

Science Education for Public and Design of Infrastructure at Rest Area KM 260B Banjaratma

Yerisca Novri Nathania Saragih¹, Asep Mulyana¹, Wa Ode Yuznita¹

¹ Master of integrated microfinance management program, Faculty of Economics and Business, Universitas Padjajaran, Indonesia.

Received: October 5, 2023

Revised: November 23, 2023

Accepted: December 25, 2023

Published: December 31, 2023

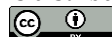
Corresponding Author:

Yerisca Novri Nathania Saragih

yerisca.novri@gmail.com

DOI: [10.29303/jppipa.v9iSpecialIssue.6405](https://doi.org/10.29303/jppipa.v9iSpecialIssue.6405)

© 202 The Authors. This open access article is distributed under a (CC-BY License)



Abstract: Rest areas on toll roads are an important public infrastructure of the entire freeway construction. Interesting innovations occur on this toll road section in Brebes district, Central Java. The purpose of this study is to describe how design education and digital promotion design at 260B Banjaratma rest area occur. The research method used in this study is descriptive qualitative with an empirical approach, namely with on the spot research. Data was extracted by observation in the field, in addition to data derived from books, journals and other sources compatible with the research theme. The results of the study found that there is public learning about science in the area, namely science about the chemical process of sugar making, architecture, spatial construction, and microeconomics, (2) there is public learning about the history of the area, the physics of materials, namely the construction of bricks that are strong for hundreds of years, and (3) elements of edutourism, namely the combination of public learning with tourism for visitors or toll road users.

Keywords: Infrastructure; Science Education; Rest Area

Introduction

Public space as the main element of the city also has the problem of limited space. Moreover, public space is a space that can be accessed by anyone with a very diverse range of activities, such as: sports, arts, recreation, demonstrations, trade, transit, and others. In addition to being utilised by citizens of the city itself, these public spaces are often also used by citizens from other cities, thus increasing the space burden that has an impact on the city's public spaces. Many public spaces have changed function to accommodate various activities that are needed as a "solution" to the problem of limited urban public space. Sidewalks as part of the city's public space that functions as a circulation path are often used as a place to sell street vendors (Hantono et al., 2018; Rizqullah & Fuad, 2022).

Public space is one of the important component in urban planning. Because today, most of the development activities in urban areas are starting to forgetting the existence of public spaces for community.

This has the potential to cause inequality in the community. Therefore the Indonesia has endeavoured to improve and build public space facilities so that they can be accessible to many people (Carmona, 2021; Rohmah, 2022).

In the current era, people must be able to cope with the use of information and communication technology (Gnams, 2021; Wang et al., 2020), especially as technological sophistication develops very rapidly. We can realize that almost all people are used to using information and communication technology in their daily lives such as the use of gadgets and internet services (Tinambunan, 2022). And the use of technology also certainly makes it easier for people to communicate with each other. With gadgets, tablets, computers and laptops connected to internet access, everyone can use this technology to carry out various activities to fulfil their needs and interests such as doing school assignments, finding news, facilitating work and so on (Tinambunan, 2022).

How to Cite:

Saragih, Y.N.N., Mulyana, A., & Yuznita, W.O. (2023). Science Education for Public and Design of Infrastructure at Rest Area KM 260B Banjaratma. *Jurnal Penelitian Pendidikan IPA*, 9(SpecialIssue), 686–691. <https://doi.org/10.29303/jppipa.v9iSpecialIssue.6405>

The public space in the discourse of this study is the rest area in Banjaratma, Brebes. This public space provides various functions as a promotional space for various micro business units. To ensure promotional space and support this commitment, four ministries consisting of the Ministry of Cooperatives and SMEs, the Ministry of SOEs, the Ministry of Public Works and Public Housing, and the Ministry of Transportation signed an MoU located at Rest Area KM 260 Banjaratma, Brebes, Central Java. Rest Area KM 260 Banjaratma is managed by PT PP Sinergi Banjaratma which is an affiliated company whose share ownership is owned by PTPP, PT PP Properti Tbk, and other state-owned companies.



Figure 1. Construction bricks as a form of physical science material

There is something interesting about the public space in this rest area, because it occupies the land and area of the sugar factory bricks. The construction is a form of physics science, especially in the brick building materials that are still organised today. Bricks as a construction material display a great arrangement of physics (Hall & Hoff, 2021; Hens, 2023).

Method

The type of research the author uses is qualitative research. Qualitative research is research whose final results produce descriptive data sourced from information on people and behavior that is usually observed directly (Thompson Burdine et al., 2021). This means that the author will provide factual information in data and information because of direct observation. The approach used is ethnography. Ethnography is a building of knowledge that includes research techniques, ethnographic theory, and various kinds of cultural descriptions (Madden, 2022; Wijaya, 2018).

The research was conducted by taking a location in rest area Bajaratma. A Study with modern architectural approach in office building. Explaining thoroughly by

examining the problems and existing needs to be adjusted to the writing. This research was conducted in several stages, namely: the data collection stage, data collection stage, data analysis stage, and the conclusion drawing stage (Qoron & Yandri, 2022).

Result and Discussion

Brick Construction : A Science Education Of Material Physics

This building was once the former Banjaratma Sugar Factory established by the Amsterdam, Netherlands-based plantation company NV Cultuurmaatschappij in 1908. The construction of the rest area was carried out by maintaining the original physical form of the sugar factory. Some parts of the building were not changed, such as walls that still use the original bricks. Even so, there are several additions made, such as steel construction to strengthen the building structure and patch up the bricks that have become porous (Kumar et al., 2021; Singh et al., 2023).

This is a heritage because we still maintain the original building of the former sugar factory. There are only a few (renovations) that are technically not feasible, we repair them," he said. Inside the main building of the factory, visitors can enjoy the classic atmosphere while relaxing while waiting for the trip. Even the manager still maintains two sugarcane milling machines and a locomotive used to pull raw materials to make the rest area look more artistic. Heritage elements are favoured. We also added a locomotive that used to pull sugarcane that we asked PTPN IX for, so it was placed there and became one of the spots where people took pictures. Not only that, the manager also added others such as a dancing fountain that operates at certain times.

Bricks are a material that is quite good at retaining heat and slow to conduct it (Vijayan et al., 2021; L. Zhang et al., 2020), or it can be called a good insulator (Ahmadi et al., 2020), so that during the hot days, houses that use bricks, usually the room in the house will feel cooler. If it has received heat from the sun during the day, then usually the brick wall will flow the heat into the room of the house slowly at night, so that the house using bricks will feel warmer at night.

This will continue, so that the effect of a house that uses brick material will feel cooler during the day (Sharaf, 2020), and will feel warmer at night (Rai, 2021). The effect will make the occupants of the house feel more comfortable to be in it. In addition, bricks are also stronger in the face of weather attacks (Sitia et al., 2021), when compared to using materials such as wood for example, so that the time of use can be longer. Moreover, the price of bricks is not as expensive as stronger materials such as concrete for example (N. Zhang et al., 2021). So work using bricks can be more economical and

affordable (Alam et al., 2022; Edike et al., 2022). Maybe bricks are not a very strong material, but if the workmanship and installation is correct, then the bricks are able to withstand their own load and also withstand the burden of other materials charged to them, even though the load is quite heavy.



Figure 2. Stand for SME Faced the Bricks Wall

Perhaps the durability of a brick building is not as strong as a natural stone building, but if it only lasts for a few hundred years, then the brick building is still able to withstand it (Fiala et al., 2019; Yavartanoo & Kang, 2022). As an example, maybe you can see buildings made by the Dutch in Indonesia, which are still firmly standing today.

Public Infrastructure for Development of SME

Public space itself also has such plural meanings, depending on the context in which it is used. Nonetheless, despite the various semantic differences, there are common characteristics attached to public space. In a general sense, public space is a space where various public interests meet, in which public authority is formed public interests meet, in which public authority is established. authority). In this regard, this discussion only focuses on the mass media as the main public space most popularly used by the public (Garnham, 2020).

The existence of space is always side by side with other spaces, inner space and outer space, dark space and light space, downstairs and upstairs space, and so on. dark and light, downstairs and upstairs, and so on. In the context of its usefulness, these spaces can be said to be a function of space. Before the form of the space exists, the space already has a limited function (space by design). But over time the use and activities that develop in it, it is not uncommon for spaces that have been formed to have functions that are different from the original purpose (design) and there are even additional functions (Hantono et al., 2018).

The more activities that take place in it, the more likely the utilization or function of this space becomes more complex. becomes more complex. One space that

is used at the same or different times becomes a shared space for the people who use it. becomes a shared space for the people who use it. This is what often happens in urban public spaces (Hantono et al., 2018).

Public open spaces have a close relationship with urban communities. Spaces These urban spaces are easily accessible to the public, both visually and physically. Assessment of the visual aspect of an visual aspects of an area against the shape of the city is the result of interaction between the community and the urban environment, namely human perception of the character of space related to aspects of the city. the urban environment, namely human perception of the character of space related to natural and cultural aspects. (natural) and cultural (cultural). These perceptions arise due to the interaction between the observer with the object of observation which is influenced by the distance of observation in space (Purwanto, 2014).

Public space is a space to promote and honour the right to be different. Expressions of difference, spontaneity, and creativity are part of everyday life in public spaces. Public spaces should be free of charge, free from fear, open to all, including the poor, and free from physical barrier (Purwanto, 2014). Streets, parks, and open fields are public spaces that allow us to contact and live with differences. Individual and group freedoms are recognized as long as they do not interfere with others. However, this has been challenged since the privatization of public space. Not only are public spaces being converted to commercial use, but also the creation of public spaces by the private sector. On the other hand, on the other hand, many government-created public spaces, or formal public spaces, are less popular than those created by the private sector. compared to those created by the private sector.

The notions of public space and open space in general are not always understood based on the same view if open space is seen as a subjective notion. something subjective. Therefore, open space must be seen and understood objectively with regard to the following three principles objectively by paying attention to the following three principles: (1) open space is an open space that more meaningful than something that is just empty; (2) open space is formed organically or technically by the objects that limit it. (3) open space can be divided into four aspects that are functional aspects, namely (a) public space: the focus of the city, (b) semi-public space: the focus of the city, (c) semi private space: the focus of the house / building, (d) private space: the focus of the house / building.

Public space in the city center is an area that is very prominent in its growth. This is driven by a variety of activities including: trade, entertainment/recreation, culture and government. Therefore, public space in the city center therefore public space in the city center has

an important meaning for the community in the context of utility, culture, history and politics, which in turn will give a certain meaning to the space.

Perception is a person's process of selecting, organizing and interpreting benefits then focusing on what is done in adding something raw to give meaning. Based on some of the above definitions, it can be concluded that perception is subjective where each individual has a different interpretation of something, where perceptions are formed based on the characteristics and conditions within a person.



Figure 3. Public Infrastructure for SME (Source : Doc Rest Area Banjartatma)

Consumer perception is a process that makes users of goods or services select, organise, and interpret the stimuli received about a product. Consumer perceptions can be negative and positive towards a product so that it can affect the good or bad judgement of the company or store that sells the product.

Furthermore, according to Kotler Keller, there are eight marketing communication mix models, namely (Mihardja et al., 2020): Advertising. Any form of paid nonpersonal presentation and promotion of ideas, goods, or services by sponsors identified through print media (newspapers and magazines), broadcast media (radio and television), network media (telephone, cable, satellite, wireless), electronic media (sound recordings, video recordings, web pages), and display media (billboards, signs, posters); Sales promotions Various short-term incentives to encourage trial or purchase of products or services including consumer promotions (such as samples, coupons and premiums), trade promotions (such as advertising and trade displays), business and sales force promotions (context for salespeople); Events and experiences. Sponsoring programmes designed to create daily or brand-specific interactions with consumers, including sports, arts, entertainment, and preferably less formal events; PR and publicity. Various programmes directed internally to employees of the company or externally to consumers, other companies, governments, and the media to promote or protect the image of the company or

individual communication products; Internet to communicate directly with or solicit responses or dialogue from specific customers and prospects; Interactive marketing Online and programmes designed to engage customers or prospects and directly or indirectly raise awareness, improve image, or generate sales of products and services; Word of mouth marketing. Person-to-person, written, or electronic communication, relating the benefits or experience of buying or using a product or service; Personal selling. Direct interaction with one or more prospective buyers for the purpose of making presentations, answering questions, and procuring orders.

With the increasing competitiveness and the development of technology and information today requires all business people to be able to continue to adjust the services and needs of their users. Information today requires all business people to be able to continue to adjust their services and the needs of their users. The development of the internet as an information technology infrastructure has changed many aspects of life including the business aspect. In business activities, especially in the aspect of trade began to shift from conventional markets to online-based. Business people take advantage of virtual space, especially in the aspect of sales either by using social media owned to join electronic markets or known as marketplaces (Fatihah & Saidah, 2021).

The marketplace has enormous market potential, especially for MSME (Micro, Small and Medium Enterprises) players when selling the goods they produce. Through this marketplace, MSME players will get a lot of convenience and benefits of doing business with this intermediary platform that connects sellers and buyers. In Indonesia, marketplaces are very diverse, starting from marketplaces developed by the nation's or local and marketplaces that come from abroad. In facing e-commerce business competition, the marketplace is supported by technology based on artificial intelligence (Fatihah & Saidah, 2021).

One of the artificial intelligence or AI technologies developed by the marketplace is the Tokopedia marketplace. The Tokopedia marketplace has used a product recommendation system, where the system works when a consumer opens a site or website on the internet, AI will provide product recommendations according to the consumer's preference. Based on this, AI supports the marketing program of the marketplace in marketing partner products, one of which is MSMEs (Fatihah & Saidah, 2021).

Conclusion

From this study can be concluded that study found that there is public learning about science in the area,

namely science about the chemical process of sugar making, architecture, spatial construction, and microeconomics, there is public learning about the history of the area, the physics of materials, namely the construction of bricks that are strong for hundreds of years, and elements of edutourism, namely the combination of public learning with tourism for visitors or toll road users.

Acknowledgments

The author would like to thank the parties who have played a role in this research activity, so that this research can be carried out well. Thank you to the informants, and the local government for giving permission to researchers to complete this academic task.

Author Contributions

In this study, all researchers contributed actively with the tasks that were carried out together. In other words, this research was supported by equal distribution of roles and contributions of all authors, because each stage was always discussed together.

Funding

This research is an empirical research funded by the researchers themselves or independent research. So on this happy occasion, I as the first author express my highest appreciation and gratitude to my colleagues who are members of this research team for their financial participation.

Conflicts of Interest

In this research, there is no tug of interest and or hidden interests among the researchers. In addition, this research is also not an order from any funder because it is an independent-research, or in other words, the research team itself plays a role in preparing proposals, selecting topics, conceptualizing problems, collecting data, analyzing problems, drawing conclusions until the publication stage in this journal.

References

- Ahmadi, R., Sourti, B., & Ebrahimi, M. (2020). Evaluation of wheat straw to insulate fired clay hollow bricks as a construction material. *Journal of Cleaner Production*, 254, 120043. <https://doi.org/10.1016/j.jclepro.2020.120043>
- Alam, P., Singh, D., & Kumar, S. (2022). Incinerated municipal solid waste bottom ash bricks: A sustainable and cost-efficient building material. *Materials Today: Proceedings*, 49, 1566–1572. <https://doi.org/10.1016/j.matpr.2021.07.346>
- Carmona, M. (2021). *Public places urban spaces: The dimensions of urban design*. Routledge.
- Edike, U. E., Aina, O., & Adeoye, A. B. (2022). Adoption of eco-bricks for housing: The case of Yelwa, Nigeria. *African Journal of Science, Technology, Innovation and Development*, 14(3), 801–812. <https://doi.org/10.1080/20421338.2021.1903735>
- Fatihah, D. C., & Saidah, I. S. (2021). Model Promosi Marketplace Berbasis Artificial Intelligence (AI) di Indonesia. *JMBI UNSRAT (Jurnal Ilmiah Manajemen Bisnis Dan Inovasi Universitas Sam Ratulangi)*, 8(3), 806–817. <https://doi.org/10.35794/jmbi.v8i3.35908>
- Fiala, J., Mikolas, M., & Krejsova, K. (2019). Full brick, history and future. *IOP Conference Series: Earth and Environmental Science*, 221(1), 12139. <https://doi.org/10.1088/1755-1315/221/1/012139>
- Garnham, N. (2020). The media and the public sphere. In *The information society reader* (pp. 357–365). Routledge. <https://doi.org/10.4324/9780203622278-34>
- Gnambs, T. (2021). The development of gender differences in information and communication technology (ICT) literacy in middle adolescence. *Computers in Human Behavior*, 114, 106533. <https://doi.org/10.1016/j.chb.2020.106533>
- Hall, C., & Hoff, W. D. (2021). *Water transport in brick, stone and concrete*. CRC Press.
- Hantono, D., Sidabutar, Y. F. D., & Hanafiah, U. I. M. (2018). Kajian Ruang Publik Kota Antara Aktivitas Dan Keterbatasan. *Langkau Betang: Jurnal Arsitektur*, 5(2), 80. <https://doi.org/10.26418/lantang.v5i2.29387>
- Hens, H. S. L. (2023). *Building Physics-Heat, Air and Moisture: Fundamentals, Engineering Methods, Material Properties and Exercises*. John Wiley & Sons.
- Kumar, R., Kumar, M., Kumar, I., & Srivastava, D. (2021). A review on utilization of plastic waste materials in bricks manufacturing process. *Materials Today: Proceedings*, 46, 6775–6780. <https://doi.org/10.1016/j.matpr.2021.04.337>
- Madden, R. (2022). Being ethnographic: A guide to the theory and practice of ethnography. *Being Ethnographic*, 1–100. Retrieved from <https://www.torrossa.com/en/resources/an/5409487>
- Mihardja, E. J., Mulyasari, P., Widiastuti, T., & Bintoro, B. K. (2020). Strategi City Branding,. In *Slims.Bakrie.Ac.Id* (Issue 1). Retrieved from https://slims.bakrie.ac.id/index.php?p=show_detail&id=3792
- Purwanto, E. (2014). Privatisasi Ruang Publik dari Civic Centre menjadi Central Business District (Belajar dari kasus Kawasan Simping Lima Semarang). *Jurnal Tataloka*, 16(3), 153. <https://doi.org/10.14710/tataloka.16.3.153-167>
- Qoron, U., & Yandri, S. (2022). Kajian Konsep Arsitektur Modern Pada Bangunan Kantor Permata Kuningan Office Tower. 55–62. Retrieved from <https://jurnal.umj.ac.id/index.php/purwarupa/article/view/12680>
- Rai, A. C. (2021). Energy performance of phase change

- materials integrated into brick masonry walls for cooling load management in residential buildings. *Building and Environment*, 199, 107930. <https://doi.org/10.1016/j.buildenv.2021.107930>
- Rizquallah, A. F., & Fuad, A. H. (2022). Identifying Urban Public Spaces Through Substance and Surface Approaches. *Proceedings of the International Conference of Contemporary Affairs in Architecture and Urbanism-ICCAUA*, 5(1), 393–402. <https://doi.org/10.38027/ICCAUA2022EN0200>
- Rohmah, E. N. L. (2022). Pengelolaan Ruang Publik (Studi Kasus Pembangunan Alun-Alun Lamongan). *HUMANIS: Jurnal Ilmu-Ilmu Sosial Dan Humaniora*, 14(1), 46–54. <https://doi.org/10.52166/humanis.v14i1.2832>
- Sharaf, F. (2020). The impact of thermal mass on building energy consumption: A case study in Al Mafraq city in Jordan. *Cogent Engineering*, 7(1), 1804092. <https://doi.org/10.1080/23311916.2020.1804092>
- Singh, D., Kumar, R., Nighot, N. S., Rajput, A., Prajapati, A., Singh, B. K., Kirgiz, M. S., Srinivasaraonik, B., Mishra, R. K., Khan, S., & others. (2023). A comprehensive review on valorisation of octal by-product as supplementary admixtures in the production of fired and unfired bricks. *Construction and Building Materials*, 408, 133641. <https://doi.org/10.1016/j.conbuildmat.2023.133641>
- Sitzia, F., Lisci, C., & Mirao, J. (2021). Accelerate ageing on building stone materials by simulating daily, seasonal thermo-hygrometric conditions and solar radiation of Csa Mediterranean climate. *Construction and Building Materials*, 266, 121009. <https://doi.org/10.1016/j.conbuildmat.2020.121009>
- Thompson Burdine, J., Thorne, S., & Sandhu, G. (2021). Interpretive description: a flexible qualitative methodology for medical education research. *Medical Education*, 55(3), 336–343. <https://doi.org/10.1111/medu.14380>
- Tinambunan, T. M. (2022). Pemanfaatan Youtube Sebagai Media Komunikasi Massa Dikalangan Pelajar. *Jurnal Mutakallimin: Jurnal Ilmu Komunikasi*, 5(1), 14–21. <https://doi.org/10.31602/jm.v5i1.6756>
- Vijayan, D. S., Mohan, A., Revathy, J., Parthiban, D., & Varatharajan, R. (2021). Evaluation of the impact of thermal performance on various building bricks and blocks: A review. *Environmental Technology & Innovation*, 23, 101577. <https://doi.org/10.1016/j.eti.2021.101577>
- Wang, B., Liu, Y., & Parker, S. K. (2020). How does the use of information communication technology affect individuals? A work design perspective. *Academy of Management Annals*, 14(2), 695–725. <https://doi.org/10.5465/annals.2018.0127>
- Wijaya, H. (2018). Analisis Data Kualitatif Model Spradley (Etnografi). *Research Gate*, March, 1–9.
- Yavartanoo, F., & Kang, T. H.-K. (2022). Retrofitting of unreinforced masonry structures and considerations for heritage-sensitive constructions. *Journal of Building Engineering*, 49, 103993. <https://doi.org/10.1016/j.jobbe.2022.103993>
- Zhang, L., Sang, G., & Han, W. (2020). Effect of hygrothermal behaviour of earth brick on indoor environment in a desert climate. *Sustainable Cities and Society*, 55, 102070. <https://doi.org/10.1016/j.scs.2020.102070>
- Zhang, N., Tang, B., & Liu, X. (2021). Cementitious activity of iron ore tailing and its utilization in cementitious materials, bricks and concrete. *Construction and Building Materials*, 288, 123022. <https://doi.org/10.1016/j.conbuildmat.2021.123022>