ANALYSIS OF THE SUITABILITY OF PHYSICAL DEVELOPMENT OF THE CITY TOWARDS SPATIAL PLANNING IN PEKANBARU CITY

ANALISIS KESESUAIAN PEMBANGUNAN FISIK KOTA DENGAN PERENCANAAN TATA RUANG DI KOTA PEKANBARU

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Abstract. Pekanbaru City is one of the cities appointed as a National Strategic Area. Therefore, urbanization and changes in land use occur in Pekanbaru City. This study aims to decide on land-use changes, obtain information on the direction of physical development in Pekanbaru City, and decide the suitability between physical development and the Pekanbaru City spatial planning plan. The method used in this study is quantitative descriptive, digitizing on screen to make land use maps and overlaying in 2017 and 2023 to see changes in land use. The direction of physical development is obtained using a standard deviational ellipse. The suitability of land use with The Integration of Regional Spatial Planning (RTRW) was obtained using the intersect overlay method. The results of this study are 1) Changes in land use between 2017 and 2023 are dominated by settlements, industrial areas, and trade and services. For other land uses, there are also changes but not too significant. 2) The direction of physical development from the city center to the suburbs with a south and southwest direction. 3) The suitability between physical development and the Pekanbaru City Spatial Plan 2020 - 2040, as much as 33,6% is by the RTRW. Areas that are not following the RTRW are 63%. For areas that do not follow the RTRW, the figure is 3,4%. The conclusion of this study shows that most areas in Pekanbaru City have not been realized by the Pekanbaru City RTRW 2020-2040. With the increase in population, it is hoped that development will be achieved through the established development plan.

Abstrak. *Kota Pekanbaru merupakan salah satu kota yang ditetapkan sebagai Kawasan Strategis Nasional. Oleh karena itu, urbanisasi dan*

perubahan penggunaan lahan terjadi di Kota Pekanbaru. Penelitian ini bertujuan untuk memutuskan perubahan penggunaan lahan, memperoleh informasi tentang arah pembangunan fisik di Kota Pekanbaru, dan memutuskan kesesuaian antara pembangunan fisik dengan rencana tata ruang Kota Pekanbaru. Metode yang digunakan dalam penelitian ini adalah deskriptif kuantitatif, digitasi pada layar untuk membuat peta penggunaan lahan dan overlay pada tahun 2017 dan 2023 untuk melihat perubahan penggunaan lahan. Arah pembangunan fisik diperoleh dengan menggunakan elips deviasi standar. Kesesuaian penggunaan lahan dengan RTRW diperoleh dengan menggunakan metode intersect overlay. Hasil dari penelitian ini adalah 1) Perubahan penggunaan lahan antara tahun 2017 sampai dengan tahun 2023 didominasi oleh pemukiman, kawasan industri, serta perdagangan dan jasa. Untuk penggunaan lahan lainnya juga terjadi perubahan tetapi tidak terlalu signifikan. 2) Arah pembangunan fisik dari pusat kota ke pinggiran kota dengan arah selatan dan barat daya. 3) Kesesuaian antara pembangunan fisik dengan RTRW Kota Pekanbaru 2020 – 2040, sebanyak 33,6% sesuai dengan RTRW. Daerah yang tidak sesuai dengan RTRW sebanyak 63%. Untuk daerah yang tidak sesuai dengan RTRW, angkanya sebesar 3,4%. Kesimpulan dari penelitian ini menunjukkan bahwa sebagian besar daerah di Kota Pekanbaru belum terealisasi sesuai dengan RTRW Kota Pekanbaru 2020 – 2040. Dengan adanya peningkatan jumlah penduduk, diharapkan pembangunan dapat terlaksana melalui rencana pembangunan yang telah ditetapkan.

1. INTRODUCTION

Urbanization is the phenomenon of shifting the population from villages to cities. Rural residents make urban areas a choice to settle down and find work. The process of urbanization also contributes to changes in land use in urban areas (Wirawan et al., 2025). This causes the number of people in urban areas to increase. The highest level of urbanization occurs in metropolitan areas that are National Strategic Areas. The National Strategic Area makes the metropolitan area a center of economic growth so that many residents come and settle, either as commuters, rising migrants, or settlers. The high concentration of population in urban areas has led to the expansion of built areas, not only residential land but also economic infrastructure land (Hidayati, 2021).

Economic growth followed by population growth has put pressure on the use of urban space in Pekanbaru. In line with the rapid population growth, the demands of living needs in economic, social, cultural, political, and technological aspects also continue to increase, which has implications for the increasing need for urban space (Hidayat, 2024). The rapid economic growth in the city center has led to the emergence of new cities around it. The emergence of these new cities changed the village area into a city area. The expansion of built land around metropolitan centers allows urbanization to increase in the surrounding cities as well. The Pekansikawan urban area (Pekanbaru, Siak, Kampar, and Pelalawan), which is appointed as a strategic economic area of Riau Province, makes Pekanbaru City one of the important urban centers on a national scale (Firmansyah & Raharja, 2021).

Pekansikawan is a metropolitan area in Riau Province that aims to develop areas around Pekanbaru. In Riau Province Regional Regulation number 10 of 2018 concerning the Riau Provincial Spatial Plan for 2018-2033, it is stated that the Pekansikawan area is the priority in the development of strategic areas in Riau

Province. The strategic issues faced by the development of PEKANSIKAWAN are dominated by economic issues related to physical infrastructure services (Nurrady et al., 2020).

Pekanbaru City as an engine of growth for the surrounding urban area, has a major influence in fulfilling the economic and social activities of the community in the suburbs of Pekanbaru City. However, there are indications of land use change and dominance formation, unsuitable land use that is not as planned which leads to non-optimal spatial performance (Firmansyah & Raharja, 2021). Consequently, more research is needed about alterations in land use and the appropriateness of physical development of the Spatial Plan proved by the Pekanbaru City Government.

2. LITERATURE REVIEW

2.1. Physical Development

Development can be seen as a transformative process that encompasses the state's involvement in an organized and deliberate way in societal life. It is a process of rejuvenation and revitalization across all systems, as well as in economic and social endeavors, aimed at enhancing and enriching the lives of the community (Nuryadi et al., 2023). Development can be categorized into two types: physical development and non-physical development, based on Pradono et al. (2024) physical development is a development that can be felt directly by the community or development that is visible. Physical development, for example, is in the form of infrastructure, buildings, and public facilities. Non-physical development is an activity to improve the quality of human resources, improve the economy, improve the quality of health services, and improve the quality of education (Wresniwiro, (2012) in Tambunan (2021)).

2.2. Spatial Planning

According to Kay and Alder (1999) in (Rustiadi et al., 2018), planning involves showing future goals and setting up the necessary steps to reach them. Regional planning focuses on managing land use and organizing activities within a specific geographic area. Planning can be classified into three main types: physical planning, economic planning, and social planning. Planning can be classified into three main types: physical planning, economic planning, and social planning. According to Conyers and Hill in Ahyuni (2016) in contemporary times, development planning in developing countries is recognized to encompass two forms of planning: economic planning and physical planning. Physical planning includes land use planning, regional and urban planning, and space allocation of an area. The Government of Indonesia has set up the definition of spatial planning and poured it into Law Number 26 of 2007 concerning Spatial Planning, Article 1 as follows:

a. Space is a container that includes land, sea, and air space, including space within the earth as a single territory, where humans and living things carry out and support their survival.
b. Spatial Planning is a form of spatial structure and spatial patterns
c. Spatial Structure is an arrangement of settlement centers and a network system of infrastructure and facilities that function as a support for the socio-economic activities of the community that hierarchically have functional relationships
d. Spatial Pattern is the distribution of space allocation in an area which includes the allocation of space for protective functions and the allocation of space for cultivation functions.
e. Spatial planning is a system of spatial planning, space use, and space use control.

2.3. Land Suitability

According to FAO in Hardjowigeno (2007), land suitability is the level of suitability (adaptability) of land for a certain type of land use (type of plant and level of management).

Land suitability is closely related to land use, which is a form or alternative to land use business activities, Land use begins with the classification of the land's ability to group land into certain classes based on land evaluation. Land evaluation is estimating (interpreting) land potential for land use. According to Ahyuni (2016), the purpose of land suitability evaluation is to estimate the level of suitability of land for several types of land use. The basis for grouping from land evaluation is land suitability, which is the suitability of a plot for a certain use. Land suitability can be distinguished into 2 namely:

a. Actual land suitability is land suitability based on data on the biophysical properties of soil or land resources before the land is given the inputs needed to overcome obstacles. This suitability shows the suitability of the land at the time of land evaluation, without any significant improvements, and the level of management that can be carried out to overcome the obstacles or limiting factors that exist in a land (land map unit).

b. Potential land suitability describes the suitability of the land that will be achieved if improvement efforts are made. The land being evaluated can be converted to forests, abandoned or unproductive land, or agricultural land that is less productive but still possible to be improved if the commodity is replaced with more suitable crops.

2.4. Development Distribution Pattern

The characteristics of the spatial distribution pattern of the geographical elements can be accurately expressed by the standard deviation elliptical. The model parameters consist of four basic elements: the coordinates of the center of gravity, the angle of rotation, the standard deviation along the semi-long axis, and the standard deviation along the semi-short axis. In general, the spatial and temporal evolutionary characteristics of geographical elements are expressed by the trajectory of the center of

gravity movement and the range of elliptical distributions (Li et al., 2021). The attribute values for these elliptical polygons include the x and y coordinates for the mean center, the two standard distances (long and short axes), and the orientation of the ellipse.

The attribute values for these elliptical polygons include the x and y coordinates for the mean center, the two standard distances (long and short axes), and the orientation of the ellipse. When point data that supports z is used, the attribute value will also include the z-coordinates for the mean center, the third standard distance (altitude), and the size of the ellipsoid orientation. If the input feature is 2D, the field names are CenterX, CenterY, XStdDist, YStdDist, and Rotation (ESRI, n.d.).

3. RESEARCH METHODS

The research location is in Pekanbaru City, Riau Province. Using SPOT-7 imagery for 2017 and Sentinel 2A imagery for 2023. The type of research used is quantitative descriptive. The method used is quantitative descriptive, by digitizing on the screen to make land use maps for 2017 and 2023. To view land use changes in 2017 and 2023 land use maps in the intersect overlay. Physical development directions can be used with the Standard Deviational Ellipse tool. The suitability of land use with The Integration of Regional Spatial Planning (RTRW) was obtained using the intersect overlay method. The following are the stages of data analysis in this study:

3.1. Image Pre-Processing Stage

Before processing and interpreting the image, several stages are carried out before the image is used:

3.1.1. Image Fusion or Pan Sharpening

Image fusion is carried out by combining multispectral and panchromatic images to produce a higher quality and more informative product (Sari & Santosa, 2022). The images carried out by the fusion process are *multispectral SPOT-7 images and* panchromatic *SPOT-7 images* in 2017. The image fusion process uses the *Pan Sharpened*

Dataset menu with the *Gram-Schmidt algorithm*. The results of the fusion of SPOT-7 images produce spatial resolution in performing ± 1,5 meters. *Pan Sharpening,* there is the largest ratio of the spatial resolution level of *Pan Sharpening* multispectral and panchromatic images, which is 4:1 (Indonesia, 2025). For example, SPOT 7 Satellite Image has a multispectral spatial resolution of 6 meters and a panchromatic spatial resolution of 1.5 meters with a difference ratio of 4:1. An example not recommended for Pan Sharpening is between multispectral Sentinel 2A Satellite Image data with a spatial resolution of 10 meters and a panchromatic SPOT 7 Satellite Image with 1.5 meters. The spatial resolution ratio between the two-image data is 6.6:1, more than the recommended maximum ratio. The Sentinel 2A image is not suitable for *Pan Sharpening* due to the absence of *panchromatic bands.*

3.1.2. Image Cropping

Image cropping aims to make data processing easier and the process faster. SPOT imagery and Sentinel 2-A imagery are clipped with the administrative boundaries of Pekanbaru City in Shapefile (.shp) format.

3.2. Image Interpretation for Land Use in 2017 and 2013

Image interpretation is carried out on high-resolution satellite imagery using visual interpretation methods (*on-screen digitization*). In the land use classification process, the nomenclature is adjusted to the nomenclature on the Pekanbaru City RTRW spatial pattern map for 2020-2040. This is done to help the overlay process with the RTRW map in finding land suitability later. The digitization process is also correct by looking at Google Earth in 2017 and 2023 so that the results are also correct.

3.3. Accuracy Test and Confusion Matrix

A Fusion Matrix is a matrix that shows the level of accuracy of the image that has been classified against the reference data. The confusion matrix was carried out to test the accuracy value of land use digitization results. The accuracy of land use classification is obtained based on the user's accuracy, producer's accuracy, and overall accuracy (Sari & Santosa, 2022). This fusion matrix performs calculations with four outputs namely, overall accuracy i.e. to see the accuracy of the classification in general, user accuracy that is, the possibility of image classification having a different value in each classification category, producer accuracy that is, the possibility of land in the field being classified correctly in the image and kappa accuracy that is, the measure of truth between classes that is interpreted in the image (Sipayung et al., 2019).

3.4. Analysis of Changes and Conformity of Physical Development of the RTRW

On-screen digitization was performed to delineate the "true" land–water boundaries from each reference dataset (Langat et al., 2024). The digitization results of SPOT-7 imagery from 2017 and Sentinel 2-A imagery from 2023 produced a land use map. The mapping used the ArcGIS software with the overlay method as the main tool for analysis (Nastiti et al., 2019). The next stage is to create a map of land use changes by overlaying land use intersects in 2017 and 2023. To create a map of the suitability of physical development to the Pekanbaru City RTRW, an intersect overlay was also carried out, the results of this overlay were edited on the table attributes to create a classification of proper, inappropriate, and not yet realized according to the RTRW.

4. RESULTS AND DISCUSSION

Pekanbaru City has an area of 632.26 km^2 (Badan Pusat Statistik Pekanbaru City 2024 in **Figure 1**) located between 101° 14' - 101° 34' East Longitude and 0° 25' - 0° 45' North Latitude with the following administrative boundaries:
- Northern: Siak Regency and Kampar Regency
- Southern: Kampar Regency and Pelalawan Regency
- Eastern: Siak Regency and Pelalawan Regency
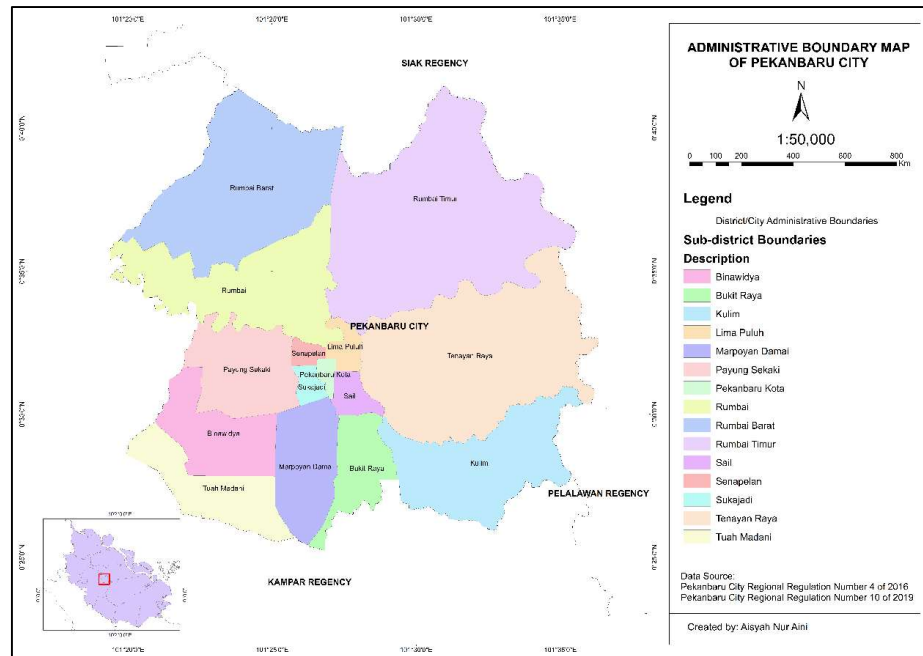- Western: Kampar Regency

Figure 1. Pekanbaru City Administrative Map

Pekanbaru City has a very strategic location because it is in the center of Sumatra Island. Based on Government Regulation No. 19 of 1987 dated September 7, 1987, the Pekanbaru City area was hostile from ± 62.96 km² to ± 446.50 km², consisting of 8 Districts and 45 Villages. From the results of field measurements by BPN Level I Riau, the area of Pekanbaru City was determined to be 632.26 km2. The increase in development activities has led to an increase in population activities in all fields, which in the end has also increased the demands and needs of the community for the provision of urban facilities and utilities and other needs. To create more orderly governance and development of a large area, new sub-districts were formed with Pekanbaru City Regulation No. 2 of 2020 to become 15 sub-districts and new sub-districts with Pekanbaru City Regulation No. 4 of 2016 to become 83 sub-districts.

4.1 Types of Land Use Changes in Pekanbaru City in 2017 and 2023

Generally, there are two types of land use, namely built-up land, and unbuilt-up land. Built-up land consists of housing, industry, trade, services, and offices. Meanwhile, undeveloped land is divided into undeveloped land used for urban activities (cemeteries, recreation, transportation, open spaces) and undeveloped land for non-urban activities (agriculture, plantations, water areas, production and mining of natural resources) (Fadilla et al., 2017).

The method used in the analysis of land use changes is on-screen digitization to classify classifications such as settlements, industry, trade and services, shrubs, and other land uses in the 2017 and 2023 images. The digitization process was also made more correct by looking at Google Earth in 2017 and 2023, so the results were also correct. The nomenclature for land use classification follows the nomenclature in the Pekanbaru City Spatial Plan and the map-making rules of the Geospatial Information Agency. **Figure 2** is a map of changes in land use in Pekanbaru City.
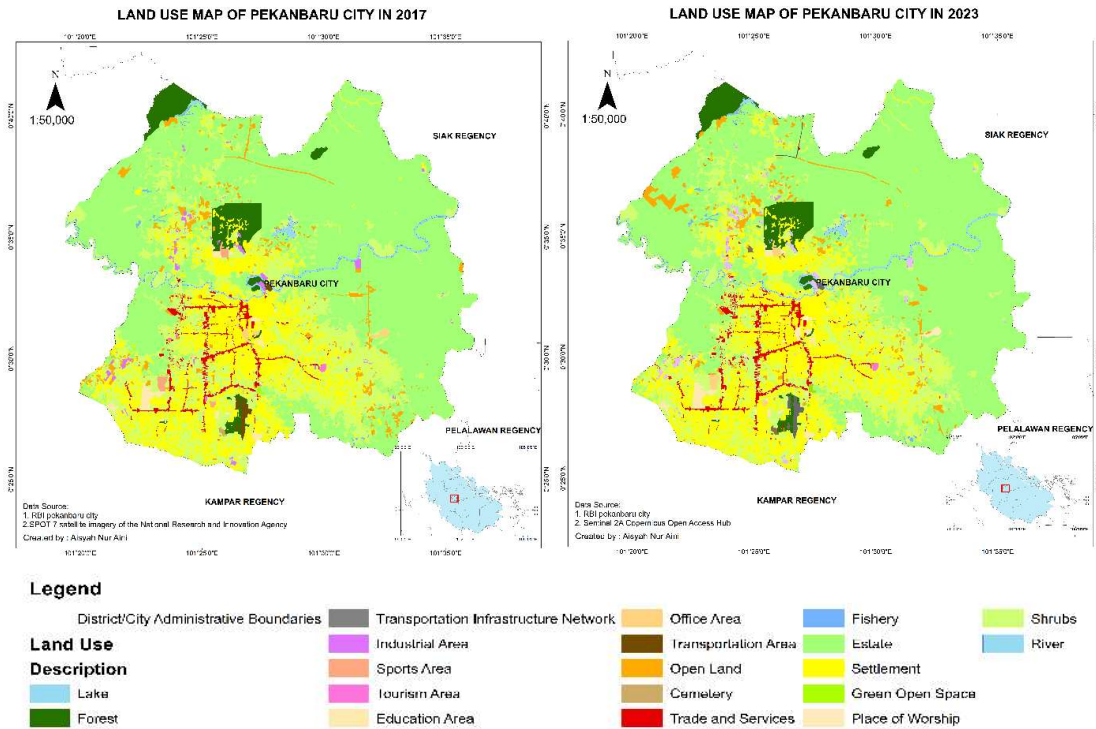
Figure 2. Land Use Change of Pekanbaru City in 2017 and 2023.

The **Table 1** shows the area of changes in land use in Pekanbaru City in 2017 and 2023. From the results of the **Table 1**, it can be seen that the biggest change occurred in the use of residential land with an additional area of change from 2017 to 2023 of 1,074.92 Ha, then there was also an increase in the area of the industrial area by 106.32 Ha, and trade and services by 103.21 Ha. In addition, there was also an increase in the area for the education area and transportation infrastructure network.

This is shown by the addition of new schools in several areas in Pekanbaru City, as well as the existence of a toll road connecting Pekanbaru City and Dumai City. The Siak River crossing bridge on Jalan Jenderal Sudirman in 2017 has not been completed, but in 2023 it can be used. For land use such as forests, bushes, plantations, and open land there was a decline in 2023, this was due to changes in land use conversion. The area of land use changes in 2017 and 2023 based on whether the status has changed or not can be seen in the **Table 2**.

Table 1. Changes in Land Use Area of Pekanbaru City 2017-2023.

No.	Land Use	Area (Ha)		Extent of Change (Ha)
		2017	2023	
1	Settlement	9272.66	10347.6	1074.92
2	Trade and Services	932.47	1035.68	103.21
3	Estate	33524	33205.2	-318.85
4	Open Land	1455.84	1444.61	-11.23
5	Transportation Area	171.24	171.24	0
6	Industrial Area	327.58	433.9	106.32
7	Sports Area	132.92	133.28	0.36

8	Education Area	422.42	463.57	41.15
9	Tourism Area	26.05	36.45	10.4
10	Office Area	172.22	182.81	10.59
11	Fishery	72.64	84.91	12.27
12	River	555.42	555.42	0
13	Lake	151.64	151.64	0
14	Green Open Space	47.18	47.18	0
15	Place of Worship	21.52	33.12	11.6
16	Transportation Infrastructure Network	0.31	23.08	22.77
17	Cemetery	42.53	70.74	28.21
18	Forest	2031.22	2022.36	-8.86
19	Shrubs	14624.5	13441.6	-1128.67
	Total Area	63984.4	63984.4	-45.34

Table 2. Land Use Change Status of Pekanbaru City in 2017 and 2023.

Land Use Change Status	Area (Ha)	Percentage (%)
Changed	3177.54	4.97
Unchanged	60804.98	95.03
Total	63982.52	100

From **Table 2**, there was a change in land use of 3,177.54 Ha or 4.97% from 2017 to 2023 in Pekanbaru City. Meanwhile, the area that did not change was 60,804.98 Ha, which shows momentous change in Pekanbaru City from 2017 to 2023.

4.1.1. Accuracy Test

A good map is a map that can be confirmed for its accuracy. Land use and land cover maps are tested for suitability to field conditions. The results of the accuracy test in **Table 3**, show an overall accuracy of 91% and a Kappa value of 90%. The accuracy results of the confusion matrix have met the standards of Congalton and Green (2019) in (Sasmito et al., 2023) where the accuracy requirements are that the Overall Accuracy value is greater than 85% and the Kappa Accuracy value is greater than 80%.

Table 3. Land Use Accuracy Test of Pekanbaru City.

Land Use	1	2	3	4	5	6	7	...	19	Total	U_Accuracy	Kappa
1	45	5	0	0	0	2	0	...	0	52	0.87	0
2	0	16	1	0	0	2	0	...	2	21	0.76	0
3	0	0	10	0	0	0	0	...	0	10	1	0
4	0	0	0	9	0	1	0	...	0	10	0.9	0
5	0	0	0	0	10	0	0	...	0	10	1	0
6	1	1	0	0	0	8	0	...	0	10	0.8	0
7	0	0	0	0	0	0	10	...	0	10	1	0
8	0	0	0	0	0	1	0	...	0	10	0.9	0
9	0	0	0	0	0	0	0	...	0	10	1	0
10	0	0	0	0	0	0	0	...	0	10	1	0
11	0	0	0	0	0	0	0	...	0	10	1	0
12	0	0	0	0	0	2	0	...	0	10	0.8	0
13	0	0	1	0	0	0	0	...	0	10	0.9	0
14	0	0	0	0	0	0	0	...	0	10	1	0

15	0	1	0	0	0	0	0	…	0	10	0.9	0
16	0	0	0	0	0	0	0	…	0	10	1	0
17	0	1	0	0	0	0	0	…	0	10	0.9	0
18	0	0	0	0	0	0	0	…	1	10	0.9	0
19	0	0	0	0	0	0	0	…	16	16	1	0
Total	46	24	12	9	10	16	10	…	19	249	0	0
P_Accuracy	0.98	0.67	0.83	1	1	0.5	1	…	0.84	0	0.91	0
Kappa	0	0	0	0	0	0	0	…	0	0	0	0.90

4.2. Direction of Physical Development of Pekanbaru City

The analysis of urban development aims to find the direction and development of the city that occurred in Pekanbaru City during the period 2017 to 2023. This development is marked by an increase in built-up land that can be detected through remote sensing imagery.

The increasingly dense development trend of Pekanbaru City is due to changes in land use into built-up land, with one of the triggering factors being the influence of growth centers, such as campuses built in the outskirts so that the development of the city spreads to the outskirts beyond the city's administrative boundaries.

Table 4. Results of the Standard Deviational Ellipse (SDE) Analysis of Pekanbaru City in 2017.

CenterX	CenterY	XStdDist	YStdDist	Rotation
772163.6	58832.61	3799.226	6470.632	1.453844

Based on the results of data processing using the SDE tool, the direction of changes in physical development in Pekanbaru City in 2017 (**Table 4**) was at the intersection point of X and Y of the ellipse polygon at coordinates 772163.64 and 58832.64. The axis of rotation of the polygon is 1.45 degrees. The centre of the ellipse is in the middle and the direction of development is heading north.

The **Table 5** shows the results of the analysis for the direction of physical development of Pekanbaru City in 2023.

Table 5. Results of the Standard Deviational Ellipse Analysis of Pekanbaru City in 2023.

CenterX	CenterY	XStdDist	YStdDist	Rotation
771966.6	59788.96	3469.747	7122.248	6.078762

For the direction of physical development in 2023, based on the results of the analysis using the Standard Deviational Ellipse (SDE) tool, the direction of change in physical development in Pekanbaru City is at the intersection point of X and Y of the ellipse polygon at coordinates 771966.61 and 59788.95. The axis of rotation of the polygon is 6.07 degrees. The center of the ellipse is in the middle and the direction of development is heading north. From the results of data processing, the direction of physical development of Pekanbaru City in 2017 and 2023 is both heading north, but in 2023 physical development is more spread out than in 2017.

Access to national roads connecting Pekanbaru with other areas such as Kampar (west) and Pelalawan (south) supports the growth of settlements and industry. The construction of the Pekanbaru-Dumai Toll Road and the Pekanbaru-Bangkinang Toll Road further accelerates development on the west and south sides. Pekanbaru's physical

development tends to develop more towards the south and west, because it is more supportive of economic growth, easier to develop, and has good connectivity with the surrounding areas.

Figure 3 is the direction of the map of changes in the physical development of Pekanbaru City in 2023 and the direction map of changes in physical development in 2017-2023.
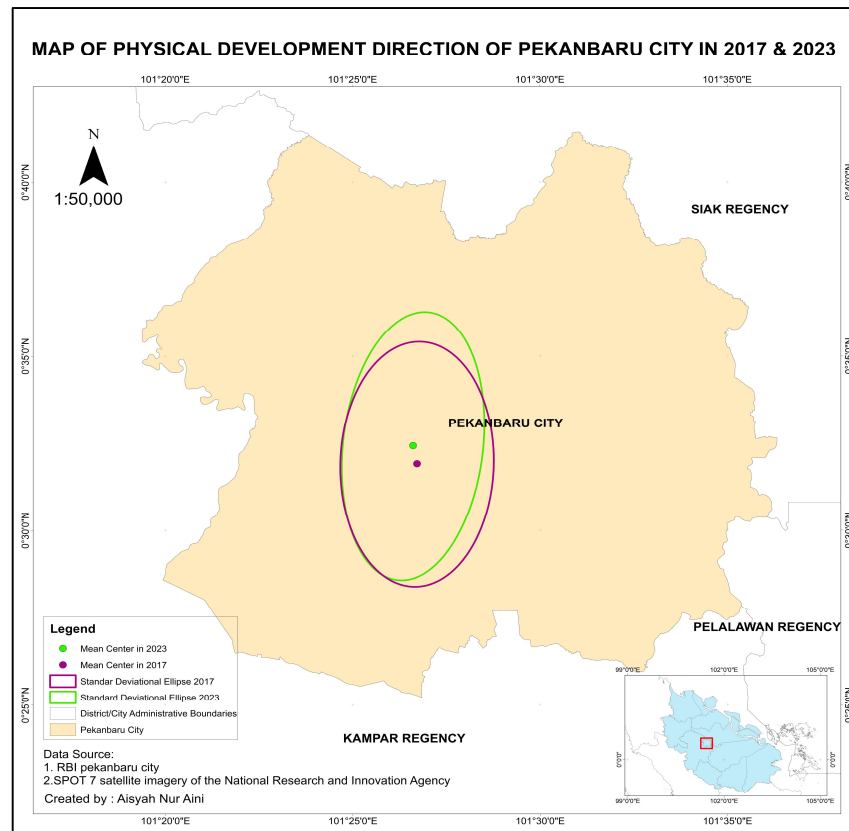

Figure 3. Map of Direction of Change in Physical Development of Pekanbaru City 2017 & 2023.

Changes in land use that occur in Pekanbaru City such as increasing the area of settlements, the existence of toll roads, and bridges, added school construction, and so on. This has caused changes in physical development in Pekanbaru City. Along with the increasing population and land conversion, its development is quite widespread but more dominant towards the west and south of Pekanbaru City. In terms of space, the development of built-up land in Pekanbaru City in 2017-2023 was unevenly distributed and tended to be concentrated in certain areas, meaning that the increase in built-up land did not occur evenly across all areas and

this increase occurred in different periods but forms a pattern and direction of development that tends to be the same, namely with a spreading pattern or spread from the city center towards the outskirts of the city (fringe area) in the south and west directions following the main road (Yunus, 2012) categorizes the spread of cities that develop following the existing transportation network as a longitudinal spread model (ribbon development).

4.3. Compliance of Physical Development with the Pekanbaru City Spatial Planning Plan

Based on the Pekanbaru City Regional Spatial Plan (RTRW) contained in Pekanbaru City Regional Regulation Number 7 of 2020 concerning the Pekanbaru City Regional Spatial Plan (RTRW) for 2020-2040. **Figure 4** is a map of the Spatial Pattern of the Pekanbaru City Spatial Plan.
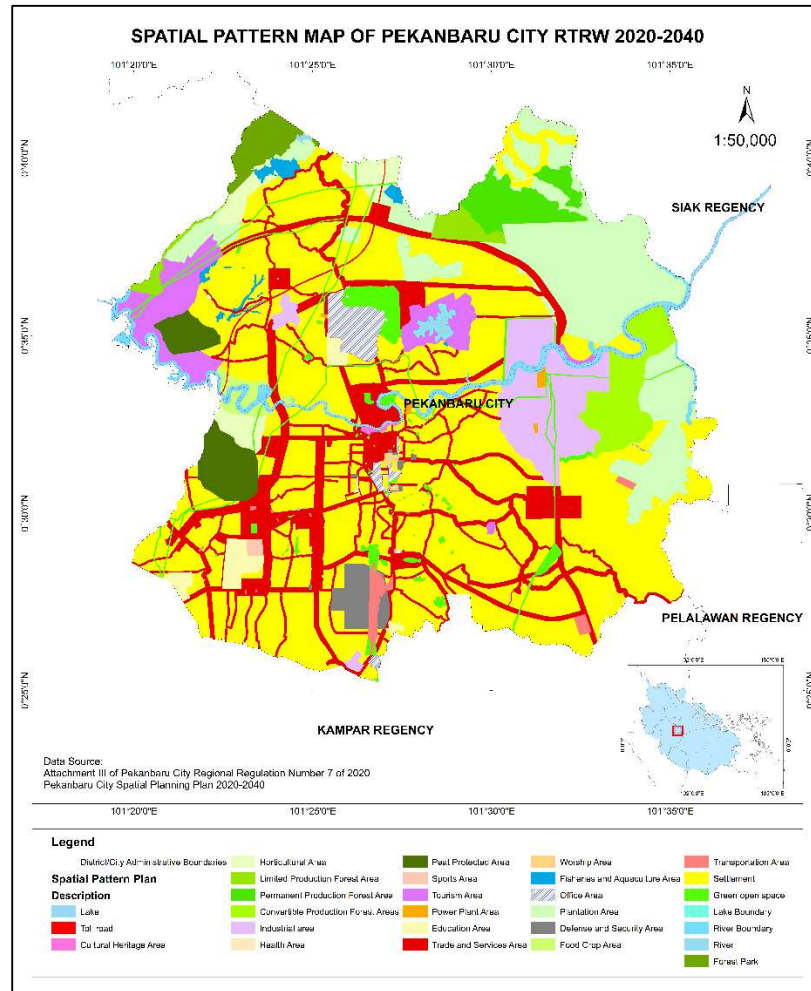

Figure 4. Spatial Pattern Map of Pekanbaru City RTRW 2020-2040.

From the Regional Spatial Planning Plan that was created, several strategic areas in the city of Pekanbaru are appointed as follows:

a. Strategic Areas from the Perspective of Economic Growth Interests

- Meranti Pandak Area

    Meranti Pandak area with the theme of the city's business center. This area has a strategic location because it is right across from the Central Market trading area and will be connected by the Siak IV Bridge.

- Bandar Raya Payung Sekaki Area

    This area is located in Payung Sekaki District. Payung Sekaki District has a direction as a limited warehousing area, sports area, terminal area, trade area, and services. This area has a cross-city bus terminal center.

- Commercial Hijau Setia Maharaja Area

Setia Maharaja Strategic Area is an area where the Purna MTQ Pekanbaru Field is found. This area is in Bukit Raya District, directed as a Residential Area, Office Area, Trade, and Service Area.

- Office and Business Development Area

The Tenayan Raya area is appointed as an industrial area called the Tenayan Industrial Area of Pekanbaru City. The Tenayan Industrial Area of Pekanbaru City is part of the development of the strategic industrial area priority of the 2020-2024 RPJMN.

b. Strategic Areas from the Perspective of Social and Cultural Interests

The Old City Area of Senapelan, Covers the area with the boundaries of Jl. General Sudirman, Jl. Ir. H. Juanda, Jl. Riau, Jl. Panglima Undan, Siak River.

c. Strategic Areas from the Perspective of Functional Interests and Environmental Carrying Capacity

The Bandar Kayangan Artificial Lake area covers the lake area and its surroundings with a radius of approximately 500 m towards the land. This area is a strategic area with ecological functions with the main goal of supporting the existence and sustainability of the lake.

The **Table 6** is a table of conformity of physical development to the Pekanbaru City RTRW.

Table **6**. Area of Compliance of Physical Development with RTRW.

Compliance of Physical Development with RTRW	Area (Ha)	Percentage (%)
Not Yet Realized	40305.37	63%
According to RTRW		
Suitable	21490.90	33.6%
Unsuitable	2161.62	3.4%
Total	63957.88	100%

Based on the table above, it can be concluded that the balance between physical development and the Pekanbaru City Spatial Planning Plan for 2020-2040, as much as 33.6% of the Pekanbaru City area is by the RTRW with an area of 21,490.90 Ha. Meanwhile, for land use that has not been implemented by the RTRW as much as 63% with an area of 40,305.37 Ha. For areas that do not follow physical development or land use the RTRW is as much as 3.4% with an area of 2,161.62 Ha.

Based on the table above, the classification of the division of conformity with the RTRW is divided into three. For the category by the RTRW, this is shown by the physical development or use of land in 2023 by the spatial planning made. For the category that has not been realized by the RTRW, this occurs because there has been no change in physical development in land use in 2023, such as in the RTRW the land is for housing, but in the use of the land it is shrubs, industrial areas in the RTRW but in the use of the land it is open land, etc.

For the category of not in accordance, this is because there has been previous physical development, but it is not by the regional spatial plan, for example in the RTRW the area is designated as a peat protection area, but in land use it is residential, the industrial area becomes an office area, etc. **Figure 5** is a map of the conformity of physical development to the RTRW of Pekanbaru City.
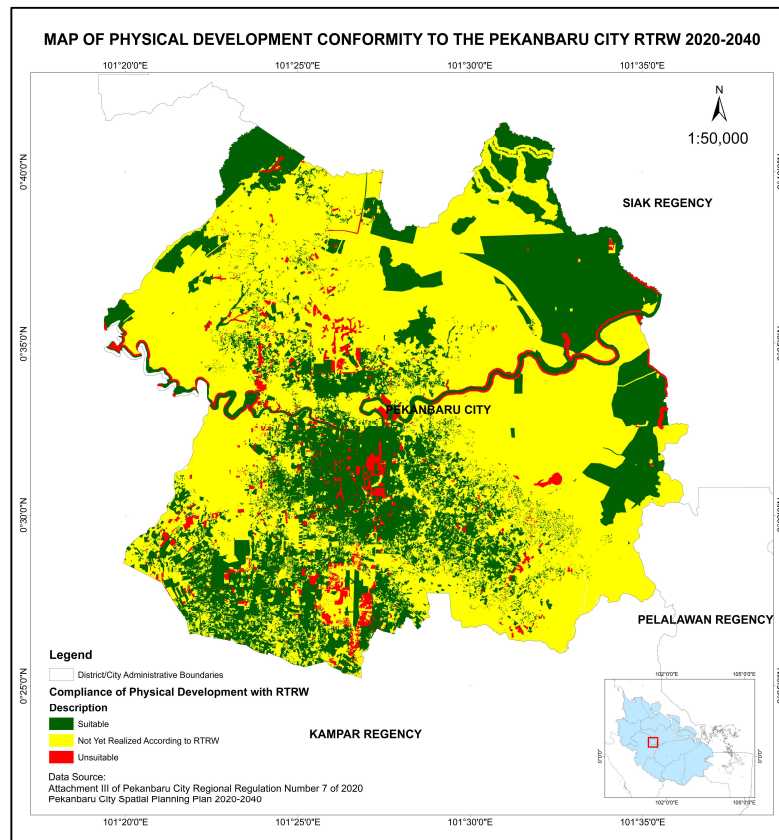
Figure 5. Map of Physical Development Conformity to the Pekanbaru City RTRW 2020-2040.

From the results of the RTRW suitability analysis, areas by the RTRW are symbolized in green, those that have not been realized by the RTRW are symbolized in yellow, and those that are not in accordance are symbolized in red. With this analysis, the level of suitability with the RTRW that has been designed for the future can be seen. The proposed plan can improve patterns that are less suitable and develop functional areas while still paying attention to the existing land suitability map. Discussion of the results of research and testing obtained is presented in theoretical descriptions, both qualitatively and quantitatively. The experiment results should be shown in the form of graphs or tables. For graphs, you can follow the format for diagrams and images.

5. CONCLUSION

From the results of the research that has been conducted, the following conclusions can be drawn:

a. The largest land use changes occurred in residential land use with an added area of change from 2017 to 2023 of 1,074.92 Ha, then there was also an increase in the industrial area of 106.32 Ha, and trade and services of 103.21 Ha. In addition, there was also an increase in the area for the education area and transportation infrastructure networks. This happened because of the increase in the population in Pekanbaru City, so there was a change in land function to meet the needs of the community.

b. The pattern of physical development of Pekanbaru City in 2017-2023 is unevenly distributed and equally directed towards the north. The direction of development is from

the city center to the south and west of the city towards the outskirts of the city.

c. Compliance between physical development and the Pekanbaru City Spatial Plan for 2020-2040, as much as 33.6% of the Pekanbaru City area is by the RTRW with an area of 21,490.90 Ha. Meanwhile, for land use that has not been implemented by the RTRW as much as 63% with an area of 40,305.37 Ha. For areas that do not follow physical development or land use the RTRW is as much as 3.4% with an area of 2,161.62 Ha.

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