



# Comparative Analysis of E-Commerce Sales of Halal-Labeled Products in Muslim Majority and Minority Countries

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## Abstract

E-commerce is an alternative for individuals to look for and purchase things. Unfortunately, despite its importance in digital market connectedness, e-commerce has not played a significant role in the continuity of the halal market. This study aims to look at the differences in halal product sales in Muslim majority and minority countries, which can stimulate the availability of halal products on e-commerce and increase halal product exports, as well as make it easier for Muslim communities to buy halal products. There was no previous research on a similar topic, notably one that specifically explored the sale of halal products through e-commerce. Halal-labeled product data was taken from Lazada e-commerce using web scraping (using the Selenium package in the Python programming language), which was then carried out by Kruskal-Wallis analysis. According to the findings, the average sales of halal products in Indonesia, Malaysia, Singapore, and Malaysia varies significantly. However, in the pairwise or combination test comparing groups of

countries, it was discovered that the average sales of halal products in Indonesia and Singapore were identical.

**Keywords:** Halal Product, Product Sales, E-Commerce, Halal-Labeled Product, Comparative Analysis, Social Science

## 1. Introduction

E-commerce is an alternative way for many people today to find a product. People can buy and sell more readily with the help of e-commerce media. This purchasing and selling process extends beyond food and beverages to include cosmetics, household appliances, fashion, and many other items. However, the products offered by e-commerce do not meet everyone's needs, including those of Muslims. When a Muslim is looking for a product, the halal component must be considered. This is because there is an effort to stay away from anything that is against religious law.

The term halal is taken from Arabic, which means to unravel or release.<sup>1</sup> In essence, halal is a matter that can be done because it is free and has no connection to the provisions that prohibit it. According to a global halal report, the demand for halal products grows year after year in various countries. According to the 2022 report, the global Muslim community spent \$1.9 trillion on halal products. This also encourages many countries to invest in and export halal products on a global scale. There were \$11.8 billion in investments and \$200 billion in total exports. Several countries' investments and exports are divided into various sectors such as food, travel, fashion, medicine, and cosmetics. With as much as 72% in food, 14% in medicine, 10% in fashion, and 5% in cosmetics. Some sales are also made through e-commerce in these areas, such as in Indonesia, Malaysia, and Saudi Arabia, which have made extensive use of e-commerce. Although e-commerce is currently believed to have a minor impact on the halal market's continuity, it is critical to digital connectivity. E-commerce sales have a significant impact even on sales of small-brand products. It is clear that

<sup>1</sup> Helva Diansyah Putri, Indah Wulan Sari Batubara, dan Siti Aisyah, "Analisis Manajemen Rantai Pasok Halal di Indonesia" 2, no. 1 (2022): 10.

throughout the pandemic period, some firms turned to e-commerce as a way to reach a wider spectrum of consumers.

In fact, based on the data provided above, public spending on halal items in various countries must differ. It is vital to consider how many halal items are sold in various countries. This expense must be considered in order for a country to export and compete for the sale of halal products with other countries. Apart from that, it is hoped that e-commerce can increase the availability of halal products to make it easier for Muslim communities to find halal products. According to the report, not many Muslim-majority countries export halal products, such as food. On average, Muslim-majority countries import more.<sup>2</sup>

## 2. Literature Review

### Halal-Labeled Product Sales

Looking at past studies on the same topic, there is no literature that expressly examines the sale of halal products via e-commerce. However, there is literature that discusses the influence of the halal label on product purchasing behavior. According to Osman et al. (2020), awareness, attitude, and knowledge have the greatest influence on purchasing halal cosmetics.<sup>3</sup> Other literature analyzes the impact of halal labels on customer decisions, especially showing that halal variables can influence people in Medan City to purchase halal-labeled products.<sup>4</sup> There is also literature that analyzes the sales volume or sales turnover of halal-labeled products in a company, and the results of the study show differences in sales volume for products labeled halal.<sup>5,6,7</sup> However, in the

<sup>2</sup> DinarStandard, "State of the Global Islamic Economy Report," Economy Report, 2022.

<sup>3</sup> Syuhaily Osman dan Norzalina Zainuddin, "Eksplorasi Faktor Pengaruh Terhadap Tingkah Laku Pembelian Kosmetik Halal Dalam Kalangan Pengguna," *International Journal of Social Science Research* 2, no. 4 (2020): 12.

<sup>4</sup> Al-Bara Al-Bara dan Rahmayanti Nasution, "Analisis Pengaruh Label Halal Pada Produk Makanan Terhadap Keputusan Pembelian Konsumen Masyarakat Kota Medan," *Intiqad: Jurnal Agama dan Pendidikan Islam* 10, no. 2 (30 Desember 2018): 227–48, <https://doi.org/10.30596/intiqad.v10i2.1987>.

<sup>5</sup> Resi Resmawati, "Analisis Perbandingan Volume Penjualan Sebelum Dan Sesudah Mendapatkan Sertifikasi Halal," 2 Agustus 2018, 7.

<sup>6</sup> Sri Wahyuni, Daharmi Astuti, Dan Boy Syamsul Bakhri, "Pengaruh Label Halal Terhadap Peningkatan Omset Penjualan Produk Makanan Ringan Umkm Di Kota Dumai," 2020.

<sup>7</sup> Rima Nurul Hikmah dkk., "Pengaruh Volume Penjualan Dan Biaya Operasional Terhadap laba BERSIH Pada Produk Makanan Dan Minuman Yang Berlabel Halal Di Indonesia Periode 2014-2018 (Studi Empiris Pada Perusahaan Manufaktur Sektor Makanan dan Minuman Yang Terdaftar Di Bursa Efek Indonesia)" 12, no. 1 (2020).

context of selling halal products in e-commerce, until now there has been no literature that discusses this. The goal of this study is to determine how halal goods sales in e-commerce differ in Muslim-majority and Muslim-minority countries.

## Data Collection

In this research, data was collected from e-commerce. There are several methods that have been widely used in previous research to collect data via websites. One of these methods is web scraping. Web scraping makes it possible to collect data on websites according to specified documents. There are numerous web scraping methods that can be used, such as DOM parsing, JSON API, CSS Selector, Selenium, or using tools like Scrapy. These methods make it simple to collect data automatically rather than manually. For example, Rahmatulloh and Gunawan (2020) used the DOM approach to collect journal data.<sup>8</sup> Fikri et al. (2022) used web scraping to collect news sites as well.<sup>9</sup> There has also been research that uses web scraping in e-commerce to acquire product data.<sup>10</sup>

There are a variety of data collection characteristics among the various web scraping techniques. To acquire data through web scraping, you must consider legal aspects, the type of website, and the data you wish to collect. Not all web scraping techniques are applicable to all website categories. For instance, HTML DOM and Selenium can only retrieve data from websites that load data via HTML documents; this cannot be done on websites that load data via Javascript. This differs from the JSON API, which utilizes an API via JSON data and can retrieve data from websites that load data using Javascript.<sup>11</sup> However, this cannot be done arbitrarily because a valid API key is required, which can only be obtained from the site that provides the API. Therefore, it is essential to know what data you wish to collect prior to performing web scraping.

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<sup>8</sup> Alam Rahmatulloh dan Rohmat Gunawan, "Web Scraping with HTML DOM Method for Data Collection of Scientific Articles from Google Scholar," *Indonesian Journal of Information Systems* 2, no. 2 (26 Februari 2020): 95–104, <https://doi.org/10.24002/ijis.v2i2.3029>.

<sup>9</sup> Muhammad Ramadan Fikri, Rahmadya Trias Handayanto, dan Dadan Irwan, "Web Scraping Situs Berita Menggunakan Bahasa Pemogramaran Python," *Journal of Students' Research in Computer Science* 3, no. 1 (30 Mei 2022): 123–36, <https://doi.org/10.31599/jsrscs.v3i1.1514>.

<sup>10</sup> Muhammad Joko Umbaran Haris Bahrudin dan Hardan Gutama, "Scraping Web Marketplace Menggunakan Metode DOM Parsing Untuk Pengumpulan Data Produk," 2020.

<sup>11</sup> Michael Levi, Henry Novianus Palit, dan Silvia Rostianingsih, "Perbandingan Performa Tools Web Scraping pada Website dengan Data Statis dan Dinamis," t.t.

## Data Analysis

The analysis of the acquired data is critical in this research in order to produce accurate conclusions and information that is relevant to the phenomenon at hand. This study compares the sales of halal-certified items in Muslim-majority and Muslim-minority countries. However, finding out what analysis method might be appropriate to use can be seen through some literature that conducts research on analyzing differences within a group. Commonly used comparison analyses include the T-test, Anova, Kruskal-Wallis, and Mann-Whitney U. This analysis aims to determine whether or not there is a significant difference between groups. In the results of the literature review, various comparisons were found, such as the comparison of average production,<sup>12</sup> average sales,<sup>13</sup> and the value of a research object or a measurement.<sup>14,15</sup>

The Anova test is a popular statistical analysis among scholars. This methodology is utilized when the group being compared has more than two groups of independent variables. Aside from that, assumptions must be met in order for the findings of the Anova test to be valid. The first assumption is that the data is normally distributed. To find out whether the data is normal or not, further tests can be carried out using Saphiro-Wilk or Kolmogorov-Smirnov, depending on the number of data samples. The second assumption is that the data has the same variance (homogeneity). Additional tests like the Levene, Barlett, Hartley, and others further support this assumption. It is evident that certain literature conducts normality tests before conducting further statistical tests.<sup>16</sup> Although, in other literature, the normality of data may also be seen by quartile visualization by observing whether the points of the data distribution

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<sup>12</sup> Septiadi A. dan Ramdhani W. K, "Penerapan Metode Anova untuk Analisis Rata-rata Produksi Donat, Burger, dan Croissant pada Toko Roti Animo Bakery," 9 Februari 2020.

<sup>13</sup> Estiningsih Trihandayani dan Sri Utaminingsih, "Analisis Peramalan Dan Perencanaan Penjualan Buku Lks Dalam Upaya Meningkatkan Kebutuhan Produk Dengan Menggunakan Metode Least Square Dan Anova," *Teknologi : Jurnal Ilmiah dan Teknologi* 2, no. 1 (4 Januari 2020): 27, <https://doi.org/10.32493/teknologi.v2i1.3907>.

<sup>14</sup> Nur Arifiya dan Aliffia Teja Prasasty, "Analisis Penjualan dan Citra Merek dari 3 Merek Sepeda Motor dengan Metode Anova," 2020.

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<sup>16</sup> Firmansyah Firmansyah dkk., "Analisis Perbedaan Penjualan, Harga dan Struktur Pasar Ternak Sapi Kurban Periode Sebelum, Awal dan Masa Pandemi Covid-19 di Kabupaten Batang," *Ekonomis: Journal of Economics and Business* 7, no. 1 (31 Maret 2023): 708, <https://doi.org/10.33087/ekonomis.v7i1.1097>.

are close to the specified diagonal line or not.<sup>17</sup> The Anova test is included in the parametric statistical test, which requires assumptions of normality and homogeneity. However, there are tests that can be performed by ignoring these assumptions. Such tests are included in non-parametric statistical tests. The Kruskal-Wallis test is a popular one. As previously stated, this test disregards the two assumptions that need normal data and homogeneous variance.

### 3. Method

This study has criteria and limitations, which are as follows:

- a. Halal-labeled products have been officially certified as halal by the respective country's halal institutions.
- b. Product data collected includes: product name, product price, sales location, and sales amount.
- c. Collection of product data via Lazada e-commerce.

#### Halal Product Search

Prior to data collection, the researchers did a product search and verified halal certification on the official website of each country's halal institution. Searching for keywords from a specific brand makes it easy to find the product you're looking for. After the product being searched for has been recorded as having halal certification, it will be collected via Lazada e-commerce.

#### Data Collection Process

Web scraping is used to capture data on the Lazada website in Indonesia, Malaysia, Singapore, and Thailand. Products collected include food, beverage, and cosmetic categories. The Selenium package in the Python programming language is used to retrieve halal product data. This method is based on a web driver that we can command as needed and can be executed automatically by adjusting the path to the HTML document whose data we wish to retrieve. The retrieved data is then saved in a CSV file.

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<sup>17</sup> Achmad Zulfikar, Muhammad Yusuf R. Siahaan, dan Ruli Bay Syahputra, "Analisis Signifikansi Roda Skateboard Berbahan Komposit Serbuk Batang Pisang Terhadap Perfoma Kecepatan Dengan Metode Anova," *Jurnal Rekayasa Material, Manufaktur dan Energi* 4, no. 2 (21 September 2021), <https://doi.org/10.30596/rmme.v4i2.8068>.

## Analysis Method

This study employs a quantitative descriptive analytic approach using the independent variable of halal product sales from Indonesia, Malaysia, Singapore, and Thailand. Using the Kruskal-Wallis test, determine the average difference in sales between countries. However, prior to performing the Kruskal-Wallis analysis, several other tests must be performed as a prerequisite for the analysis. The Saphiro-Wilk and Kolmogorov tests will be used to determine if the data is normally distributed or not, and the Levene test will be used to determine the similarity of variance in the data (homogeneity). The Kruskal-Wallis test is then used to determine whether there is a significant average difference between the country groups. To see how the test results can be concluded, a hypothesis test will be performed utilizing the significant value of the test results. To conduct the test, the following hypothesis was proposed:

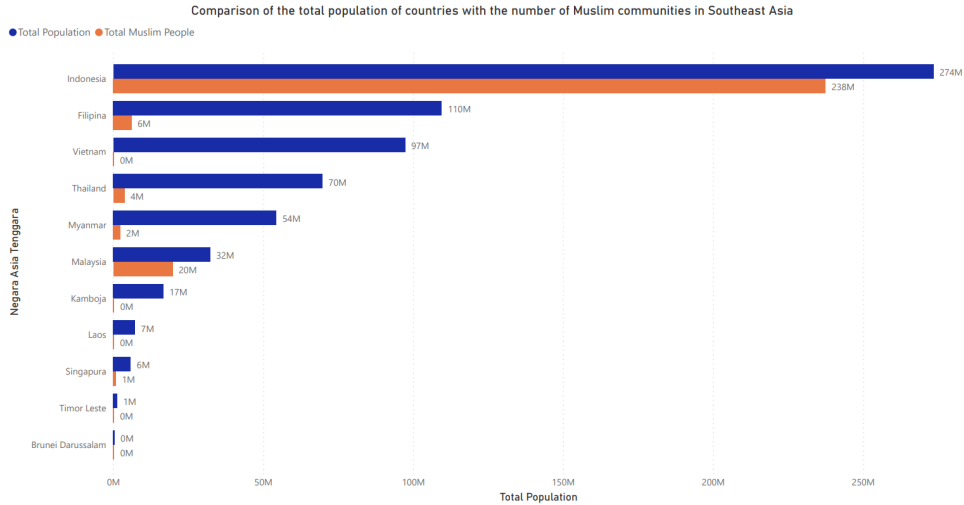
- a. Test Hypothesis: Saphiro-Wilk & Kolmogorov  
H<sub>0</sub> = Data normally distributed  
H<sub>1</sub> = Data is not normally distributed
- b. Test Hypothesis: Uji Levene  
H<sub>0</sub> = Data has the same variance  
H<sub>1</sub> = Data does not have the same variance
- c. Test Hypothesis: Kruskal-Wallis  
H<sub>0</sub> = There is no significant difference between groups  
H<sub>1</sub> = There is a significant difference between groups

With the first assumption, if the test results exceed the significance level ( $P > 0.05$ ), then H<sub>0</sub> is accepted and H<sub>1</sub> is rejected. Conversely, the second assumption is that if the test results are less than the significance level ( $P < 0.05$ ), then H<sub>0</sub> is rejected and H<sub>1</sub> is accepted. In this study, statistical computations were aided by SPSS software to facilitate the test.

## 4. Result and Discussion

Data on halal-labeled product sales was collected from the Lazada e-commerce website in Indonesia, Malaysia, Singapore, and Thailand. Figure 1 depicts the Muslim population in Southeast Asia. According to the data on the

nations studied, Indonesia and Malaysia have a majority Muslim population, while Singapore and Thailand have a low Muslim population.



**Figure 1. Total population of Muslims in Southeast Asia**

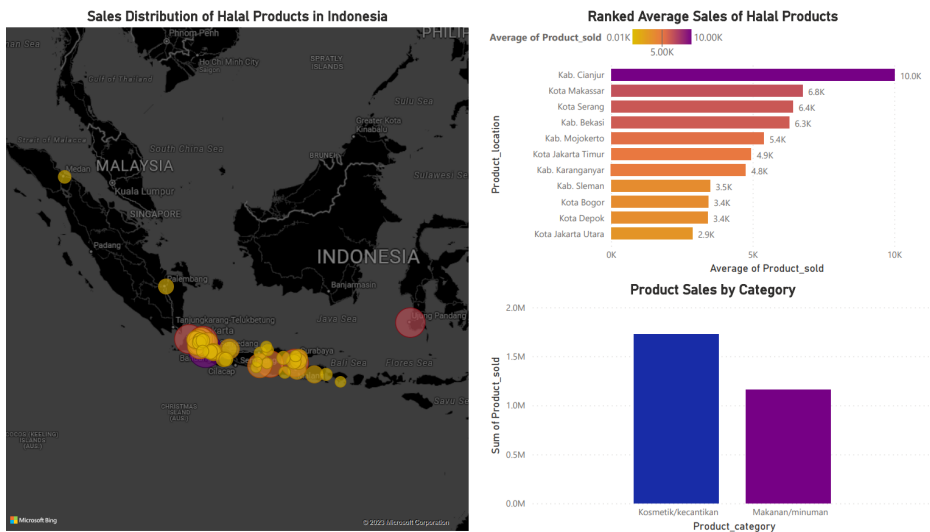
The data scraping process is carried out by running a command on the Lazada site in each country using the Selenium web driver. The web driver will execute the command by automatically running the driver on each product page to be searched. The data is then retrieved by searching for HTML elements that contain the data to be retrieved. Scraping yielded as much as 600–1700 product data points in each country.

Following the collection of data, data cleansing is performed. The data used in this test has gone through a cleaning process. This process includes removing outliers and cleaning up missing data. Because in the data collection there is an amount of data that is much higher than the average, this must be cleansed so that the resulting value in the test can be more accurate. The data tested must have a balanced scale, as this could affect the test results. Table 1 shows data on halal product sales in each country where data has been cleansed, for a total of 1310 halal product data points. Each country will be given initials in order to shorten and simplify testing. Indonesia has the initials INA, Malaysia has the initials MY, Singapore has the initials SG, and Thailand has the initials THA.

**Table 1. Halal product sales data**

Country	Data Scraping	Data Used (n)
INA	1759	359
MY	1760	378
SG	574	353
THA	631	220
Total	4724	1310

Before conducting further analysis, it is important to see how the data is distributed among the population of product sales in each country in e-commerce Lazada.



**Figure 2. Sales distribution of halal products in Indonesia**

Figure 2 shows that sellers of halal products on Lazada e-commerce are widely spread on the islands of Java, NTB, and Sumatra. It can also be noticed from the halal product categories sold in Indonesia that the comparison across product categories is not similar; cosmetic/beauty products rank higher than food/drinks.

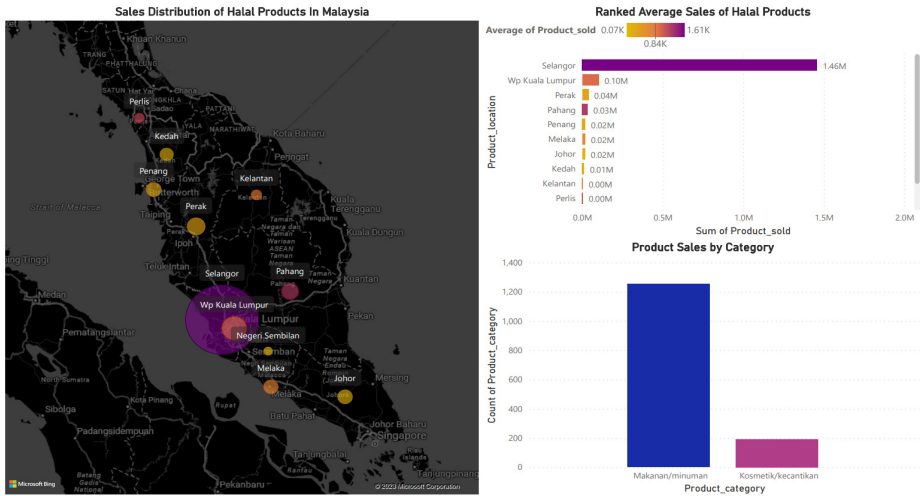


Figure 3. Sales distribution of halal products in Malaysia

According to Figure 3, the distribution of halal product sales in Malaysia, the majority of product sellers are centered in Selangor and are the items with the highest average sales in Malaysia, which is 1.46 million sales. In terms of sales categories, food and beverages sold the most. In Malaysia, it is quite difficult to find halal-labeled cosmetics and beauty products. This also makes the comparison of sales of cosmetic/beauty and food/beverage products unbalanced.

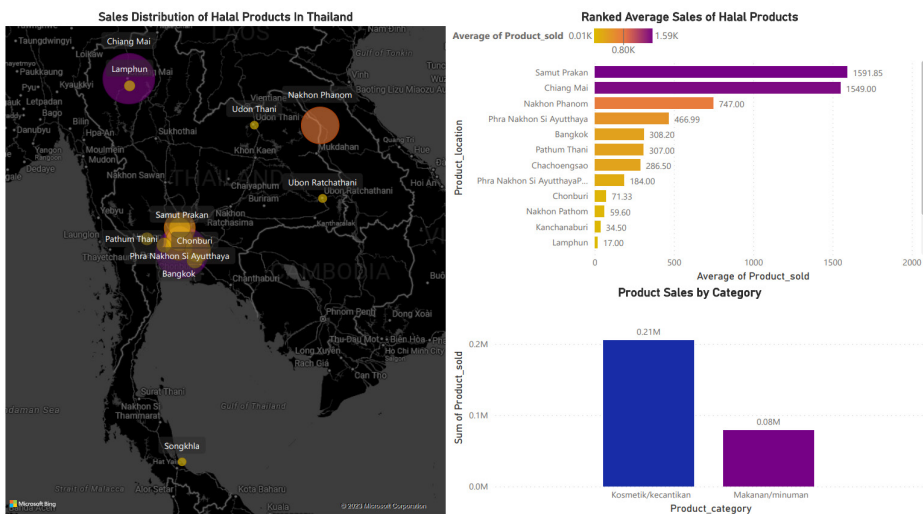
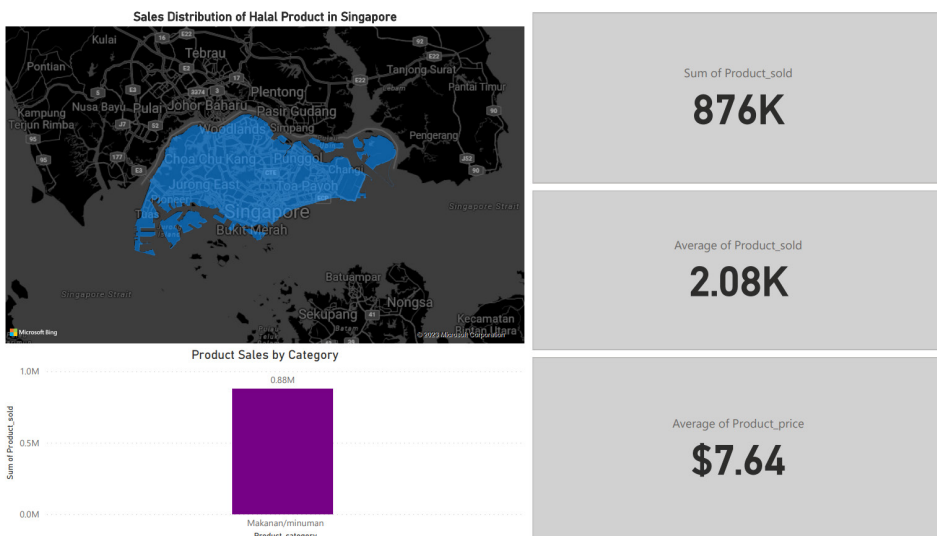


Figure 4. Sales distribution of halal products in Thailand

Figure 4 depicts that sales in Thailand are concentrated in the capital city of Bangkok. However, based on average sales, the Samut Prakan area had the most sales, with an average of 1591 sales. In Thailand, the largest average consumption is in the cosmetic product category, while the food/beverage category has low consumption on Lazada Thailand e-commerce. Unfortunately, there is no exact location where the sales are in Singapore on the Lazada website; therefore, visualization cannot be done efficiently (Figure 5). In terms of halal product references, Singapore has very few references to halal-labeled products, making it difficult to identify halal products in Singapore.



**Figure 5. Sales distribution of halal products in Singapore**

After examining the distribution of the collected data, the data will be analyzed. The first step of the data will be examined for normalcy using the Saphiro-Wilk and Kolmogorov tests, as explained previously. The purpose of this test is to determine whether or not the data is normally distributed. Table 2 displays the results of the normalcy test.

**Table 2. Kolmogorov test and Saphiro-Wilk test results on country sales data**

Country	Test	Stats	Sig.(> 0.05)
Indonesia	Kolmogorov	.111	<.001
	Saphiro-Wilk	.915	<.001
Malaysia	Kolmogorov	.140	<.001
	Saphiro-Wilk	.889	<.001
Singapore	Kolmogorov	.308	<.001
	Saphiro-Wilk	.683	<.001
Thailand	Kolmogorov	.155	<.001
	Saphiro-Wilk	.853	<.001

The test findings show that each country has a test value less than the significance level (P 0.05), indicating that these results reject H0 and accept H1 under the assumption that each country's data is not normally distributed. Following that, it will be determined whether the data has the same variance (homogeneity) or not in order to meet the standards. We will utilize Levene's test to see if each data point has the same variance.

**Table 3. Levene test result of halal product sales**

Levene Test Summary		
Based on	Stats	Sig.(> 0.05)
Mean	608.867	<.001
Median	119.021	<.001
Median Adj. df	119.021	<.001
Trimmed Mean	465.923	<.001

The test values in Table 3 are less than the significance level (P 0.05). This means that H0 is not true and H1 is true, assuming that the variance values for sales data in each country are not the same. Because the data from each country is not normally distributed and does not have the same variance (homogeneity), parametric statistical methods such as Anova cannot be applied. Parametric analysis can be done when the previous assumptions are met, such as normally distributed data with no outliers and data with the same variance

(homogeneous). Based on the findings of the preceding homogeneity test and the normality test, in this case we will use non-parametric analysis using the Kruskal-Wallis test. Non-parametric statistical analysis is an analysis that is not sensitive to the assumptions of data with a normal distribution or homogenous variance.

**Table 4. Kruskal-Wallis test halal product sales data**

Kruskal-Wallis Test Summary	
Total N	1310
Statistic	193.329
Df	3
Sig (2-sided)	.000

According to Table 4, the results of the Kruskal-Wallis test produced a low significance value and are below the significance level (P 0.05). With this result, we can observe that there is a considerable difference in average sales between the groups of countries based on the combined direct test.

**Table 5. Pairwise test of halal product sales data**

Pairwise Test Summary		
Sample 1 – 2	Stats	Sig.(> 0.05)
THA-SG	235.600	<.001
THA-INA	276.746	.000
THA-MY	442.197	.000
SG-INA	41.146	.147
SG-MY	206.597	<.001
MY-INA	-165.451	<.001

Table 5 displays the results of a pairwise or combination test between groups of nations on halal product sales. According to these findings, the majority of halal product sales comparisons have test value results that are less than the significance level (P 0.05), indicating that the test results reject H0 and accept H1 under the assumption that product sales from the two countries have

a significant difference in average halal product sales. Except for Singapore and Indonesia, with a test value greater than the significance level ( $P > 0.05$ ), these results accept  $H_0$  and reject  $H_1$ , which means that the average value of halal product sales does not differ significantly.

## 5. Conclusion

The test results show that the data on halal products is not normally distributed, and the data variance is not the same (homogeneous). Because of this, the Kruskal-Wallis test, which is a non-parametric statistical test, is used to test the average of the country group. The results of this test show that the comparison of each country has a value less than the significance level ( $P > 0.05$ ), indicating that there is a significant difference in the average sales of halal products, with the exception of Singapore and Indonesia, which have test values greater than the significance level ( $P > 0.05$ ), indicating that the average sales of halal products in Singapore (a Muslim-minority country) and Indonesia (a Muslim-majority country) have no significant difference. This research can be continued by improving quality by analyzing a broader product sector, not just food, beverages, and cosmetics. However, it should be noted that sales of halal products in each nation can vary at any time; therefore, this analysis is just intended to serve as a reference or illustration for future research in discussing sales of halal products in Muslim-majority and minority countries in e-commerce, which in this study is Lazada.

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