Adaptive reuse of old houses as coffee shop: Environmental and spatial aspects

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Abstract. Adaptive reuse is a transformation carried out on buildings to provide new functions both from aesthetic and functional aspects. For decades, adaptive reuse has been a panacea for bridging the conservation and current needs for development. In addition, adaptive reuse has been considered an environmentally friendly approach to architectural conservation practices regarding the reuse of building materials and spaces. Besides government-imposed conservation, the community initiated to conserve everyday buildings by spontaneously and informally reusing and adapting various types of buildings known as a vernacular adaptive reuse. This study examines this vernacular approach by analyzing the process and changes that occur because of its application. The case study examined three residential houses that were built in the late 1960s and have been transformed into coffee shops. A research method is an approach through interviews with coffee shop business owners and local government, site observations on the surrounding area of old houses, building measurements, as well as literature studies related to adaptive reuse. The results showed that the process of the vernacular adaptive reuse approach was carried out by the business owners in a creative and pragmatic way with minimal cost and without expert’s involvement. Its application has positive impacts on the surrounding environment, such as social and economic activities, and it reduces environmental impacts by reusing abandoned buildings. In the spatial aspect, the old houses are regenerated by using a new spatial organization that still utilizes some of the spatial organization from the previous function.

1. Introduction
Currently, in the architecture discipline, converting buildings to meet current uses has become an ongoing, creative, and interesting challenge [1]. This practice is generally known as adaptive reuse, referring to remodeling, retrofitting, conversion, adaptation, reworking, rehabilitation, or refurbishment [2]-[3]-[4]-[5]. The practice of adaptive reuse have numerous potential benefits such as reducing emissions of greenhouse gases, increasing energy efficiency, decreasing environmental costs of building demolition and new construction, also economic development [6]-[7]-[8].

So far, in doing adaptive reuse, experts have taken part in most cases [9]. However, some buildings are converted beyond the formal approaches; they were used, reused, and adapted by the community in a spontaneous or user-led way. This approach is also called vernacular adaptation, which refers to community initiatives as the main actors of adaptive reuse. The vernacular approach in the adaptation
process can build an intense relationship with the place, where the community is directly involved in the process of creating a new functional place \[10\].

The impact of implementing vernacular adaptive reuse on the surrounding environment is closely related to the informal or community-driven approach in urbanism theory called Do-It-Yourself. The theory describes community participation in spontaneous changes in urban fabric without experts' involvement which is contrary to the top-down approach. Its characteristics include community-driven, low budget, temporary, and experimental \[11\].

Research on other vernacular adaptive reuse projects also shows the emergence of a strong 'sense of place' through the use of existing values on the site, whether economic, social, or historical. The application of vernacular adaptive reuse utilizes various potentials that develop in local communities as value to strengthen regional characteristics \[12\].

Several studies have identified the application of adaptive reuse of vernacular in historical buildings to determine the specific characteristics, potential, and threats of this practice. Research by Plevoets and Swinska-Heim \[10\] shows vernacular adaptation as an alternative that can reuse buildings with high social value by analyzing the specific character which applied bottom up. Through analysis of relevant literature and reviewing various historical buildings and contemporary buildings that are reused through vernacular adaptation. However, previous studies have not examined the application of adaptive reuse of vernacular on vernacular buildings such as residential houses, but on historical buildings that are included in the government list.

The current study aims to find out vernacular adaptive reuse as buildings intervention which explains the process of adaptive vernacular reuse in a systematic way, as well as the impact of its application on the surrounding environment and changes in residential’s spatial space to fulfill the new function as a coffee shop. The research was conducted on three old houses as vernacular buildings that have been converted into coffee shops through vernacular adaptive reuse. The three case studies are located in the first residential area in Banda Aceh City which was built in the 1960s and has undergone several changes.

2. Methods

2.1. Case study

The study was based on a case study of three houses that has been transformed into coffee shops which are House Number 10 (Waroenk Rumah Senja), House Number 17 (White Elephant), and House Number 30 (Milkyway Coffee/Eatery/Workspace). The three houses are located in a residential area along Jalan Gabus, Gampong Bandar Baru, Kuta Alam, Banda Aceh, Aceh with the location of the houses are near to each other, and the transformation is conducted by the business owner as of the main driver.

![Figure 1. Case Study (a) House Number 10 (Waroenk Rumah Senja); (b) House Number 17 (White Elephant); (c) House Number 30 (Milkyway, Coffee, Eatery, and Workspace).](image-url)
The residence was built in the late 1960s to early 1970s and was occupied by the upper-middle class. Applying a tropical architectural design by prioritizing thermal comfort through window openings and ventilation, the use of a massive shield roof, and a large yard as a green open space.

2.2. Research methodology
Research methodology was made with the following instruments: In-depth structured interviews with business owners and local government, on-site observations, and buildings measurements.

Data was collected through in-depth and structured interviews with coffee shop owners to gain a comprehensive understanding of current adaptive reuse practices. The interview involved six coffee shop owners as interviewees and structured questions related to the research’s object. Topics of interview were the houses history, applicational procedures of vernacular adaptive reuse, activity on new function as analysis on social aspects. Secondly interview conducted towards the local government with related questions about the impact of coffee shop in economic aspect and the suitability of new function with the city's spatial plan.

Site observation and measurement of buildings are carried out through several visits within a month, systematically recorded with photo documentation. The components that will be observed consist of the current spatial organization and the surrounding environment. Analysis of scale building drawing provide deep understanding of changes in spatial organization.

3. Results and discussion

3.1. The current building’s condition
The buildings had been upgraded in different periods, with original age estimated at 50 years. The conversion of residential houses into commercial buildings began after most of the homeowners moved out of the city so that many houses were abandoned. As a result, these houses are not maintained and damaged, this also has an impact on the lack of activity in the residential environment.

In 2014 the residential house began to be converted into a cafe and coffee shop which continues to develop until this day.

Figure 2. Old houses transformation.
The first house that changed function was House Number 30 which in 2014 became CMY Kafe, then became A to Z in 2018, and since 2019 has been operating as Milkyway Coffee, Eatery, and Workspace. Secondly House Number 10 was first converted into a coffee shop called Barcode Coffee in 2016. Then changed into House Ten Cafe which occurred in 2017 and became Waroenk Rumah Senja from 2020 until now. The third case study is the House Number 17 was converted into a coffee shop called White Elephant. Since its establishment in 2017, White Elephant is doing its first renovation in 2021.

3.2. Vernacular adaptive reuse as buildings intervention
Process of adaptive reuse implementation is a series of intervention stages carried out by business owners as an effort to change the function of the building. The conversion of residential houses into coffee shops occurred because the desire of business owners to adapt the same trend that had developed in the cities of Bandung and Jakarta. Business owners as adaptive reuse actors have experience in the creative industry both job or passion. This experience is used as a reference when the intervention is carried out.

The building’s selection as objects of adaptive reuse is influenced by economic aspects; low rental fee, practical aspects; the size of building area and its surface, and location aspects; the potential strategic location because it is located close to the main road. The intervention was carried out in old-age houses in a bottom-up or user-led manner without involving experts such as architect or interior designer. This encourages business owners to solve various problems during the building development process creatively and at minimum cost. The intervention is divided into three main stages as follow:

- Project Planning Stage: Planning is performed by business owners by looking for references related to the design using digital research and personal experience in creative industry, then determining the spaces that will be transformed according to the needs of the coffee shop.
- Project Development Stage: There are no manuals or drawings involved. The business owner will hire the services of a handyman to do the technical work and some non-technical work is done by the business owner and employees. Meanwhile, mural making is done directly by a professional mural artist.
- Project Completion Stage: The completion stage consists of non-technical work carried out before the coffee shop can fully operate.

| Stages of Intervention | Types of Intervention | Components | Case Study |
|------------------------|-----------------------|------------|------------|
| Project Planning Stage | Functional and artistic Landscape organization | The yard transformation as an outdoor seating area and parking lot | House Number 10 | House Number 17 | House Number 30 |
|                        | Functional and artistic Spatial organization | The conversion of space requirement from housing to coffee shop | | | |
| Project Development Stage | Functional and pragmatic Utility | New requirements of electricity, plumbings, and | New requirements of electricity, plumbings, and | New requirements of electricity and plumbings |
Additional toilets

| Functional and artistic | Upper floor | Additional concrete floor height (yard) and tiles (kitchen and bathroom) | Crooked floor reparation and additional concrete floor height (yard) | Crooked floor reparation and additional concrete floor height (yard) |
|-------------------------|-------------|------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
| Functional and pragmatic | Roof        | Tiles reparation using different materials, and additional canopy     | Tiles reparation using different materials, and additional canopy   | Tiles reparation using different materials, and additional canopy   |
| Functional              | Ceilings    | Ceilings reparation using different materials                         | Ceilings reparation using different materials                       | Ceilings reparation using different materials                       |
| Artistic                | Facade (exterior walls) | Repaint walls                                                     | Repaint walls                                                      | Repaint walls                                                      |
| Functional and artistic | Walls       | Additional wall partition, repaint, and mural addition/removal        | Repaint and wall partition removal                                 | Additional wall partition and repaint                                |
| Artistic                | Doors and windows | Panel modification and additional doors                             | Panel modification and additional doors, doors removal              | Panel modification and additional doors and windows                 |
| Project Completion Stage | Furniture   | New furniture and reused through modification                        | New furniture and reused through modification                      | New furniture and reused through modification                      |
| Functional              | Utility     | Installation of outdoor artificial light                             | Installation of outdoor artificial light                           | Installation of outdoor artificial light                             |
| Artistic                | Fence       | Additional                                                             | Repaint and removal                                                | New materials and repainting                                       |

The limited knowledge of business owners in correlation to technical building utilities causes the emergence of a try and error process in pragmatic interventions, so that utility components require regular repairs and maintenance which increase building development costs. Considering the impact, one of three case studies, namely White Elephant (House Number 17) no longer applies adaptive reuse at later renovation and switches to hiring a civil contractor. Meanwhile, Waroenk Rumah Senja (House Number 10) and Milkyway, Coffee, Eatery, and Workspace (House Number 30) continue to use the same method in every renovation on the basic consideration is the success of previous adaptive reuse implementation.
3.3. The impact on environmental and spatial aspects

The environmental impact is assessed in the area of housing blocks along Gabus Street where the land use regulation has been changed from residential into commercial and service for 2009-2029 city planning of Banda Aceh. The results of the analysis show that there are improvement after adaptive reuse vernacular application. Changes are found in the aspects of economic, social, and urban fabric.

In the economic aspect, there is an increase of economic activity in the surrounding environment which is triggered by the existence of coffee shops. Interview with the local government shows the increasing number of coffee shop visitors attracts other business owners to participate in developing their business along Jalan Gabus. Up until 2021, six food and beverage businesses have developed in the past three years. Coffee shops also provide employment opportunities for vendors, buskers, parkers, and also help local businesses to market their products.

![Figure 3. Prototype of building components along Jl. Gabus.](image)

Figure 3. Prototype of building components along Jl. Gabus.

The review on the social impact shows an improvement in social activities, where coffee shops act as a forum that can support various social needs. This cannot be separated from the influence of Acehnese coffee culture, which still developing in modern coffee shops. To optimize this potential, coffee shop owners adapting the space organization to suit local coffee shop culture. So that not only socialize visitors can also working, meeting, and organizing various creative events such as workshop, community meet up, stand up comedy, music stage, office meeting, political campaign, etc.

![Figure 4. Space for creative events in coffee shop.](image)

Figure 4. Space for creative events in coffee shop.
Meanwhile, on a larger scale, the application of vernacular adaptive reuse lead to the transformation of urban fabric. The transformation is needed due to the change of land use based on 2009-2029 regional spatial planning regulations of Banda Aceh. Initially, the area was owned by the government and developed as housing for governor's employees. Then after the changes, some of the residential area was privatized and developed as commercial use.

![Urban land use plan of Banda Aceh city (2009-2029).](image)

Through the implementation of bottom-up adaptive reuse that changes the function of old houses into coffee shops, the area can be transformed according to a new land use regulation while maintaining its history as the first residential area in Banda Aceh City. This also supports the establishment of Banda Aceh city branding as one of the Heritage Cities in Indonesia. However, the three old houses that have been converted into coffee shops are not sufficing the building permit as commercial buildings, but still registered as residential buildings. The three coffee shops also do not meet the municipal regulation of commercial building requirements in the area such as Building Coverage Ratio, Floor Average Ratio, and Set Back Building.

In a spatial aspect, old houses has regenerated despite the changes in building components. In the three case studies, there are similarities in the transformation of spacial organization of yard, living room, bedroom, toilet, and dishwashing room. Significant changes in yard which was originally used as an open space for vegetation, turning into seating area with high social activity. Meanwhile in the living room and bedroom, although there is a change in function the types of activities are not much different from the original function as social space. It shows the use of previous function, although not optimally. In the service area, namely toilets and dishwashing, no changes are made because these functions are still needed in coffee shop with consideration of effectiveness and cost savings.

| Components       | Original Use                                      | Current Use                                      |
|------------------|--------------------------------------------------|--------------------------------------------------|
| Yard             | Public space: vegetation area, green open space, and children's play area | Public space: seating area socialization and creative event Service: warehouse and development area |
| Living Room      | Public space: receiving guests and socializing   | Public space: seating area for socializing       |
| Bedroom          | Private space: resting and sleep                 | Private space: employee room                     |
| Toilet           | Service: utility                                 | Service: utility, maintained                      |
| Dishwashing Room | Service: utility                                 | Service: utility, maintained with modification on grey water system. |
Changes in seating area occur periodically both functional and artistic to keep up with trends that affect the number of visitors. Meanwhile, in the service area, namely toilets and dishwashing, there is no change in function and is still used after going through modifications to fulfill the increasing requirements of coffee shop.

4. Conclusions
Vernacular adaptive reuse practices on the transformation of old houses into coffee shops are mainly motivated by community. Interventions are generated in creative and pragmatic way with minimal cost, without expert involvement. Its implementation transforms inactive residential area into an active area through the increase of social and economic activities. These changes also support the transformation of the previous land use as residential to suit commercial use with community as the main driver. In spatial aspect, the buildings are regenerated by using new spatial organization that still utilizes some of spatial organization from the old houses.

Despite the positive sides of vernacular adaptation, this study recommends expert participation in technical interventions in the planning of building utilities to avoid increasing development costs. Control is needed on the degree of intervention in landscape organization to comply with the regulation of commercial buildings requirements. This shall cover issues related to building permits arrangement, where permit processing can be carried out more easily when the coffee shops meet applicable requirements.

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