MALAYSIA ARCHITECTURAL JOURNAL

Malaysia Architectural Journal

Journal homepage:
https://majournal.my/index.php/maj
e-ISSN : 2716-6139

Heritage, Innovation, and Sustainability: Discourse from Sragi, Pekalongan, Indonesia

Agus S. Ekomadyo*[1], Eko Agus Prasetio[2], Ahmad Zuhdi Allam[3], Dini Agumsari[4]

[1]School of Architecture, Planning, and Policy Development, Institute of Technology Bandung, Indonesia
[2]School of Business and Management, Institute of Technology Bandung, Indonesia
[3]Groningen Research Institute for the Study of Culture, University of Groningen, Netherland
[4] Faculty of Engineering, University of Lampung, Indonesia

ARTICLE INFO

Article history:
Received: 30 April 2024
Received in revised form
Accepted: 15 October 2024
Available online: 23 June 2025

Keywords:
architectural heritage, sustainability transitions, Sragi Sugar Factory, innovation economy

ABSTRACT

This article addresses heritage issues within the context of sustainability, highlighting the integration of efforts to preserve the past with considerations for the future. In Indonesia, several industrial heritage sites, which remain active and serve as repositories of societal history and knowledge, are currently under threat due to political and economic pressures. Despite its efforts to survive, the Sragi Sugar Factory continues to hold economic value and generates a multiplier effect on the surrounding communities. Several incremental initiatives have been trying to revitalize several heritage buildings with new functions, but these innovations have not yet received comprehensive policy protection. Here, heritages are seen as a representation of the social struggle to maintain the historical values of the societies. The sustainability transition approach encourages an economic perspective that is more pro-innovation rather than a transactional neo-classical perspective, enabling heritage sites to be valued and considered through various incentives and empowerment programs as long-term investments.

1. Introduction

The discourse between architectural heritage and sustainability is often addressed separately. The former predominantly focuses on entities originating from the past, integrating them into values relevant to the present. Meanwhile, the latter is more concerned with the future, aiming to perpetuate values deemed essential in the present. Both discourses can intertwine when there is architectural heritage that still exists (as living heritage) but is threatened in its continuity due to various reasons. This often occurs with industrial heritage, where many industries were established and possess values from the past but are subsequently forced to close due to perceived inability to adapt to current conditions. However, as "living heritage," these industries operate akin to ecosystems: involving multiple actors within the industrial system, each with attachments stemming from the values built

* *Corresponding author.*
E-mail address: aekomadyo00@gmail.com

through historical processes. Thus, a sustainability approach for threatened "living heritage" becomes urgent, as it concerns how this heritage can continue to endure.

The focus on sustainability has become a significant concern in studies on architectural heritage when preservation efforts are linked to environmental issues and sustainable development. Semes [1] sought to explore the ethics of conserving historical environments to balance modern development with the cultural and social values established from the past. Carroon [2] aimed to develop practical strategies for making the revitalization of historical buildings more environmentally friendly while respecting their historical significance. He emphasized the importance of balancing modern sustainability goals with preservation efforts. Some heritage activists have attempted to incorporate sustainability principles into conservation efforts for buildings [3-5]. Others have endeavored to integrate issues of heritage conservation and sustainability [6-7].

Innovation plays a crucial role in strengthening sustainability by promoting the development of more efficient solutions. However, often, the implementation of these innovations requires a complex transitions process. Discourse on sustainability transitions often discusses how these transitions efforts can support the adoption of innovations for long-term sustainability. Sustainability transitions refer to fundamental and systemic changes in societal structures, behaviors, and practices, involving shifts across various sectors toward more sustainable and resilient pathways [8-10]. This innovative approach fosters the development of various new ideas that enable economic-oriented development to maintain future needs and equity.

The case studied is the initiative to revitalize several old buildings into culinary places the area of Sragi Sugar Factory in Pekalongan, Indonesia. Representing the irony of the sugar industry in Indonesia, which was prosperous before independence but now has become a sugar-importing country, the existence of old buildings in this sugar factory area remains, yet they appear to be poorly maintained. While the Sragi Sugar Factory remains operational, the current sugar business has not been able to fully utilize the old buildings as effectively as it did during its peak in the 1930s. Some members of the Sragi diaspora have initiated the revitalization of several old buildings around the Sugar Factory, transforming them into culinary places. This revitalization initiative also represents an innovation effort, showcasing how a love for historical legacies is transformed into a new economic function more relevant to the present. But, how these initiatives can sustaining in revitalizing heritage in Sragi?

By integrating the concepts of sustainability transitions and representational space, this article aims to open opportunities for heritage revitalization efforts within an innovation framework for sustainability. Considered as representational space, architectural heritage is seen as a representation of a community's struggle, including the efforts of community groups striving for heritage revitalization. From an innovation perspective, architectural heritage is not seen as isolated buildings but as part of an ecosystem that qualifies them as heritage, thus generating various transitional efforts to ensure their continued existence is not threatened.

2. Methodology

The research was conducted using a case study method, with Sragi Sugar Factory as the case. In addition to exploring the history of this area as is customary in heritage studies, the research focused on old buildings undergoing adaptive reuse as culinary places. This initiative was considered innovative due to its potential to enhance the value of a previously unused historic building.

The data were collected through secondary data, observations, informal interviews, and focus group discussions. Secondary data were primarily used to gather information about the history and development of Sragi Sugar Factory. Observations were mainly conducted on four old buildings repurposed as culinary places. Informal interviews were conducted with the owners and employees of these culinary places. Meanwhile, focus group discussions were held with the management of Sragi

Sugar Factory, discussing various revitalization initiatives, challenges faced, and potential for innovation sustainability.

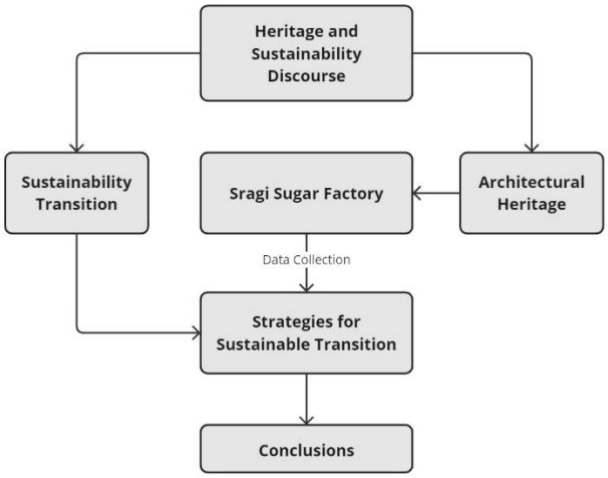

Fig.1. Research Methodology

The results of the focus group discussions were analyzed using a sustainability transition approach to offer solutions for the sustainability of innovation efforts towards heritage in Sragi. The sustainability transitions approach is expected to provide innovative perspectives for heritage revitalization efforts (Fig.1). Thus, revitalization efforts will be seen not as a cost, but as an investment for future sustainability.

3. Heritage and Sustainability: an Overview

While heritage conservation has traditionally focused on preserving the past, the sustainable transitions approach encourages a forward-looking perspective that aims for the future while aligning it with modern sustainability goals and practices. As a result, it is uncommon to find research exploring the application of the sustainable transition approach in heritage conservation studies, particularly in adapting heritage sites to changing environmental conditions and societal needs. The condition is happen in common heritage studies in Indonesia.

In recent discourse, preserving architectural heritage and sustainability has become a prominent focus, with architects and preservationists increasingly emphasising the adaptive reuse of historic structures as a sustainable alternative to new construction. This approach promotes the conservation of embodied energy in older buildings and minimises environmental impacts. Some architects have given ices on how architectural heritage and sustainability can synergise. In "The Future of the Past", Semes [1] explores the challenges and opportunities in preserving architectural and urban heritage. Semes argues for a conservation ethic that balances modern development with the need to safeguard historic structures and urban fabrics. Drawing on case studies and principles, the book advocates for a thoughtful approach to architectural preservation that considers the cultural and social value of the past in shaping the future. Another architect, Carroon [2] delves into the intersection of sustainability and historic preservation. Carroon outlines practical strategies for making existing buildings more environmentally friendly while respecting their historical significance. She emphasises the importance of balancing modern sustainability goals with preserving architectural heritage, offering insights and guidance for professionals in the field.

Positioning the past and future in heritage is perhaps most striking in the heritages in industrial settings, where innovations, development, and newness are constantly present. Industrial heritage refers to preserving and celebrating structures, sites, and artefacts associated with the past's industrialisation and technological advancements [11]. This heritage category encompasses former factories, mines, railways, and other industrial facilities, highlighting their historical, architectural, and

cultural significance. However, some experts argue that the principles and practices of preservation can be useful for industrial heritage; they offer valuable insights into how these spaces can be repurposed and conserved for contemporary use and appreciation.

In Indonesia, industrial heritage comprises the rich legacy of industrialisation, reflecting its historical, economic, and technological development. This includes Dutch colonial-era factories, mines, industrial infrastructure, and post-independence industrial sites. Although having experienced prosperity in the past [12], the sugar industry in Indonesia faces an irony: amidst the increasing domestic sugar demand driving sugar imports [13], sugar factories as heritage are often non-operational and neglected. With the case of sugar factories in Indonesia, the discourse on heritage and sustainability encounters a central issue: how heritage can sustain in the present; knowledge from the past can remain relevant for current conditions.

As a heritage, sugar factories inherently possess a culture that can foster an industrial ecosystem. Within this ecosystem, interdependency exists in the sugar industry supply chain: between sugar factories and farmers, sugar factories and consumers, and sugar factories and the surrounding communities. Viewing sugar factories as ecosystems allows for an examination of how cultural capital, including knowledge, values, and beliefs, is constructed through the interdependent relationships among industry's stakeholders.

This ecosystem perspective opens discourse on innovation that can contribute to heritage sustainability, as like as sustainability transitions discourses. This discourses adheres to the principle that various innovation efforts for sustainability agendas will require diverse transitions to achieve stability. Sustainability transitions aim for radical societal transformation towards eco-friendly, equitable, and socially responsible practices [14-15]. It is important to identify the niche in sustainability transitions, emphasize an innovation efforts by give as temporary shelters for pioneering. The niche will provide environments insulated from mainstream pressures, fosters innovation development and integrate this efforts into existing systems or reshaping them to support niche innovations [16-17].

4. Sragi Sugar Factory: Stories, Societies, and Innovation

4.1 Sugar Industry in Indonesia: a Historical Overview

Like stories of societal struggles intertwined with various controversies, the history of sugar factories in Indonesia embodies both sweetness and irony. The sweetness lies in nostalgic tales of the glory days of the sugar industry in this country, once ranking among the world's largest sugar producers before Indonesian's independence [12,18]. Meanwhile, the irony within sugar industry is found in its sugar import policies: as demand for sugar rises, existing sugar factories are unable to meet the emerging needs [19]. This controversy is epitomized by the existence of grand, beautiful sugar factories that were once symbols of past glory but now lie neglected due to dwindling production capacities or are abandoned and cease operations.

Currently, there are 207 sugar factories in Indonesia, with the majority (77%) no longer active, while only a small portion (23%) remain operational. From these data, it is observed that sugar factories in Java comprise a larger proportion (81%) of those that are inactive, whereas those outside Java, conversely, have a higher percentage (83%) of active factories (Fig.2). Based on this data, the hypothesis arises that sugar production in Indonesia is currently dominated by sugar factories outside Java, in islands where agricultural land for sugarcane cultivation remains extensive. Meanwhile, agricultural land in Java is increasingly pressured by urbanization.

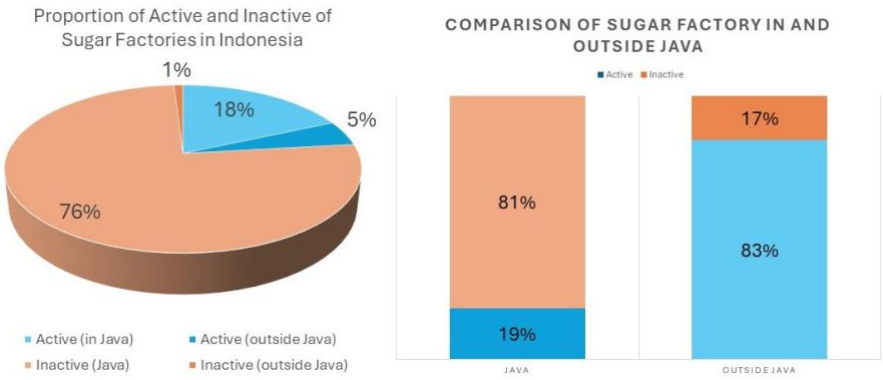

Fig.2. Overview of the proportion of sugar factories in Indonesia: Java and Outside Java (source: adopted from https://id.wikipedia.org/wiki/Daftar_pabrik_gula_di_Indonesia)

Based on the history and development, it is evident that sugar productivity and quality have tended to decline [20]. Examining the sugarcane cultivation area, there was a significant sharp decrease before Indonesia's independence in 1945, followed by a substantial increase in land area since the 1980s. It is highly likely that this increase in land area occurred outside of Java. However, despite this expansion, the productivity and quality of sugar produced (as seen from the yield) have experienced a decline (Fig. 3). From these data, the hypothesis arises that the decline in sugar productivity and quality in Indonesia is more attributed to factors related to management, including technology usage and innovation, rather than a decrease in the cultivation area.

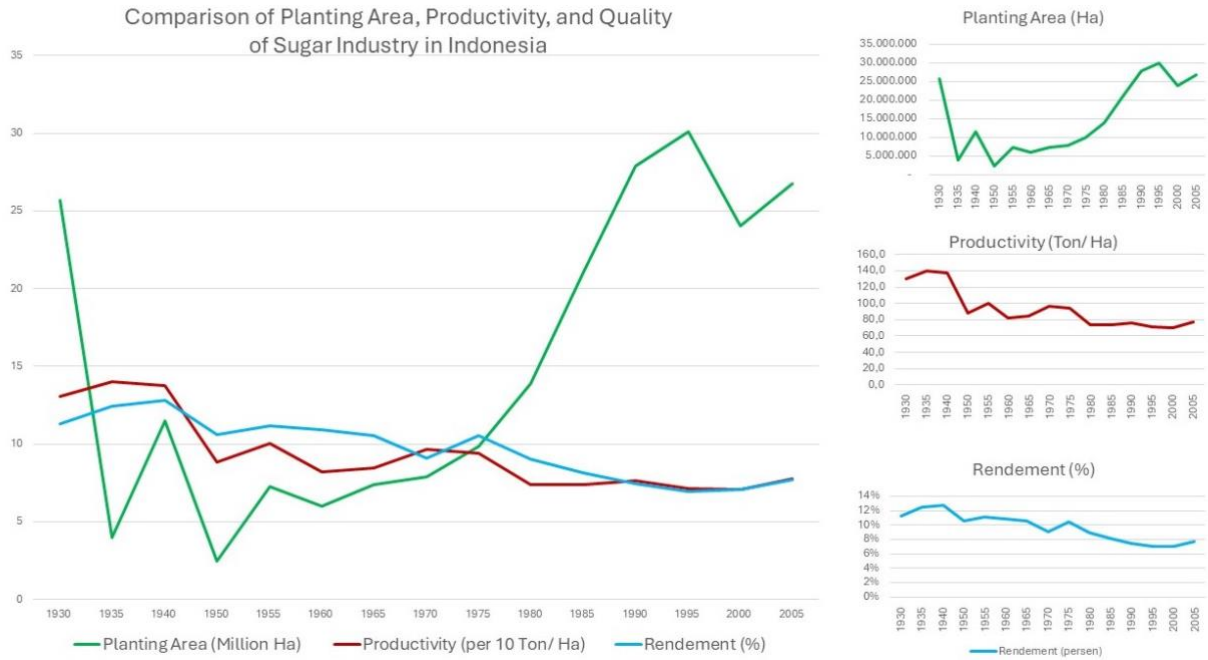

Fig. 3. Overview of the condition of sugar factory activities in Indonesia from 1930 to 2005 (source: Mardianto, et al., 2005)

4.2 Sragi Sugar Factory as Architectural Heritage

The Sragi Sugar Industry in Pekalongan, Central Java, Indonesia, has significant historical and economic importance. It was one of the country's earliest and largest sugar factories, with operations dating back to the Dutch colonial period. The sugar industry played a vital role in the region's economic development, particularly during the late 19th and early 20th centuries. In its development, Sragi Sugar Factory has undergone dynamics in the management of the sugar industry in Indonesia, leading

to its merger with other sugar factories into a state-owned company named Sinergi Gula Nusantara (Fig.3).

Situated in Sragi Village, Sragi District, Pekalongan Regency, Central Java, Indonesia (Fig. 4), Sragi Sugar Factory presently stands as the last bastion in the Northern Coastal region of Central Java, where numerous sugar factories under the PTPN Group umbrella have been deactivated [22]. When the modernization of the sugar factory was carried out over the past few years, the machines and techniques used in Sragi Sugar Factory's operations were still the same, at least during the Second World War. Sragi Sugar Factory's production period is only around 3-5 months per year, from May to August or October. This factory collects sugar from its own gardens and community gardens. Sragi Sugar Factory has existed since the mid-19th century. Construction was approved by the Dutch East Indies colonial government in 1836 and began in 1837 on 141,170 square meters for factory buildings and 400 bouw for sugar cane plantations. The construction of this factory used funds from Javasche Courant, which were invested through the government, amounting to 50,000 guilders. A. Zicsel, as the designer, realized the Sragi factory had limited funds and later became the administrator [23].

For efficiency and national budget balance, many sugar factories in Java that are considered unproductive are now closed and abandoned. Some of the closed sugar factories have now been converted into tourist attractions, often devoid of the buildings' history. Some examples include the Colomadu Sugar Factory, Solo, which was transformed into a cultural facility, and the Banjaratna Sugar Factory, Brebes, which was converted into a rest area. In 2023, only a few Dutch East Indies sugar factories will remain operational [24] (Fig. 5). The continued function of heritage is essential because many historical lessons can be learned, not only related to the building but also to the systems and activities within it.

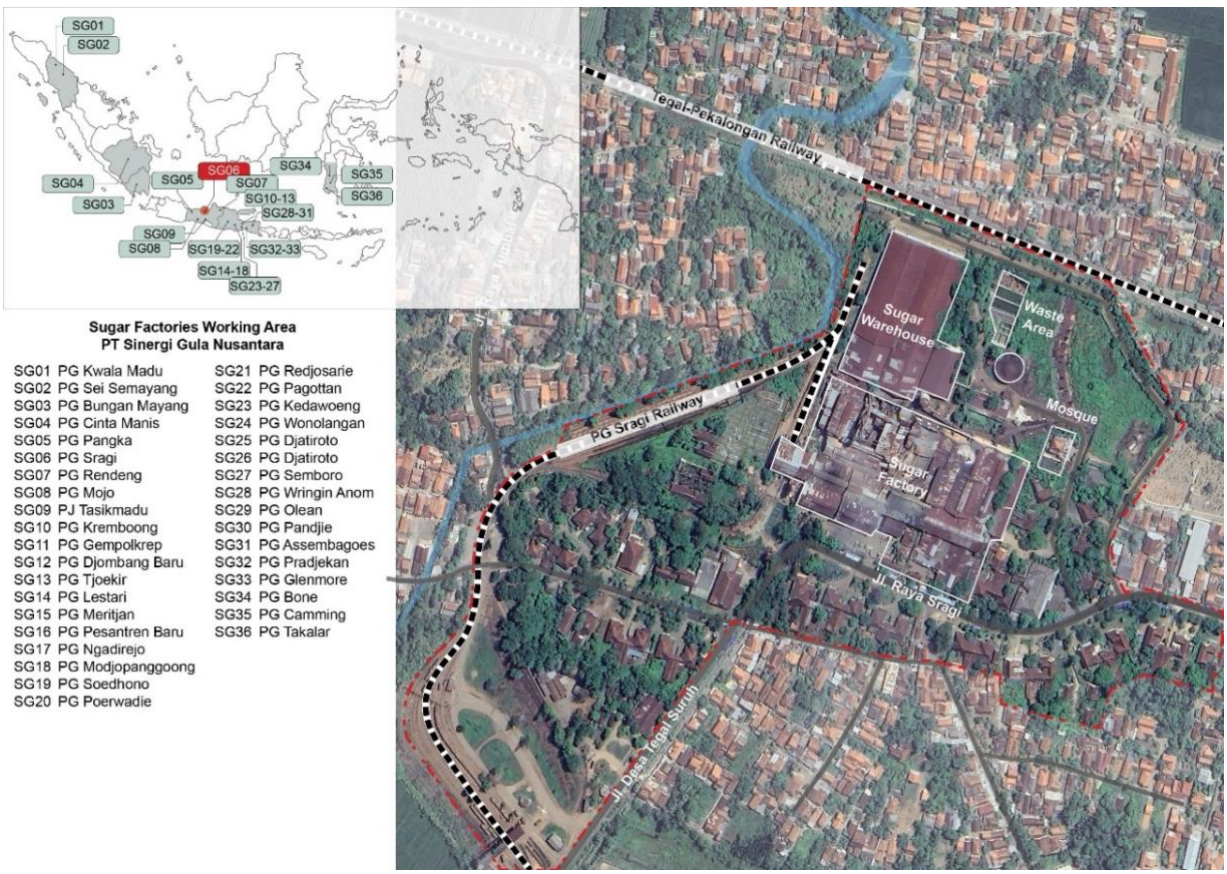

Fig. 4. (Left) The location of the Sragi Sugar Factory as one of the factories owned by PT Sinergi Gula Nusantara, (Right) The Sragi Sugar Factory Area (source: Sinergi Gula Nusantara from https://sinergigula.com/about/wilayah. Basemap from Google Earth, 2024, with modification)

Fig. 5. The distribution of colonial-era sugar factories on Java Island. Green highlight: active sugar factories, red highlight: locus of Sragi Sugar Factory (source: Nugroho, *et al* 2019, with modification)

Despite being recognized as heritage, the current existence of the Sragi Sugar Factory is facing threats. These threats are represented by the factory buildings, which still embody the heritage character but with limited activity (Fig.6 left). One of the strengths of this factory as heritage lies in its management, which largely comes from the families of the previous factory management. Knowledge about sugar factory management is evidently passed down through generations, revealing that the meaning of heritage does not only stem from the buildings but also from the knowledge (Fig.6, right).

Fig.6. Sragi Sugar Factory (left) and discussion between the research team and the management (right)

From discussions with the management of the Sragi Sugar Factory, it became apparent that there are numerous challenges in policy-making to treat this factory as heritage. In the name of production efficiency, national sugar industry policies prioritize efficiency, often resulting in a lack of allocation of funding for heritage conservation efforts. Some other sugar factories, which also hold heritage value,

have even been closed down due to being deemed inefficient. However, despite operating on a limited scale, these sugar factories still produce and employ workers. The loyal employees are motivated not solely by salary but also by heritage values, as the factory holds significant historical importance as a source of livelihood. Policies oriented towards deterministic efficiency often fail to account for heritage that could still sustain sugar factories economically.

4.3 Innovating Heritage: Transformation of Old Buildings into Culinary Places

In the district of Sragi Sugar Factory, a heritage culture in architectural buildings are represented by the emergence of several culinary places by transforming sevaral old buildings here (Fig.7). Two factors drive this transformation initiative: internal and external. Internally, there is a romanticism towards the past glory of the Sragi Sugar Factory, prompting local children who have become entrepreneurs outside of Sragi to return to their hometown and open dining establishments here. Externally, there is a rising culinary trend as a lifestyle choice, allowing heritage to be commodified as a differentiation strategy to organize culinary business.

Fig.7. Transformation of old buildings into culinary places in Sragi Sugar Factory area

The initiative to revitalize old buildings into contemporary dining venues demonstrates that heritage can serve as cultural capital for innovation. Here, innovation is understood as the added value of a product or service due to its novelty based on specific knowledge, which has economic and/or social impacts [25-26]. The revitalization of heritage in Sragi is driven by the affection for the past by several entrepreneurs aiming to create added value to old buildings, thereby enhancing their economic values.

However, for this initiative to have sustainable value, particularly in terms of economic and social sustainability, various transition efforts are needed. Currently, support for this innovation initiative remains local, with incentives provided to entrepreneurs revitalizing old buildings by the sugar factory management. These incentives have a very limited timeframe and are vulnerable to discontinuation in case of changes in management personnel. There is no national policy from state-owned enterprises serving as the legal basis for providing incentives for the revitalization of heritage buildings. This means that, legally and formally, heritage assets are still considered like any other property asset, valued solely in economic terms. Transitional efforts are needed so that heritage assets, such as old buildings owned by state-owned enterprises, also have cultural value, thus providing the basis for calculating economic incentives for various innovation efforts aimed at sustaining the heritage owned by these state-owned enterprises.

5. Sustaining the Innovation of Heritage in Sragi: a Transition Approach

Based on observations, informal interviews to the informants, and Focus Group Discussions with the stakeholders, several important findings emerged regarding the significance of heritage and how

the sustainability transitions approach could play a role in preserving heritage as an ecosystem. Firstly, the initiative to revitalize old buildings in Sragi is based on a romanticism of initiators, triggered by the narrative of the past glory of the sugar industry. Some initiators of heritage revitalization in Sragi are entrepreneurs from outside Sragi now, who had childhood experiences there. These memories drive them to appreciate the presence of old buildings because they hold stories within them, forming cultural capital that stimulate efforts for revitalizing old buildings into culinary places.

Secondly, there is potential market growth driven by the increasing connectivity of the community in the Sragi area and its surroundings. Digital interconnectivity has led to new lifestyles, including hanging out at eateries and taking selfies with the buildings in the background. Transportation interconnectivity allows people to choose dining venues even if they are located relatively far away. Some consumers of culinary places in Sragi old buildings arrive by cars from areas outside. Additionally, the construction of the Trans-Java toll road also contributes to making the Sragi area a transit area. It makes Sragi and the potential of its architectural heritage, becomes destination for the new consumers for eating activities.

Thirdly, the initiators faced many challenges when initiating the revitalization. One entrepreneur described his efforts as "babat alas", which literally means "clearing the forest," implying that this initiative would face numerous obstacles, lack of support, and uncertainty. Like any innovation, this initiatives would encounter many risks to achieve its goals.

Fourth, there is support from the local management of Sragi Sugar Factory, which provides incentives for these entrepreneurs to revitalize the old buildings. It reduces in the rental costs of the old buildings, considering that the entrepreneurs still have to bear the cost of renovating the building damages. This cost relief significantly impacts the business cycle of the innovators by reducing the risks associated with running culinary businesses.

Fifth, these incentives are still put in local authority domain that have limited duration. This means that if there is a change in management leadership, these incentive policies could change. There is no national policy from this state-owned company that provides economic value for buildings with heritage significance. Commonly, the rental costs of heritage buildings could be equated with the rents of ordinary buildings based on their size.

Sixth, the lack of economic valuation of heritage is a consequence of the lack of inclusion of cultural aspects for investment strategies and governance of the sugar industry in Indonesia. Currently, the governance perspective of the sugar industry is still dominated by a transactional Neoclassical economic approach that overly emphasizes productivity and efficiency. The local knowledge held by the factories and the surrounding community has not been well formulated as cultural capital that can be transformed into economic capital.

Seventh, to ensure that cultural values, including heritage, become an integral part of the sugar industry's governance in Indonesia, a transition strategies is needed for heritage to be sustainable. Transition efforts include shielding, nurturing, and empowering to allow innovative efforts to grow, develop, and stabilize within an ongoing market system. One transition approach is to calculate the societal impact of investment [27-29]. Referring to the case of Sragi Sugar Factory, there is a need for shielding strategies to protect the sustainability of revitalizing old buildings into culinary places.

Eighth, in addition to shielding strategies, the sustainable transition approach suggests efforts in nurturing and empowering [8,33]. Referring to the case of heritage revitalization in Sragi, nurturing strategies can be implemented by encouraging local entrepreneurship, while empowering strategies involve empowering sugarcane farmers to connect with these entrepreneurial efforts.

Ninth, based on innovation and sustainability transition perspective, architectural heritage is seen not just as buildings but as ecosystems. Many actors are involved and build interdependence represented in the heritage. This mutual relationship generates a wealth of knowledge, which can serve as cultural capital within the ecosystem of architectural heritage. This cultural capital can be a source of knowledge to drive various innovations by circulating it with social and economic capital [30-32].

6. Conclusion

Learning from the sustainability transitions approach for revitalization initiatives of old buildings in Sragi, this article presents arguments to see architectural heritage not only as artifacts but as ecosystem. It examines the connections with the buildings that are built from the past to be related to present issues and how it can be conserved for the future. This ecosystem approach brings heritage more relevance with current issues such as innovation and sustainability.

The advantage of ecosystem approach for heritage is how knowledge is possessed by the actors that related with the of architectural heritage. Learning from Sragi Sugar Factory, this knowledge can stimulate actors to initiate the revitalization effort, based on memorable stories from the past in this place. This memories becomes cultural capital, which can be circulated into economic capital and to drive innovation.

Exercising the sustainability transitions approach brings heritage issues into the discourse on sustainability, and also encourages various innovations for the sustainability of heritage itself. Here, the sustainability discourse is used enlarge the continuity efforts of heritage. The approach of heritage as an ecosystem is able to uncover intangible actors that are actually part of its mutual relations, such as the presence of sugarcane farmers in the sugar factory ecosystem. The sustainability transition can be used to make heritage revitalization efforts as innovation, and how this effort can be stable in market dynamics through shielding, nurturing, and empowerment strategies.

Acknowledgement

Acknowledgements are extended to the Institute of Research and Community Services, Institut Teknologi Bandung for providing Community Services Funding, Mr. Tegoeh Narwanto, General Manager of Sragi Sugar Factory, and the factory's staff. Special thanks also go to the entrepreneurs of Sragi culinary places: Ms. Susiana (Omah Carkonah) and Mr. Voo Fahman (Teman Semeja).

References

[1] Semes, S. W. (2009). *The Future of the Past: A Conservation Ethic for Architecture, Urbanism, and Historic Preservation.* Norton Professional Books
[2] Carroon, J. (2010). *Sustainable Preservation: Greening Existing Buildings*. John Wiley & Sons.
[3] Weaver, M.E. (1997). *Conserving Buildings: A Manual of Techniques and Materials.* Wiley
[4] Bergman, D. (2012). *Sustainable Design A Critical Guide.* Princeton Architectural Press
[5] Brophy, S. & Wylie, E. (2008). *The Green Museum: A Primer on Environmental Practice.* AltaMira Press
[6] Leifeste, A, & Stiefel, B.L. (2018). *Sustainable Heritage: Merging Environmental Conservation and Historic Preservation.* Routledge.
[7] Merlino, K.R. (2018). *Building Reuse: Sustainability, Preservation, and the Value of Design.* University of Washington Press
[8] Geels, F. W. (2002). Technological transitions as evolutionary recon Figuration processes: a multi-level perspective and a case-study. *Research Policy,* 31(8-9), 1257-1274:
[9] Rotmans, J., Kemp, R., & van Asselt, M. (2001). More evolution than revolution: transition management in public policy. *Foresight,* 3(1), 15-31:
[10] Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy,* 41(6), 955-967:
[11] Douet, J. (ed.) 2013. *Industrial Heritage Re-tooled: The TICCIH Guide to Industrial Heritage Conservation.* Routledge.
[12] Rohman, F. (2022). Menilik Sejarah Gula di Indonesia, Komoditas yang Bikin Betah Penjajah. *Katadata.* https://katadata.co.id/ekonopedia/sejarah-ekonomi/63342bc3ee213/menilik-sejarah-gula-di-indonesia-komoditas-yang-bikin-betah-penjajah
[13] Thertina, M.R. (2020). Ironi RI Raja Gula Dunia dan Mimpi Setengah Abad Swasembada. *Katadata.* https://katadata.co.id/berita/pertanian/5eb183d9a9edf/ironi-ri-raja-gula-dunia-dan-mimpi-setengah-abad-swasembada

[14] Smith, A. & Raven, B. (2012). What is protective space? Reconsidering niches in transitions to sustainability, *Research Policy,* 4 (6), 1025-1036, https://doi.org/10.1016/j.respol.2011.12.012.
[15] Kemp, R., Schot, J., & Hoogma, R. (1998). Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management. *Technology Analysis & Strategic Management,* 10(2), 175–198. https://doi.org/10.1080/09537329808524310
[16] Markard, J. & Truffer, B. (2006). Innovation processes in large technical systems: Market liberalization as a driver for radical change? *Research Policy,* 35 (5), 609-625, https://doi.org/10.1016/j.respol.2006.02.008.
[17] Bergek, A., Jacobsson, S., Carlsson, B., Lindmark, S.,&Rickne, A., (2008). Analyzing the functional dynamics of technological innovation systems: a scheme of analysis. *Research Policy*, 37, 407-429. http://dx.doi.org/10.1016/j.respol.2007.12.003
[18] Knight, R. G (2013). Introduction: Java Sugar and the Age of Mass Production. In Knight, R.G. (2013). *Commodities and Colonialism: The Story of Big Sugar in Indonesia,* 1880-1942, Brill, https://doi.org/10.1163/9789004251090_002,
[19] Idris, M. (2020). Ironi Gula, Eksportir Era Hindia Belanda, Jadi Importir Usai Merdeka. *Kompas.com*, https://money.kompas.com/read/2020/05/25/134125926/ironi-gula-eksportir-era-hindia-belanda-jadi-importir-usai-merdeka?page=all.
[20] Mardianto, S., Simatupang, P., Hadi, P.U. Malian, H., & Susmiadi, A. (2005). Peta Jalan (Road Map) Dan Kebijakan Pengembangan Industri Gula Nasional. *Forum Penelitian Agro Ekonomi,* 23 (1) 19 – 37.
[21] Suryantono, I. (2010). Kondisi Sosial Ekonomi Buruh Pabrik Gula Sragi Kabupaten Pekalongan Pasca G30S Tahun 1965-1998. *Paramita Historical Studies Journal,* 20 (1), 45-60.
[22] Pratomo, S. (March 2024). SGN PG Sragi, Benteng Terakhir Pabrik Gula di Pantura Jawa Tengah: Fokus Bangun Kemitraan Petani Jaga Pasokan BBT. *Sinergi Gula Nusantara.* https://sinergigula.com/news/SGN-PG-Sragi-Benteng-Terakhir-Pabrik-Gula-di-Pantura-Jawa-Tengah-Fokus-Bangun-Kemitraan-Petani-Jaga-Pasokan-BBT retrieved 30 April 2024.
[23] Cahyono C. (2001). *Pekalongan 1830-1870: Transformasi Petani Menjadi Buruh Industri Perkebunan*. LEC
[24] Nugroho, P.S., Yuliastuti, N., Rukayah, R., Nugroho, R., Cahyono, U.J. (2020). Identifikasi Pabrik Gula Sebagai Industrial Heritage Di Jawa. *Jurnal Arsitektura,* 18(1) 119-128, doi:http://dx.doi.org/10.20961/arst.v18i1.37936.
[25] Yuliar, S. (2011). *Transformasi Penelitian ke dalam Inovasi.* Dewan Riset Nasional.
[26] Ekomadyo, A.S., Santri, T., Riyadi, A (2017). Habitat for Innovative Milieu: A Place-Making Study of University and Start-up Enterprises Relationship. *IOP Conference Series: Earth and Environmental Science*, 152, doi :10.1088/1755-1315/152/1/012020,
[27] Rotheroe, N. and Richards, A. (2007). Social return on investment and social enterprise: transparent accountability for sustainable development. *Social Enterprise Journal,* 3 (1), 31-48. https://doi.org/10.1108/17508610780000720
[28] Pathak, P. and Dattani, P. (2014). Social return on investment: three technical challenges. *Social Enterprise Journal,* 10 (2), 91-104. https://doi.org/10.1108/SEJ-06-2012-0019
[29] Lombardo, G., Andrea M., Irene R., Nader T., and Silvano C. (2019). "Assessment of the Economic and Social Impact Using SROI: An Application to Sport Companies" Sustainability 11, no. 13: 3612. https://doi.org/10.3390/su11133612
[30] Ekomadyo, A.S., Wijaya, N., Vardhani, V.J., Maulana, A.T., Suhendar, H., Susanto, V. (2023). Field of Creative Culture: a Study of Creative Movement and Innovation of Terracotta Culture In Jatiwangi, Indonesia. *Creativity Studies,* 16(1), 355–370, https://doi.org/10.3846/cs.2023.15333
[31] Swedberg, R. (2006). The cultural entrepreneur and the creative industries: beginning in Vienna. *Journal of Cultural Economics*, 30(4), 243–261. http://www.jstor.org/stable/41810929
[32] Scott, A. J. (2014). Beyond the Creative City: Cognitive–Cultural Capitalism and the New Urbanism. *Regional Studies*, *48*(4), 565–578. https://doi.org/10.1080/00343404.2014.891010
[33] Smith, A., Voß, J. P., & Grin, J. (2010). "Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges." *Research Policy*, 39(4), 435-448. DOI: 10.1016/j.respol.2010.01.023