Barriers to Industrial Heritage Reconstruction and Reuse

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Contributor: Sunny Han Han , Huimin Zhang

The reconstruction and reuse of industrial heritage has constituted important means for the protection of that heritage, and has played a crucial role in promoting urban renewal and sustainable urban development. Based on time limits imposed on the completion of any reconstruction and reuse project, the obstacles can be divided into financial and systemic barriers in the early stage of a project and into secondary problems in the latter stage of a project.

industrial heritage barriers to reconstruction and reuse

1. Industrial Heritage Reconstruction and Reuse

Industrial heritage represents key historical material evidence that testifies to the development of human industrial civilization, industrial technology and industrial systems. It has important historical, social, scientific and aesthetic value. Since the International Committee for the Conservation of the Industrial Heritage (TICCIH) adopted the Nizhny Tagil Charter For The Industrial Heritage in 2003, the concept of industrial heritage has been clearly defined internationally; it consists of “the remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education” [1].

Scholars have recognized that there are generally two ways to protect industrial heritage: specimen static protection and “development oriented” dynamic protection. The former focuses on “authenticity”, while the latter injects new vitality into industrial heritage based on this authenticity. By being “reconstructed and reused”, industrial heritage can fulfill current needs.

Paradoxically, there is no consensus about the concept of industrial heritage reconstruction and reuse. On the one hand, although the concept of “industrial heritage” has been clearly defined in the Nizhny Tagil Charter For The Industrial Heritage, it is inseparable from the concepts of “industrial architecture”, “industrial land” and “industrial brownfield”. The reason for this inconsistent presentation is that different scholars belong to different disciplines or research fields, and their research perspectives are also varied. On the other hand, most researchers have shown that reconstruction and reuse are equivalent to adaptive reuse, temporary use, etc. They have not differentiated much between the terms in their research. For example, some researchers have noted that the concept of

"reconstruction and reuse" was clearly defined in the Burra Charter adopted in 1979 [2][3]. Indeed, the Burra Charter uses the term "adaptive reuse". A small number of researchers have shown a difference between the terms and proposed the concept of "reconstruction and reuse" [4]. Nevertheless, these scholars have not gone further and have not analyzed the concept deeply. This study shows that industrial heritage reconstruction and reuse has a specific meaning and application, and that it is necessary to clarify the terms to facilitate theoretical research that can serve practical projects.

As the words imply, industrial heritage reconstruction and reuse refers to the reuse of industrial heritage. It is possible to deconstruct the notion into "industrial heritage", "reconstruction" and "reuse". "Industrial heritage" is the object, and "reconstruction" and "reuse" are the means. Here, "reconstruction" is not an adjective but a noun that is juxtaposed to "reuse". Both reconstruction and reuse are reflected in practice, but reconstruction and reuse are sequential, with reconstruction happening first, followed by reuse. In examining industrial heritage reconstruction and reuse from this perspective, researchers found that it is different from general industrial heritage reuse such as "adaptive reuse" and "temporary use". Scholarly definitions have emphasized reuse on the basis of the preservation of original buildings, whether reuse entails "adaptive reuse" [5] or "temporary use" [6]. However, reconstruction and reuse has emphasized the means by which "reconstruction" occurs. Reestablishment, expansion, renovation, and refurbishment have been used when existing structures are not suitable for new purposes or are not safe enough to be retained [7]; these approaches can be incorporated in the concept of "reconstruction and reuse" because they conform to the concept of "reconstruction". Therefore, compared with the general concept of reuse, "reconstruction and reuse" undoubtedly has greater meaning and relies on a wider vision. According to the definition, researchers contend that industrial heritage reconstruction and reuse should include the general reuse strategy of injecting new life into industrial heritage by preserving original buildings [5] and making functional changes [8]. Reconstruction and reuse should also entail reuse based on the reconstruction of the layout of the new buildings and spaces to infuse continuity in the spirit of the place. This approach includes five strategies, including internal juxtaposition, renovation and implantation, structural reconstruction, external juxtaposition, and reconstruction and expansion; these strategies constitute the conceptual framework for industrial heritage reconstruction and reuse, as shown in **Figure 1**.

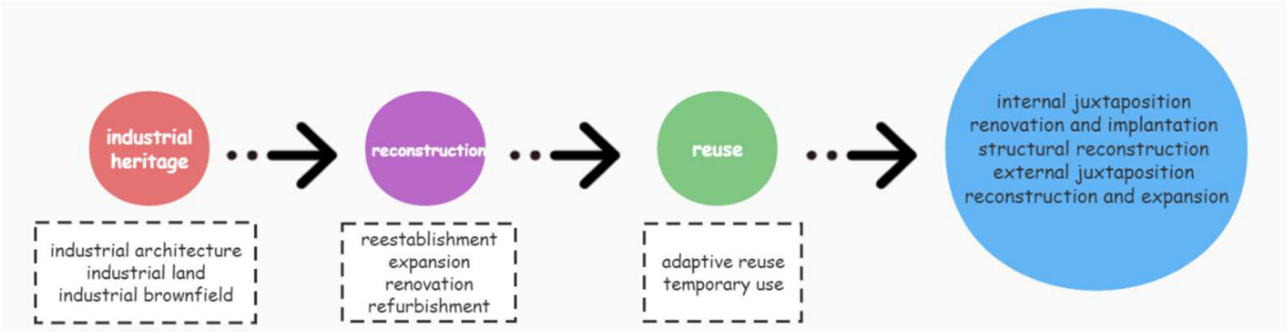

Figure 1. Schematic diagram describing the concept of industrial heritage reconstruction and reuse.

2. Current Barriers to Industrial Heritage Reconstruction and Reuse

Although industrial heritage reconstruction and reuse presents obvious benefits, “challenges and barriers involved make it futile and hard to obtain” [9]. André Fernandes, et al., highlighted the challenges and barriers of the reconstruction and reuse of waterfront areas by investigating the different foci of stakeholders, which they divided into six categories: governance (e.g., inconsistency of political vision, inadequacy of the intervention concept, inadequacy of the institutional model, inadequacy of institutional coordination, instability of the institutional model, lack of promotion and marketing); infrastructure (e.g., undefined structural projects, lack of accessibility); territory (e.g., size of the intervention areas, location of the intervention areas, metropolitan territorial model, land ownership issues); finance (e.g., lack of investment, financial liabilities, financial crisis, property market crisis); culture (e.g., industrial tradition, industrial stigma); and environment (e.g., environmental liabilities, climate change effects) [10]. These problems basically cover every aspect of the difficulties of industrial heritage reconstruction and reuse. In the past five years, research on the barriers to industrial heritage reconstruction and reuse has focused on some of these obstacles. Based on time limits imposed on the completion of any reconstruction and reuse project, these obstacles can be divided into financial and systemic barriers in the early stage of a project and into secondary problems in the latter stage of a project. Some representative literature is summarized in **Table 1**.

Table 1. Main literature on the current barriers to industrial heritage reconstruction and reuse.

Current Barriers		Author
Financial barriers		de Broekert, C., 2022 [9]; Yldiz, G., and Sahin Guchan, N., 2018 [11]; Dell’Ovo, M., et al., 2020 [12]; Merciu, C., et al., 2017 [13]; Nowogońska, B., 2020 [14]; Han, H., 2021 [15]; Kramářová, Z., 2018 [16]; Marian-Potra, A. C., et al., 2020 [17];
Incomplete legal system		Merciu, C., et al., 2017 [13]; Fanlei, M., and Chaojie, Q., 2020 [18]; Sadowy, K., and Lisiecki, A., 2019 [19]; Sroka, B., 2019 [20]; Wen, W., et al., 2021 [21]; Xiangguan, G., and Jiang, C., 2017 [22]; Palomares Figueres, M. T., et al., 2018 [23]; Vecchio, M., and Arku, G., 2020 [24]; Gyurkovich, M., and Gyurkovich, J., 2021 [25];
Secondary problem	Hollowing out and nihilization	Preite, M., 2020 [26]; Yong, D., 2019 [27]; Xiaojun, F., 2017 [28];
	Densification	Merciu, C., et al., 2017 [13]; Adams, C., 2021 [29];
	Gentrification	Squires, G., and Hutchison, N., 2021 [30]; Wincott, A., et al., 2020 [31]; Tideman, S., 2021 [32]; Mathews, V., 2019 [33]; Goyer, R., 2021 [34]; Radziszewska-Zielina, E., et al., 2022 [35];

2.1. Financial Barriers

Most researchers have shown that the lack of sufficient funds is the most important barrier to industrial heritage reconstruction and reuse, and that industrial heritage reconstruction and reuse projects need to find appropriate and feasible implementation methods and financial instruments [9]. In practice, “few of them are restored under poor conditions as a result of financial profits” [11]. The private sector has also often been uninterested in these projects due to “the significant remediation costs and the limited market values” [12]. Meanwhile, “the support of public actors is limited” [13], which has further aggravated the problem of funding in industrial heritage reconstruction and reuse projects.

It has happened that some private investors realized that industrial heritage reconstruction and reuse was profitable and thus invested in it, hence solving the financial obstacle encountered in the process of reconstruction and reuse. However, the short-sighted economic vision of private investors has generally pushed industrial heritage into the abyss, and the conflict of interest between the protection of heritage value and the realization of economic profits has been prevalent [14]. As Cristina Merciu, et al., pointed out, “some of the existing buildings of industrial heritage (special architecture, machinery and working tools of an outstanding value) entered a process with actions based on interests of economic gain. Interventions of brutal functional conversion affected a part of the industrial heritage, with buildings being partially or totally demolished or even being torched”. This comment emerged in the context of the privatization process initiated in Romania in the 1990s, which led to the “capitalization of industrial heritage”. When industrial buildings are bought by investors who often have different development aims, there is a “natural barrier” against the intervention of protective measures [13]. Due to the different degrees of capital intervention, a discourse based on power emerged, and industrial heritage became dependent on capitalist profit-seeking. The original purpose of industrial heritage reconstruction and reuse has tended to deteriorate, and protection has ceased to be a prerequisite for intervention.

2.2. Incomplete Legal System

The capitalization of Romania’s industrial heritage has damaged its heritage value through the reuse process, which has also highlighted the existing problems of this heritage’s protection and management system. Merciu, et al., stated that “the indifference of public administration and the bureaucratic burden related to obtaining the required approvals for the functional changes imposed by conversions and the documentation for the classification of industrial buildings as historical monuments” has had a negative impact on a process of industrial heritage reconstruction and reuse that has aimed at promoting urban renewal; hence, when planning economic policies for local, regional and national development, the protection of industrial heritage should be one of the policy objectives [13]. In fact, not only in Romania but also globally, industrial heritage protection and management have emerged as new concepts, presenting deficiencies in relatively all aspects, especially in industrial heritage reconstruction and reuse, which has become a consensual issue. Therefore, many researchers have emphasized relevant systems of industrial heritage reconstruction and reuse. Meng Fanlei and Qi Chaojie showed that industrial heritage reconstruction and reuse is inseparable from urban development and that targeted policies need to be provided at the urban level to avoid imitation and the sameness of reuse models among cities [18]. Katarzyna Sadowy and Adam Lisiecki also stressed the need for new municipal policies to better respond to grass-roots activities and socioeconomic potential in the regions at stake when studying the reconstruction and reuse of the Warsaw

industrial zone [19]. Bartlomiej Sroka showed that in the revival of industrial brownfields, in spite of permanent vertical and horizontal agreements among entrepreneurs, the lack of sectoral policies may lead to the disintegration of the local economic structure [20]. The legal system has been important for industrial heritage reconstruction and reuse. No matter who the actors involved in the implementation of an industrial heritage project are, what the protection level is, and what kind of planning system and institutional environment that project is placed in [21], the legal system is essential. Moreover, researchers have not theorized on this topic enough. Therefore, Gao Xiangguan and Chang Jiang noted that research on laws, regulations, and policies needs to be strengthened in the future to provide a scientific basis for decision-making and a mechanism for the management of industrial heritage reconstruction and reuse [22].

Moreover, financial and system barriers do not only affect the early phases of reconstruction and reuse, but also influence the removal or retention of projects after reuse. For example, María Teresa Palomares Figueres, et al., showed that a reconstruction and reuse project similar to that in the La Sang community (a project that won the Spanish Fostering Arts and Design Awards in 1999) has improved the quality of life of residents. Nevertheless, “a mix of political and economical issues truncated or set aside important ongoing projects” [23]. In this regard, finance and systems have always been important factors affecting the life cycle of industrial heritage reconstruction and reuse projects.

2.3. Secondary Problems

Industrial heritage reconstruction and reuse has not always produced economic, social, environmental, cultural and other benefits. In the case of the increasingly widespread reconstruction and reuse of industrial heritage, a paradox has become increasingly prominent about the benefits of such projects. Researchers have focused on this phenomenon and put forward three warnings. First, one should be alert to the problem of “hollowing out” and “nihilization” of heritage. In the process of industrial heritage reconstruction and reuse, removing machines and their components [26] or failing to reflect the history and value of plants (including buildings) [27] will affect the value and authenticity of industrial heritage. As a result, reconstruction and reuse projects have a “shell” but no “core”, which is not only contrary to the original intention of industrial heritage reconstruction and reuse that aims to protect industrial heritage but also causes the project to face the risk of quickly becoming outdated [28].

Second, one should be alert to the consequences of “densification” in the context of the demographic explosion. Merciu, et al., showed that although industrial heritage reconstruction and reuse can produce significant economic and social benefits, “urban regeneration may result in some negative environmental impacts as well, in relation to the quality of the urban fabric and the natural environment, due to the anthropogenic pressure generated by increased attractiveness of urban space after renovation of the industrial heritage” [13]. Carmen Adams also showed that “the paradox of rehabilitation actions is also highlighted, such as the case of Cabo de Gata, where reuse can lead to environmental deterioration, despite the patrimonial recovery that in principle it entails”. In this regard, this study emphasized that people involved in industrial heritage reconstruction and reuse should consider the tolerance threshold and the load capacity of the surrounding space, as well as the intended visual improvement of the architectural complex [29].

Third, we should be aware of the negative effects of “gentrification”. Gentrification is a phenomenon that has been abundantly debated. From an economic perspective, gentrification represents the positive external effects brought by industrial heritage reconstruction and reuse [13], which promotes regional “fashionable” and “high-quality” development. However, from a social perspective, gentrification causes “undesirable” residents to be expelled from their original residences and living spaces. Graham Squires and Norman Hutchison revealed this phenomenon by showing that the new housing, whose price exceeds the economic capacity of most community members, excludes people from less privileged social classes [30]. Abigail Wincott, et al., advanced similar views. They showed that the concept of “community” is simplified due to the intervention of more influential and powerful social classes in the process of industrial heritage reconstruction and reuse. The “disturbing” cultural history and its related intangible heritage are marginalized due to its “dark” nature, and new and more benign stories are remembered and promoted. This obliteration of local culture leads to a situation in which “while landowners and developers reap the financial benefits of this transformational process, it has been widely observed that this is often—usually—at the expense of the local communities that are marginalised or displaced” [31]. This marginalization is not conducive to shaping regional identity [32]. Vanessa Mathews analyzed and studied the gentrification of the Regina warehouse area in Saskatchewan by interviewing aborigines, representatives of local businesses and key stakeholders [33]; Renaud Goyer focused on the “gentrification” of the industrial heritage reconstruction and reuse project in Trois-Rivières, Québec [34]. Scholars have focused more on the negative effects of gentrification than its positive effects.

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