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Design Study of Al-Amin Living Lab Main Plaza and Industrial Park Sampe Cita Village, Glugur Rimbun Area

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Abstract: The main objective of designing Plaza Utama Al-Amin Living Lab and Industrial Park in Sampe Cita Village, Kutalimbaru Sub-district, is to efficiently utilize open space according to the needs of the desired activities. By designing outdoor furniture that supports these activities, Plaza Utama is expected to function as a communal space for social and cultural activities while maintaining environmental sustainability and beauty. Research was conducted at this location for one year using a qualitative descriptive method, collecting data directly from the field. The design results explained that the Main Plaza of Al-Amin Living Lab and Industrial Park applies the principles of sustainable architecture using environmentally friendly materials and designs that blend with nature. Climate-responsive technologies, such as rainwater capture systems and the adaptation of building forms to the environment, are also integrated. Plants were selected based on their suitability for Indonesia's tropical climate. This design concept refers to the area master plan, ensuring alignment with the grand vision of Al-Amin Living Lab and Industrial Park Master Plan.

Keywords: Sustainable Architecture, Traditional Aspects, Main Plaza, Tropical Vernacular

Introduction

The central plaza is a public open space design process that serves as a center for social, cultural, and recreational activities. It is usually designed to be an attractive and convenient area for the community, often symbolizing the identity of a particular building. Creating a central plaza in a building aims to strengthen its attractiveness. In contrast, it adds value to the plaza function by providing activities and facilities that support the visitor experience (Anto 2021).

The central plaza can also be utilized as a public open space designed to support various community activities, whether recreational, social, cultural, or economic. As an open space, the plaza functions not only as a gathering place but also as a place for social interaction, art performances, and community activities, creating a dynamic and inclusive environment (Kusuma and Santoni, 2020).

Universitas Pembangunan Panca Budi (UNPAB) plans to build an area designed as a center for field laboratories and workshops that support all study programs at the university. In addition, this area will function as an Ecoedutourism location that focuses on the agricultural sector and processing of farm products. This area will be named Al Amin Science and Industrial Park (Living Lab). Eco-tourism here is expected to attract visitors with various attractions based on field activities from existing study programs at UNPAB, such as horticultural gardens, nurseries, animal husbandry, waste management into renewable energy, to processing and packaging of agricultural and livestock products produced by Al Amin Science and Industrial Park.

The design of the central plaza of Al Amin Science and Industrial Park will be located in Kutalimbaru District, which is included in the Deli Serdang Regency, North Sumatra Province. Administratively, Kutalimbaru District is bordered by several areas: the north is bordered by Sunggal and Pancur Batu Districts, Sibolangit District borders the south, Pancur Batu District borders the east, and Langkat Regency borders the west (BPS Deli Serdang, 2021).

Apart from generating revenue for UNPAB, this eco-tourism activity aims to educate visitors and improve community welfare by developing MSMEs. Therefore, planning a mature design concept for the Al Amin Science and Industrial Park (Living Lab) area is necessary, considering all activities from various UNPAB Study Programs and facilities to support Eco-tourism. The design of this concept is expected to create an area that functions optimally and aesthetically, and is expected to be the center of various events or outdoor events in the area. To attract visitors to the location.

Methodology

This research material concerns the site's location in Sampe Cita Village, Kutalimbaru District, Deli Serdang Regency, the needs of the Panca Budi Development University academic community for research land, and the potential for developing the area as a tourist facility, in this case, a mall and other buildings that will support the activities of the area and the surrounding community.

This research was carried out within a period of 1 (one) year with observed parameters such as:

1. Physical Condition of the Design Site (Contour, Area, Climate, Architectural Form, etc.).
2. Non-Physical Conditions (Needs of Unpab academic community culture, local, potential development of the area, etc.).

The research uses a qualitative approach, so the data collection techniques used by researchers in this study include interviews, literature studies, field observations, documentation, data validation, and data analysis.

Result and Discussion

The development of the land that is the subject of this research aims to meet the needs of learning, practicum, research, and as a UNPAB innovation center, which is also expected to be a source of income for the university. Therefore, PSE-GR is designed with integrated spaces and activities internally and externally. In the Al Amin Living Lab and Industrial Park master plan, the central plaza will be located in the center of the area, on an area of 2,900 m². This plaza will be equipped with an Amphitheater and multipurpose area.

Currently, the land conditions in the Glugur Rimbun Living Lab Area have relatively flat contours, which significantly support the construction of plazas because flat areas are their main requirement.

Figure 1. Location of Al Amin Living Lab Main Plaza and Industrial Park

The basic concept of designing the Main Plaza in the Al-Amin Living Lab and Industrial Park area is to follow environmentally friendly design rules to create environmental sustainability in the area with the concept of Sustainable Architecture, which is reflected in the use of more ecological materials, pavement that can pass water to the ground, and the use of vegetation in the design. The design rules of the area also prioritize traditional aspects and tropical vernacular in the type of architectural design.

Figure 2. Activity, Facility, and Zoning Concept of Plaza Site

This area also houses an information center that provides visitors and users with a comprehensive overview of the area. The reception area is connected to various other zones, such as agro-tourism, education, production, residential, and service areas, through a ring road and an environmentally friendly transportation system that facilitates movement.

The central plaza facilities designed in the master plan of Al-Amin Living Lab and Industrial Park are a plaza court, amphitheatre, and sitting area for short breaks (Table 1).

Table 1. Matrix of Zones, Activities, and Facilities

Zone	Activity	Facility
Plaza Courtyard and Sitting Area	Sitting, gathering and taking a short break	Benches, plaza, garden
Amphitheatre	Outdoor seminars and outdoor events	Amphitheatre and open stage

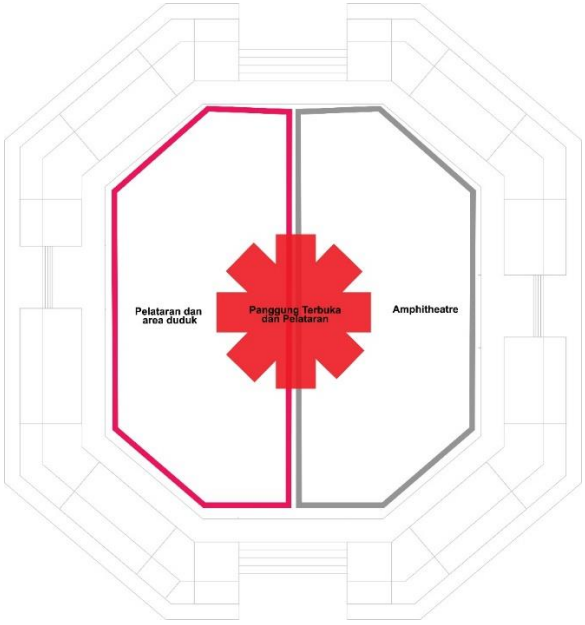


Figure 3. Concept of Placement of Plazas and Plaza Seating Areas

According to the concept in the Al-Amin Living Lab and Industrial Park area, the laying of the courtyard and plaza seating area will be on the south side, while the amphitheatre will be placed on the north side.

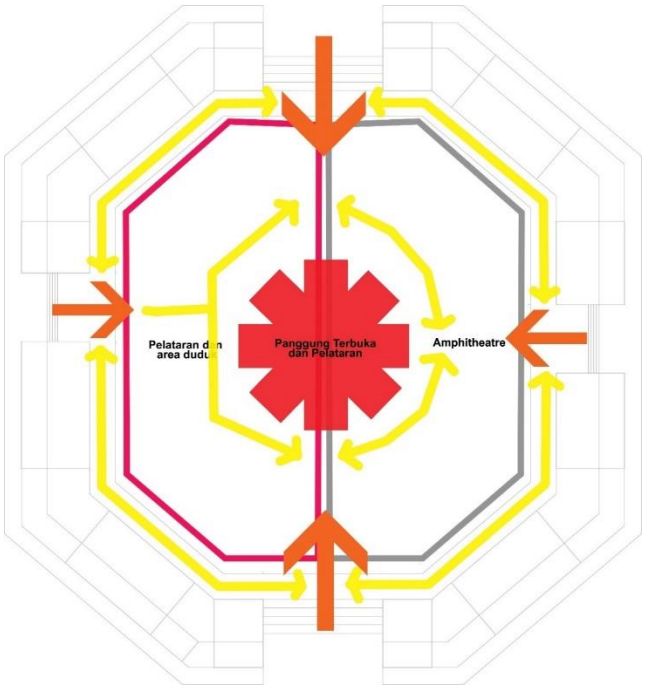


Figure 4. Site Circulation Concept

Circulation in the Al Amin Living Lab and Industrial Park area is designed with one main gate that can be accessed by public users, located on the side of Jalan Lintas Glugur Rimbun Kutalimbaru. The secondary gate on the site's south side is only used for area management purposes.

The circulation system in this area uses a ring road that connects the main gate, parking pockets, and all areas to facilitate the mobility of visitors and managers. The area is also equipped with bicycle lanes and pedestrian paths on the ring road, ensuring safety and comfort for users. Pedestrian paths in some areas are also customized to support tourist activities.

Circulation in the Al Amin Living Lab and Industrial Park area will be equipped with an electric-based shuttle car to support the environmentally friendly concept. Visitors must park their vehicles in the parking pockets in the reception area, directly connected to the two main shuttle car shelters that will take visitors around the area. Six shelters are placed along the ring road for easy access to all areas. The first and sixth shelters are connected to the parking area, the second shelter in the service area, the third shelter in the cottage and ecotourism area, the fourth shelter near the forest restaurant, and the fifth shelter in the agriculture and livestock management area. Each shelter will have electric buggy cars and bicycles that visitors can use.

Circulation in the plaza will go around the courtyard and open stage on the inside and around the entire plaza on the outside. Four entry and exit points will be placed at the plaza's four corners, with the main doors on the east and west sides, following the central axis of the Al Amin Living Lab and Industrial Park area.

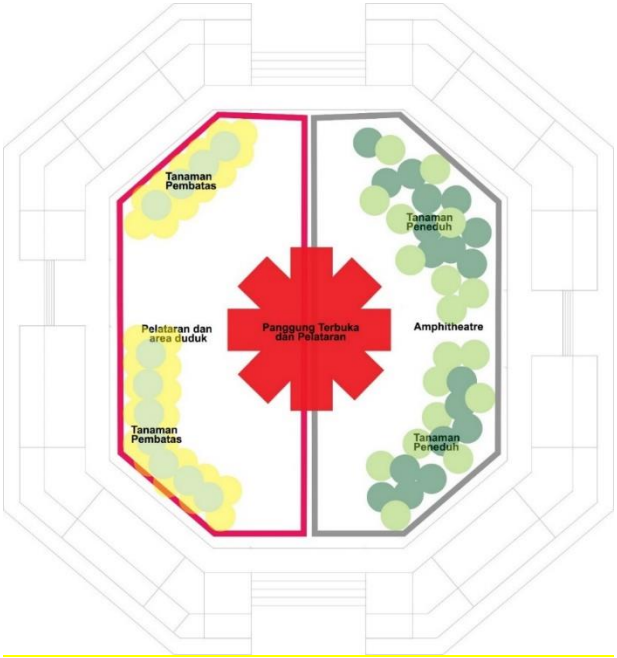


Figure 5. Concept of Laying Vegetation on Site

Softscape and vegetation are soft materials used in the landscape. The soft material in the form of plants can be used by its function in the tread. The functions of plants used in the site are shade, barrier, screen, and aesthetics.

Shade plants are usually trees with varying heights of at least 2 meters. Shade tree plants can have a round, spreading, or columnar crown character. The shade plants in the design of the Al Amin Living Lab and Industrial Park area are as follows.

Figure 6. African Fern (Schizolobium parahyba) as Shade and Aesthetics

Figure 7. Candle Fir Plant (Cuppressus sempervirens) as Screen, Aesthetics

Figure 8. Calatea (Calathea lutea) and Purple Ruelia (Ruellia tuberosa) Plants as Screen, Barrier, Aesthetics

Figure 9. Paetan Grass Plants (Axonopus compressus) as a Pedestal

Then, in the concept design of Al Amin Living Lab and Industrial Park, there is a hardscape, a complex element in the landscape. These hard elements can be in the form of ground cover pavement or building buildings on the site. Landscape furniture is adapted to the outdoor space's conditions and the functions required. The hardscape and furniture used in the design include pavement, an amphitheatre, an open stage, a stage canopy, park benches, and park lights.

Table 3. Types and Materials of Hardscape

No	Name *Hardscape*	Material	Description
1	Open Stage	Reinforced concrete pavement, surface finishing, Stamped concrete	Retaining walls use reinforced concrete, then backfilled and filled with solid soil. The stage surface is covered with reinforced concrete and stamped concrete finishing.
2	Amphitheatre	Reinforced Concrete	The structural parts of the walls and stairs use reinforced concrete and masonry. The walls are then filled with backfill soil. The surface is left for planting media filled with topsoil so that it can be grown. Then, the footrest is finished with a grass block.
3	Stage canopy	Iron pipe frame, membrane roof cover	Frame using iron pipe, then fitted with a membrane roof cover
4	Park bench	Composite	Composite material custom design
5	Garden lights	Composite	Composite material custom design
6	Plaza Grass block	Grass block	Grassblock manufacturer size 30cm x 45cm x 6cm

Design Results

The plaza design follows the concepts made in the previous stage. The idea of sustainable architecture reflected in this plaza design is ecological and environmentally friendly. This can be realized by using more ecological materials, pavement that can pass water to the ground, and using vegetation in the design. In addition, the hardscape design and landscape buildings used are expected to be in harmony with the environment, so it is disguised that there are complex buildings in the design. Floor pavement can be a grassblock arrangement that can still pass water into the ground.

The building concept development must be tropical, sustainable, environmentally friendly, and have local cultural values. The tropical concept that will be applied to the design of this plaza is the use of plants that are part of the tropical climate in Indonesia. One type of plant that will be used is the African Fern tree (Schizolobium parahyba) as a shade tree on the amphitheatre. In addition, as a reinforcement of the tropical impression on the

site, Kalatea plants (Calathea lutea) will be used as shrubs dividing the outer space. The application of the tropical concept can also be realized from the design response to the climate.

Planting tree buffers and creating a monitor road around the area's perimeter are needed for security reasons and to maintain ecological functions in the vicinity. In addition, the plants used in the landscape are also adapted to the functions and aesthetics needed in each zone in the area. The arrangement of landscape plants used is transition planting and stratification planting, which allows a combination of tree, shrub/shrub, and groundcover plant types to be used and combined.

Figure 10. Rainwater Harvesting Technology Concept Diagram

Shading technology and rainwater harvesting are also applied in the Al Amin Living Lab and Industrial Park design concept. This concept is based on Indonesia's wet tropical climate. Thus, the amphitheatre and plaza courtyard gardens are designed with technology that can channel water quickly into the ground.

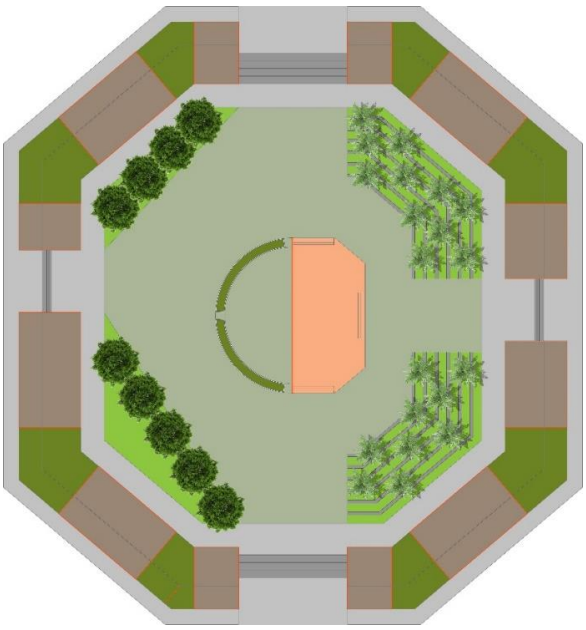


Figure 11. Design of the Main Plaza Site Plan

Based on the previously designed zoning concept, the Plaza Utama site plan includes a seating area, plaza court, open stage, and amphitheatre. Access to the plaza is available on four sides, with the main entrances located on the east and west of the plaza.

Figure 12. Illustration of the Design of the Seating Area and Plaza Court

The design of the central plaza of Al-Amin Living Lab and Industrial Park completes the gathering needs, namely sitting areas, plaza courts, open stages, and amphitheatres, so visitors and users can take a short break after touring the area. In addition, the plaza court can also be used to organize academic or non-academic events such as harvest bazaars, exhibitions, group discussions, etc.

Table 4. Illustrations of Design Results

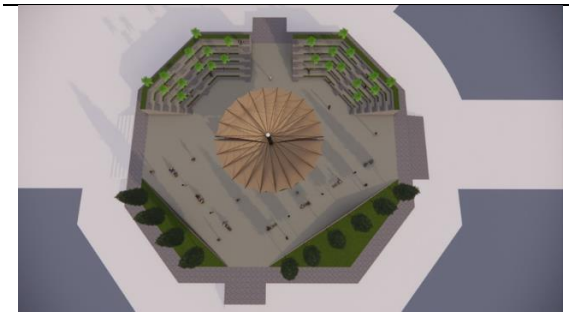
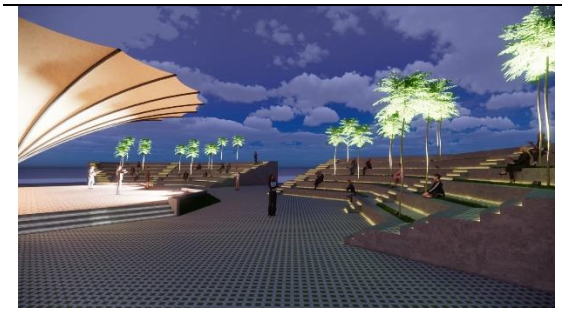
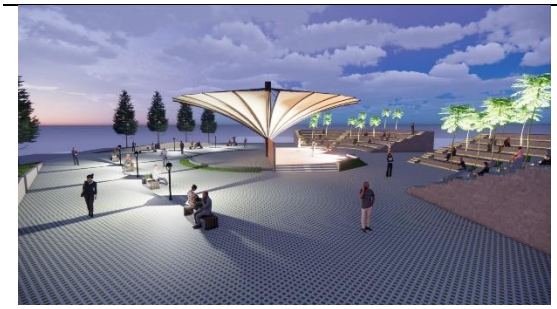
Illustration Picture	Description
	Illustration of Top View of Plaza

Illustration Picture	Description
	Bird's Eye Perspective Illustration
 	Illustration of Open Stage and Amphitheater Night Situation
	Illustration of Plaza Night Situation

Conclusion

The design of the Main Plaza of Al-Amin Living Lab and Industrial Park applies the principles of sustainable architecture, with the use of environmentally friendly materials and designs that blend with nature. Climate-responsive technologies, such as rainwater capture systems and customization of building forms to the environment, are also integrated. Plants were selected based on their suitability for Indonesia's tropical climate. This design concept refers to the master plan of the area, ensuring alignment with the grand vision of the Al-Amin Living Lab and Industrial Park Master Plan.

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