termites - Professional advice | <ul style="list-style-type: none"> - Exposing ceiling - Adding veranda - Covering & painting wall - Changing Japanese room into modern style - Structural improvement |  |
| U residence | <ul style="list-style-type: none"> - Affordable price | <ul style="list-style-type: none"> - Access to property | <ul style="list-style-type: none"> - Removing vines on the wall - Removing walls - New sanitary - Rearrange kitchen |  |

Result and Discussion

Identified selected aspects from the case studies (13)(14)(15)(16)

| Project | User motivation | User concern | Technical adjustment | Selected image |
|-----------------------------|---|---|---|---|
| Ryodonoka house | - Affordable price | - Feasibility of the new program - Professional advice | - Structural improvement - Adding toilets - Implement standard for disability people |  |
| Yakiniku Momonji restaurant | - Strategic location - Good neighborhood | - Severe damaged interior & exterior | - Removing wall partition - Adding restaurant utilities - Adding toilets - Adding kitchen counter |  |
| R-Nagaya | - High value of old house for business | - Structural safety - Insulation quality - Corroded beams & pillars | - Dividing into 3 units for commercial - Improving structure - Improving insulation - Adding restaurant & hostel utilities |  |
| Teranishiya Abeno | - Preserving old row house - Higher rent profit of repurposing | - Fire safety - Public health standard | - Adding restaurant utilities - Remove tatami with concrete and wooden deck for restaurant seats |  |

- In a particular case of conversion into commercial, old *akiya* offers a high value in terms of historical charm and unique architectural features.
- The common technical adjustments are removing the ceiling, making structural improvements, and adding utilities for the toilet or kitchen.

Conclusion

- Reutilizing *akiya* is primarily motivated by financial and location factors.
- Users needed help for making decision and desired for a comfortable and secure living environment. Therefore, insulation, structural safety, professional advice raised as concern.
- Finally, removing the ceiling, structural improvements, and installing utilities for the kitchen or toilet are the common technical adjustments to ensure comfort in utilizing *akiya*.

Acknowledgement

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