Differences in electricity consumption based on electricity user sectors in Pramuka Island, Panggang Island and Tidung Island of Kepulauan Seribu Regency, DKI Jakarta

R Rizaldy¹, T Nurlambang¹, M H Dewi Susilowati¹ and H Anggrahita¹

¹Department of Geography, Faculty of Mathematics and Science, University of Indonesia, Depok, Indonesia

e-mail: riezky.rizaldy@ui.ac.id

Abstract. Electricity consumption depends on the amount of electrical equipment owned, the size of the place of residence besides the increase in electricity consumption for the household sector due to the increase in population and per capita income. The concept of the household electricity lifestyle associated with social aspects and energy consumption behavior. The purpose of this study is to determine the differences in electricity consumption based on the electricity user in Pramuka Island, Panggang Island and Tidung Island and explain how the relationship of income, building area and the use of electronic equipment to electricity consumption. The questionnaire is used to obtain data on building area, income and use of electronic equipment. Spatial analysis is used to see differences in spatial electricity consumption, statistical analysis is used to see the relationship between building area, income and use of electronic equipment to electricity consumption. The result is the commercial sector is located along the coastline, the household sector spreads in the center, while the mixed sector is in the middle of the household sector. There is a relationship between income and use of electronic equipment to electricity consumption, while building area has no relationship to electricity consumption. But this variable does not apply to the commercial sector, because it has a different electricity usage behavior than the other sectors.

1. Introduction
The geographical condition of the Kepulauan Seribu regency of Jakarta in the form of an archipelago has areas separated by the sea. This has caused various constraints because access to the distribution of goods and the implementation of development programs is hampered. From 11 inhabited islands in that regency, only three islands were considered in this study, namely Pramuka Island, Panggang Island and Tidung Island as shown in the map of Figure 1. This because Pramuka Island is the capital and administrative center of the Kepulauan Seribu regency. Panggang Island was chosen because according to BPS data in 2018 [1], this is the most populous island in the regency. Tidung Island was chosen because it has a large population in the order of 4,977 inhabitants in the southern district of Kepulauan Seribu [1].

Household electrical energy consumption is influenced by various factors including the level of income, family patterns and daily life of the use of electrical appliances in the household [2]. According to Sweeney [3], electrical energy is used by consumers to carry out functions that use electricity such as lighting, cooling, heating, cooking, and operating electronic equipment. According to Garbacz [4], the consumption of electrical energy is very dependent on the amount of electrical equipment owned, the
size of the residence and the intensity of the use of stock of tools and shelter. Wilder and Willenborg [5] indicate that consumption of electrical energy depends on: 1) the stock or the presence of electrical equipment, 2) the size of the residence, and 3) the intensity of the use of electrical appliances in the household.

![Field map](image)

Figure 1. Field map

According to SMRProspectus and Brounen et al. in Paul A. et al [6], states that electricity consumption is highly dependent on ownership of electronic goods which are further influenced by household income, size and composition. Based on these facts, the purpose of this study is to determine differences in average inter-island electricity consumption by electricity user sector as well as the relationship of income, building area and use of electronic equipment. This study is limited by several aspects, namely:
1. The islands studied were only Pramuka Island, Panggang Island and Tidung Island.
2. The electricity user group in this study is a building unit that has functions as a household, commercial (lodging and shop), and mixed electricity user group in one unit having two functions as household and commercial.
3. The electricity consumption is measured the kWh unit obtained from the average monthly electricity cost.
4. The variable used is the income of each building unit, building area and the use of electronic equipment.

2. Research Methods
The research process is divided into three stages, beginning with a literature study, determining methods, and continuing with data collection. Following are the data needed in this research.

2.1 Primary Data
Primary data is collected to determine the distribution of electricity user sector clusters and the average electricity usage per month. The primary data consist of:
1. Electricity sector user clusters obtained from the results of on-site survey tracking along the road.
2. Total revenue, building area, total use of electronic equipment and electricity consumption were obtained from direct surveys in the field.

2.2 Secondary Data
Secondary data is collected for making work maps that use as a guidance for field survey. The secondary data consist of:
1. The administrative map of Kepulauan Seribu regency is obtained from BIG.
2. A map of the developed land is obtained from the Open Street Map.
3. The population is obtained from statistical data published by BPS.

Data processing is done in two stages, the first is secondary data processing, then proceed with primary data processing. Following is an explanation of each stage.

2.3 Secondary Data Processing
Secondary data processing is done by processing maps and information based on literature studies. Map processing is performed by displaying the built-up land, road network and POI using ArcGIS so as to produce a map of the study area.

2.4 Primary Data Processing
The main analysis of this study is the electricity user sector cluster that is obtained from tracking to produce the distribution of the electricity user sector, then a proportional sampling is done. The map of monthly electricity consumption is obtained through the results of field interviews concerning the amount of electricity energy costs spent by the inhabitants. This information then transformed into kWh units so that it can be mapped according to the electricity user sector. For electronic equipment usage data obtained from the number of electronic equipment from the field survey results and then converted to watts which are then calculated on average usage every month.

In addition, income and building area data are used as variables that affect electricity consumption in each sector. Furthermore, tabular data is generated on the use of electronic equipment and categorization of income levels, building area and electricity consumption into 4 classes, as presented in Table 1 – 4. It should be noted that the exchange rate of USD 1 is equal to IDR 14,225.

| Table 1. Income level |
|----------------------|
| Income Level | Income |
| Low | < IDR 5,500,000 |
| Moderate | IDR 5,500,000 - IDR 11,000,000 |
| High | IDR 11,000,000 - IDR 16,500,000 |
| Very High | IDR 16,500,000 |

| Table 2. Building area level |
|-----------------------------|
| Classification | Area (m²) |
| Low | <70 |
| Moderate | 70 – 140 |
| High | 140 – 210 |
| Very High | >210 |

| Table 3. Electronic equipment (Watt) |
|-------------------------------------|
| Cooking | Cooling | Entertainment | Others |
| Rice Cooker | Refrigerator | Cooling Fan | AC | TV | Washing Machine | Iron | Water Pumps |
| 400 | 300 | 15 | 350 | 250 | 250 | 350 | 380 |

| Table 4. Electricity consumption level |
|----------------------------------------|
| Electricity Consumption Level | Average Monthly Consumption | Percentage |
| Low | <500 kWh | 60% |
| Moderate | 500 kWh – 1,000 kWh | 30% |
| High | 1,000 kWh – 1,500 kWh | 5% |
| Very High | >1,500 kWh | 5% |
According to Yunus [7], spatial patterns can be interpreted as the specific spatial distribution (special spatial distribution) of the phenomenon of the geosphere in the earth’s surface. Spatial analysis is used to determine differences in electricity consumption by the sector of electricity users. Statistical analysis is used to determine the relationship between total income, building area and use of electronic equipment with average electricity consumption.

3. Results and Discussions
From the results of field surveys that have been carried out on Pramuka Island, Panggang Island and Tidung Island, there are three patterns of distribution of the electricity user sector, namely extending, clustering, and spreading. All types of distribution patterns of the electricity user sector are spread across Pramuka Island and Tidung Island, while for Panggang Island there are only clustering and spreading patterns. Distribution patterns are formed on these islands due to various factors, both physical and social factors.

3.1 Electricity Consumption
3.1.1 Electricity consumption Pramuka Island
Pramuka Island household electricity consumption varies from low to very high categories. However, it is dominated by the category of low or average monthly electricity with less than 500 kWh which is spread in the center and the southeastern part of Pramuka Island. Household groups included in the medium category, side by side with households in the low category. Then the medium category with an average monthly electricity between 500 kWh to 1,000 kWh in groups in the northern and southern of Pramuka Island. While the very high category is in the middle close to the main dock of Pramuka Island.

![Figure 2. Map of electricity consumption in Pramuka Island](image)

Commercial electricity consumption on Pramuka Island from the low to very high categories tends to be even, except for the high category. Most of the commercial electricity consumption is the same as household electricity consumption. This is because many building units that once functioned for households are now being converted into tourist accommodations. So that electricity consumption is not much different from household electricity consumption. High and very high electricity consumption is located extending along the coastline from the northern part of Pramuka Island to the southern part of Pramuka Island. The mixed electricity user sector on Pramuka Island has a total percentage with the same low and medium level of 40%, as listed in Table 5. The mixed electricity user sector group with a
The low category is concentrated in the center of Pramuka Island. Meanwhile, the mixed electricity user sector of the Pramuka Island with a very high category is clustered in the center of Pramuka Island close to the main dock of Pramuka Island.

### Table 5. Percentage of electricity consumption Pramuka Island

| Electricity Consumption Level | Average Monthly Consumption | Household | Commercial | Mixed |
|--------------------------------|----------------------------|-----------|------------|-------|
| Low                            | <500 kWh                   | 60%       | 53%        | 40%   |
| Moderate                       | 500 kWh – 1000 kWh         | 30%       | 20%        | 40%   |
| High                           | 1,000 kWh – 1,500 kWh      | 5%        | 7%         | 0%    |
| Very High                      | >1,500 kWh                 | 5%        | 20%        | 20%   |

#### 3.1.2 Electricity consumption in Panggang Island

Unlike Pramuka Island, Panggang Island is more a type of residential island that does not have a commercial and lodging sector. This is what makes Panggang Island has a pattern of household users using patterned electricity spread throughout the Panggang Island. Panggang Island has a distribution pattern of electricity consumption that spreads throughout all parts of Panggang Island. There are household building units that have moderate electricity consumption in groups in the central and northeastern part of Panggang Island.

### Table 6. Percentage of electricity consumption in Panggang Island

| Electricity Consumption Level | Average Monthly Consumption | Household | Mixed |
|--------------------------------|----------------------------|-----------|-------|
| Low                            | <500 kWh                   | 37%       | 54%   |
| Moderate                       | 500 kWh – 1,000 kWh        | 26%       | 46%   |
| High                           | 1,000 kWh – 1,500 kWh      | 29%       | 0%    |
| Very High                      | >1,500 kWh                 | 9%        | 0%    |

Unlike the characteristics of the sectors on other islands, the percentage of the sector of mixed electricity users on Panggang Island is almost the same between the low and medium electricity consumption levels, as presented in Figure 3 and Table 6. But all the mixed building units on Panggang Island are not side by side with lodging but with shops. This is what makes electricity consumption higher than the household sector.
3.1.3 Electricity consumption in Tidung Island
Based on the data obtained, household electricity consumption on Tidung Island is dominated by the low category by 77% and the rest is the medium category. It can be seen from the picture that household clusters that consume electricity from 500 kWh to 1,000 kWh are clustered near the main dock. Because the farther from the dock the less land is built. Especially in the western part of Tidung Island.

Table 7. Percentage of electricity consumption in Tidung Island

| Electricity Consumption Level | Average Monthly Consumption | Household | Commercial | Mixed |
|------------------------------|-----------------------------|-----------|------------|-------|
| Low                          | <500 kWh                    | 77%       | 67%        | 70%   |
| Moderate                     | 500 – 1,000 kWh             | 23%       | 22%        | 30%   |
| High                         | 1,000 – 1,500 kWh           | 0%        | 11%        | 0%    |
| Very High                    | >1,500 kWh                  | 0%        | 0%         | 0%    |

Figure 4. Map of electricity consumption in Tidung Island

Electricity consumption in the commercial sector is not much different from the household sector. The commercial sector which has the highest electricity consumption category is in the eastern part of Tidung Island. This is because the eastern part of Tidung Island is a tourist area. In addition, the commercial sector is in groups on the southern coastline.

The mixed electricity user sector of Tidung Island is generally in the low category or 70% of the mixed sector and the rest is in the medium category with a percentage of 30%. Unlike the case with the commercial sector, the mixed sector in the east has a low category. Because the facilities and electronic equipment provided in the mixed sector are not like those in the commercial sector in the east. In the mixed sector, electricity consumption is highest in the middle of Tidung Island or in the middle of the household group.

3.2 Total Income

3.2.1 Total income Pramuka Island
In Pramuka Island generally the inhabitants are divided into two group of professions, namely, fishermen and civil servants. The livelihoods of Pramuka Island from the household sector are dominated by fishermen. This has resulted in the low level of income in Pramuka Island. While the percentage level of mixed sector income on Pramuka Island tends to be evenly distributed, as indicated in Figure 5 and Table 8. This is because the income does not only come from one main source of livelihood as a
fisherman or civil servant, but there is other additional income from building units used as shops or lodgings. From the commercial sector the income level is dominated by the medium category. That is because many of the residents have building units for lodging that are separated from their private residences.

![Map of total income in Pramuka Island](image)

**Figure 5.** Map of total income in Pramuka Island

| Total Income | Household | Mixed | Commercial |
|--------------|-----------|-------|------------|
| Low          | 63%       | 27%   | 20%        |
| Moderate     | 26%       | 27%   | 50%        |
| High         | 2%        | 20%   | 20%        |
| Very High    | 0%        | 27%   | 10%        |

The highest average income is income from the commercial sector with an average of IDR 16,500,000 per building unit, then a mixed sector with an average of IDR 9,800,000 per building unit, and the last is the household sector with an average of IDR 5,200,000. The data indicates that the commercial sector has a very high level of income, a mixed sector with a moderate level of income, and the last is the household sector with a low level of income. This is because 62% of the households earn the living as fishermen whose income is still low each month.

### 3.2.2 Total income Panggang Island

The occupation of the inhabitants in Panggang Island are almost entirely fishermen. There are 75% of the population who work as fishermen, 15% of civil servants and 6% of others. From the results of the study concluded that in Panggang Island, almost all household income is at a low level or less than IDR 5,500,000. While the mixed sector is dominated by the medium category, as can be seen in Figure 6 and Table 9. On Panggang Island there is a very high level of income, namely shops from the mixed sector located near schools. While the level of income in the medium category is along the coastline close to the main pier.

| Total Income | Household | Mixed |
|--------------|-----------|-------|
| Low          | 100%      | 64%   |
| Moderate     | 0%        | 27%   |
| High         | 0%        | 0%    |
| Very High    | 0%        | 9%    |
3.2.3 Total income Tidung Island

From a survey conducted on Tidung Island, as revealed in Figure 7 and Table 10, the group located along the jetty and the eastern part of Tidung Island has moderate to high income. This is because the area is the center of Tidung Island sub-district which is characterized by the presence of sub-district offices, clinics, and other public places.

| Total Income | Household | Commercial | Mixed |
|--------------|-----------|------------|-------|
| Low          | 85%       | 60%        | 40%   |
| Moderate     | 15%       | 40%        | 40%   |
| High         | 0%        | 0%         | 0%    |
| Very High    | 0%        | 0%         | 20%   |

Broadly speaking, most islands have low income levels or an average total income of less than IDR 5,500,000 in the proportion of 75% and having an average income of each building unit of IDR 5,150,000. This can be seen from the level of income of each sector on Tidung island.
3.3 Building Area

3.3.1 Building area Pramuka Island

Pramuka Island has an average category of medium building area of 99 m². Each sector also has an average of above 70 m², the household sector of 77 m², the commercial sector of 127 m² and the mixed sector of 97 m². This is represented by the map in Figure 8.

![Figure 8. Map of building area in Pramuka Island](image)

3.3.2 Building area Panggang Island

Panggang Island is dominated by settlements which tend to be narrower when compared to Pramuka Island and there are no buildings over 210 m² in size. Household buildings of less than 70 m² are clustered near the pier and are spread out in the middle to the southern part of Panggang Island. Unlike the mixed sector, the mixed building cluster near the jetty has an area of between 70 m² and 140 m². For households that have a medium area or between 70 m² to 140 m² grouped around the school. While the mixed building cluster around the school has an area of less than 70 m². Whereas households that have a building area between 140 m² to 210 m² are clustered in the northern part of Panggang Island. These are illustrated by the map in Figure 9.

![Figure 9. Map of building area in Panggang Island](image)
3.3.3 Building area in Tidung Island

Tidung Island is dominated by a building area of less than 70 m². Unlike the Panggang Island, Tidung Island has a building unit of more than 210 m². Building units with an area of less than 70 m² are scattered in the central part of Tidung Island from the household, commercial or mixed sectors. In the western part of Tidung Island there is a group of buildings that have an area of less than 70 m² to 140 m². While in the eastern part of Tidung Island it has an area ranging from 140 m² to more than 210 m². These are exhibited by the map in Figure 10.

![Figure 10. Map of building area in Tidung Island](image)

3.4 Use of Electronic Equipment

The electricity consumption of each building unit is inseparable from electronic devices that require electrical energy as its source. Apart from these electronic devices, another important factor is the duration of use of these tools. Combining these two factors between ownership of electronic equipment and duration of use can indicate the average electric power used per month. From the results of a field survey that has been done, each building unit on average has 1 unit of rice cooker and 1 unit of dispenser for cooking utensils (cooking), 2 units of fan as air conditioner (cooling), 1 unit of television as a means of entertainment (entertainment / information), and other categories such as 1 unit of washing machine, 1 unit of iron and 1 unit of water pump. Of the four types of electronic devices, the category that uses the largest electrical power is cooking equipment.

From the results of research that has been done from the three islands. The average use of electronic equipment on the three islands of each sector of electricity users are as presented in Tables 11 – 13. The average use of electronic equipment on Pramuka Island is the most varied, especially in the cooler (AC) which has the highest power, thus indicating that the higher the electrical energy used. Panggang Island has the same characteristics as Pramuka Island, this is because Panggang Island is an island that is entirely functioned as a residential island, so there are no commercial buildings. On that island the mixed sector is the sector that consumes the highest electricity. The average use of electronic equipment between the household and mixed sectors on Tidung Island tends to be the same, but there are differences in the number of refrigerators that have high power. This can make the energy used to look much different.

| Table 11. Average use of electronic equipment in Pramuka Island |
|---------------------------------------------------------------|
| Sector | Cooking | Cooling | Entertainment | Others |
|        | Rice Cooker | Refrigerator | Cooling Fan | AC | TV | Washing Machine | Iron | Water Pumps |
|        | Σ Hour | Σ Hour | Σ Hour | Σ Hour | Σ Hour | Σ Hour | Σ Hour | Σ Hour |
| H³     | 1 3 1 18 | 2 18 0 0 | 1 15 1 1 | 1 1 1 1 1 3 |
| C⁶     | 0 0 0 0 | 2 14 2 14 | 2 14 0 0 | 0 0 0 0 0 0 |
| M²     | 1 22 3 20 | 1 7 1 18 | 1 1 1 2 | 1 3 1 22 |

³Household sector, ⁶commercial sector and ²mixed sector
Table 12: Average use of electronic equipment in Panggang Island

| Sector | Cooking | Cooling | Entertainment | Others |
|--------|---------|---------|---------------|--------|
|        | Rice Cooker | Refrigerator | Cooling Fan | AC | TV | Washing Machine | Iron | Water Pumps |
| H\^a  | 1 | 4 | 1 | 20 | 2 | 18 | 0 | 0 | 1 | 18 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| C\^b  | 1 | 3 | 2 | 24 | 2 | 21 | 0 | 0 | 2 | 18 | 1 | 1 | 1 | 2 | 1 | 2 |

\^aHousehold sector, \^commercial sector and \^mixed sector

Table 13: Average use of electronic equipment in Tidung Island

| Sector | Cooking | Cooling | Entertainment | Others |
|--------|---------|---------|---------------|--------|
|        | Rice Cooker | Refrigerator | Cooling Fan | AC | TV | Washing Machine | Iron | Water Pumps |
| H\^a  | 1 | 3 | 1 | 18 | 2 | 18 | 0 | 0 | 1 | 15 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| C\^b  | 0 | 0 | 0 | 0 | 2 | 14 | 2 | 14 | 2 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| M\^c  | 1 | 4 | 1 | 22 | 3 | 20 | 1 | 7 | 1 | 18 | 1 | 1 | 1 | 2 | 1 | 3 |

\^aHousehold sector, \^commercial sector and \^mixed sector

The commercial and mixed sectors have the same average number of electronic equipment. It is assumed that the electrical energy used in these two sectors is the same. Whereas the household sector has an average of less electronic equipment than commercial and mixed sectors. This is what makes the household sector does not use electricity as much as commercial or mixed sectors.

3.5 Relationship Between Income and Electricity Consumption

Total income is one of the variables selected in this study to see the relationship between total income and electricity consumption. According to Ester [8], the importance of sociodemographic variables in this case is related to the fact that they can be used as segmentation criteria for designing and implementing energy conservation programs. Pablo-Romero [9], assumes that the greater the revenue from the hotel or restaurant, the more diverse the facilities and services provided by the hotel or restaurant, in this study the income used is the income of each building.

Table 14: Relationship to electricity income and consumption

| Island | Sector | Average of Total Income | Average of Electricity Consumption (kWH) |
|--------|--------|-------------------------|-----------------------------------------|
| Pramuka| Ha     | IDR 5,189,474           | 557                                     |
|        | Cb     | IDR 16,493,333          | 799                                     |
|        | Mc     | IDR 9,767,500           | 1683                                    |
| Panggang| Ha     | IDR 1,755,263           | 438                                     |
|        | Mc     | IDR 9,887,500           | 677                                     |
|        | Ha     | IDR 2,988,462           | 348                                     |
| Tidung | Cb     | IDR 1,120,000           | 102                                     |
|        | Mc     | IDR 11,408,333          | 514                                     |

\^Household sector, \^commercial sector and \^mixed sector

The results showed that the total income is directly proportional to the monthly electricity consumption, the higher income in a sector means the higher of electricity consumption. But this does not happen for the commercial sector. Because in commercial sector, the electronic device is only used four days every weekend and is not used 30 days continuously so that the average electricity consumption obtained is only an average of days of use.
**Table 15.** Correlation test for total income and electricity consumption correlations.

|                  | Total Income       | Electricity Consumption (kWH) |
|------------------|--------------------|-------------------------------|
| Total Income     | Pearson Correlation| 1                             |
|                  | Sig. (2-tailed)    | .332**                       |
|                  | N                  | 8                             |
| Electricity Consumption (kWH) | Pearson Correlation | .332**               |
|                  | Sig. (2-tailed)    | .000                          |
|                  | N                  | 8                             |

**. Correlation is significant at the 0.01 level (2-tailed)

After total revenue data is obtained from each electricity user sector cluster, then statistical analysis is performed. Based on the correlation test conducted to see the relationship between total income and electricity consumption obtained a significance value of 0.00, where 0.00 < 0.05 so that H1 is accepted. This means that there is a relationship between total income and electricity consumption.

3.6 Relationship Between Building Size and Electricity Consumption

Building size is used in this study to see the relationship between building size and electricity consumption. According to Nababan [10], building size has a significant and positive effect on the use of electrical appliances and directly affects the amount of household electrical energy demand.

**Table 16.** Relationship between building area and electricity consumption.

| Island | Sector | Average of Building Area (m²) | Average of Electricity Consumption (kWH) |
|--------|--------|-------------------------------|------------------------------------------|
| Pramuka Ha | 77 | 557                           |
| Pramuka Mc | 97 | 1,683                         |
| Panggang Ha | 52 | 438                           |
| Panggang Mc | 73 | 677                           |
| Panggang Ha | 43 | 348                           |
| Tidung Cb | 117 | 102                           |
| Tidung Mc | 58 | 514                           |

*aHousehold sector, bcommercial sector and cmixed sector

The results showed that the area of the building has the same characteristics as total income. In general, the bigger building size mean the higher electricity consumption used. However, there are differences in the sector of mixed electricity users on Pramuka Island, because in the sector of mixed electricity users on Pramuka Island the use of electronic equipment has a more significant effect on the total average consumption of electricity used.

**Table 17.** Correlation test building size with electricity consumption correlations.

|                  | Building Area       | Electricity Consumption (kWH) |
|------------------|---------------------|-------------------------------|
| Building Area    | Pearson Correlation| 1                             |
|                  | Sig. (2-tailed)     | .243                          |
|                  | N                   | 8                             |
| Electricity Consumption (kWH) | Pearson Correlation | .243                  |
|                  | Sig. (2-tailed)     | .562                          |
|                  | N                   | 8                             |

**. Correlation is significant at the 0.01 level (2-tailed)
Based on the correlation test between building area and electricity consumption, a significance value of 0.58 is obtained, where 0.58 > 0.05 so that H1 is rejected and H0 is accepted. This means there is no relationship between building area and electricity consumption. This is because there are other factors such as electronic equipment in each building unit. The more building area is not directly proportional to the availability of electronic equipment in it, so that electronic equipment in a larger building area is not necessarily more than a building unit with a smaller building area. Reversely electronic equipment in a smaller building area is not necessarily less than that in a building unit with more spacious area.

3.7 Relationship Between the Use of Electronic Equipment with Electricity Consumption

According to Sanquist [11], explained that the lifestyle of electricity users affects the amount of electricity consumption. The use of electronic equipment was chosen in this study to see its relationship with electricity consumption. To analyze the relationship of the use of electronic equipment to electricity consumption is grouped according to the function of electronic devices such as cooking, cooling, entertainment, and others.

Table 18. Relationship of electronic devices with electricity consumption.

| Island | Sector (Watt) | Cooking (Watt) | Cooling (Watt) | Entertainment (Watt) | Others (Watt) | Total Electricity Consumption (Watt) | Electricity Consumption (kWH) |
|--------|---------------|----------------|----------------|--------------------|---------------|----------------------------------|-------------------------------|
| Pramuka | C\textsuperscript{b} | 0 | 306,600 | 210,000 | 0 | 516,600 | 799 |
| | M\textsuperscript{c} | 804,000 | 192,150 | 7,500 | 297,300 | 1,300,950 | 1,683 |
| Panggang | H\textsuperscript{c} | 228,000 | 16,200 | 135,000 | 40,800 | 420,000 | 438 |
| | M\textsuperscript{c} | 468,000 | 18,900 | 270,000 | 51,300 | 808,200 | 677 |
| | H\textsuperscript{c} | 198,000 | 16,200 | 112,500 | 52,200 | 378,900 | 348 |
| Tidung | C\textsuperscript{b} | 0 | 306,600 | 210,000 | 0 | 516,600 | 102 |
| | M\textsuperscript{c} | 246,000 | 100,500 | 135,000 | 62,700 | 544,200 | 514 |

\textsuperscript{a}Household sector, \textsuperscript{b}commercial sector and \textsuperscript{c}mixed sector

A similar case also occurs in the variable use of electronic equipment, the more types of electronic devices, the higher the consumption of electricity used, this does not apply to the commercial sector. Because in this variable also consider the frequency of usage of electrical equipment every week.

Table 19. Relationship of electronic devices with electricity consumption correlations

| Use of Electronic Equipment | Electricity Consumption (kWH) |
|----------------------------|-------------------------------|
| Pearson Correlation        | Sig. (2-tailed) | N |
| Use of Electronic Equipment | 1 | .872** | 8 |
| Electricity Consumption (kWH) | Pearson Correlation | Sig. (2-tailed) | N |
|                            | .872** | .005 | 8 |

**. Correlation is significant at the 0.01 level (2-tailed)

Based on the correlation test between the use of electronic equipment with electricity consumption, a significance value of 0.05 is obtained, where 0.05 > 0.05 so that H1 is accepted. This means there is a relationship between the use of electronic equipment with electricity consumption.

4. Conclusions

A study on the electricity consumption has been conducted on three islands in the Kepulauan Seribu regency of Jakarta, namely Pramuka, Panggang, and Tidung Island. The study concludes:
• The three islands have almost the same pattern in the distribution of the electricity user sector. The commercial electricity user sector on Pramuka Island and Tidung Island are clustered and extending along the coastline close to the pier. This is an exception on Panggang Island, because Panggang Island does not have a commercial electricity user sector.

• The household electricity sector from all islands is generally distributed in the center of each island. Whereas the mixed electricity users’ sector on all islands has a group pattern in the middle of the household electricity users’ sector. Of the three islands, the mixed sector is the electricity user sector which consumes the highest average monthly electricity in each island.

• There are different patterns in the household and commercial sectors. On Pramuka Island, the commercial sector consumes an average monthly electricity higher than the household sector while on Tidung Island the commercial sector consumes an average monthly electricity lower than the household sector. This is due to the different electricity usage behavior on the two islands.

• Of the three variables used in this study, total income, and the use of electronic equipment (cooking, cooling, entertainment, and others) affect electricity consumption. While the building area has no effect on electricity consumption. However, there was an anomaly in the commercial sector, because on average in a month the mixed electricity user sector only uses electrical energy for about four days on weekends. This results in the differences in electricity consumption behavior for the case of the commercial sector compared to the household and mixed sectors.

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References
[1] Badan Pusat Statistik. (2018). Kepulauan Seribu dalam Angka 2018. BPS, Jakarta, Indonesia.
[2] Sukarno, I., Matsumoto, H. and Susanti, L. (2017). “Household lifestyle effect on residential electrical energy consumption in Indonesia: on-site measurement methods”. Urban Climate 20:20-32.
[3] Sweeney, J.L. (2001). “Properties of energy resources and energy commodities”. Int. Encyclopedia of the Social & Behavioral Science 4513-4520.
[4] Garbacz, C. (1984). A National Micro-Data Based of Residential Electricity Demand: New Evidence on Seasonal Variation. University of Missouri-Rolla, Missouri, USA.
[5] Wilder, R.P. and Willenborg, J.F. (1975). “Residential demand for electricity: a consumer panel approach”. Southern Economic J. 42:212-217.
[6] Paul, A., Subbiah, R., Marathe, A. and Marathe, M. (2012). A review of electricity consumption behavior”. Consortium for Building Energy Innovation, Virginia, USA, Feb.
[7] Yunus, H.S. (2010). Metode Penelitian Wilayah Kontemporer. Pustaka Pelajar, Yogyakarta, Indonesia.
[8] Ester, P. (1985). Consumer Behavior and Energy Conservation. Springer Netherlands, Dordrecht, Netherlands.
[9] Romero, M.P., Sánchez-Braza, A. and Sánchez-Rivas, J. (2017). “Relationships between hotel and restaurant electricity consumption and tourism in 11 European Union countries”. Sustainability 9(11):2109.
[10] Nababan, T.S. (2008) Analisis Permintaan Energi Listrik Rumah Tangga: Studi Kasus pada Pengguna Kelompok Rumah Tangga Listrik PT PLN (Persero) di Kota Medan. Universitas Diponegoro, Semarang, Indonesia.
[11] Sanquist, T.F., Orr, H., Shui, B. and Bittner, A.C. (2012). “Lifestyle factors in U.S. residential electricity consumption”. Energy Policy 42:254-364.