

Original Article

Market Concentration and Spatial Distribution of Coffee Product Consumers in Pamekasan Regency, Indonesia

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ABSTRACT: *This study examines market concentration and the spatial distribution of coffee consumers in Kabupaten Pamekasan, Indonesia. The research addresses the limited empirical evidence regarding the structure of local coffee markets and the geographic patterns of consumer demand at the regional level. A quantitative approach is employed using primary data collected from 390 coffee consumers across thirteen sub-districts during January–April 2026. In this study, market concentration is evaluated via indicators of market share, four-firm concentration ratio, and Herfindahl–Hirschman Index; while Geographic Information System techniques identify consumer distribution patterns, density level, and consumption hotspots. The results indicated that coffee consumption is primarily conducted at the hands of consumers in productive ages and frequent drinkers, suggesting that it has become a habit of modern lifestyle and the act of purchase. It is a loose oligopoly structure and very competitive; no single coffee brand dominates the preferences of consumers. Coffee consumption behaviour across the regency is further investigated using spatial analysis, which displays an uneven distribution amongst Pamekasan, Tlanakan, Pademawu, and Proppo sub-districts. These areas encompass the major areas of consumption and, therefore, are the most valuable coffee market regions that would be well-suited for business growth. Northern sub-districts have lower consumer densification and silo development. The added value of the paper lies in combining the dataset of market concentration with a spatial consumer mapping approach to produce an empirical model describing local coffee markets. The results offer practical insights for coffee producers, small and medium enterprises, and policymakers in designing targeted marketing strategies, improving distribution efficiency, and supporting sustainable regional coffee industry development.*

KEYWORDS: *Coffee Market, Market Concentration, Consumer Distribution, Geographic Information System, Regional Development.*

1. INTRODUCTION

Coffee is one of the most strategic plantation commodities in Indonesia because it contributes not only to agricultural income but also to the development of micro, small, and medium enterprises (MSMEs), tourism, and regional branding. The domestic coffee industry has grown a lot in recent years, as the way consumers live their lives, it is becoming more urbanized, and there are greater numbers of cafes and locally owned coffee brands popping up all over. Currently Indonesia is included in the top 5 of world's coffee producers and consumers, domestic consumption continues to increase every year as coffee culture is increasingly entrenched in daily social and economic activities (International Coffee Organization, 2024). This global-level phenomenon is also present in certain regional areas like Kabupaten Pamekasan, East Java as it experiences the intensifying competition of local coffee products against traditional market shares, retail outlets and modern style coffee shop.

Due to its agricultural resources, the growing MSME sector and an expanding consumer base, Kabupaten Pamekasan has great potential for the development of the coffee industry. The Pamekasan Regency is composed of 13 sub-districts in total which is populated by more than 900 thousand people resulting in a wide domestic market for food and beverage products, including coffee. Mr. Arif continued to the Central Bureau of Statistics (BPS) data. The presence of various coffee-related businesses in urban areas such as Kecamatan Pamekasan, Tlanakan, and Pademawu indicates the increasing consumer demand and market dynamism. A few empirical studies probing market concentration and coffee consumer spatial distribution at the regency-level exist, however, they do not capture the growing popularity of coffee products.

The market concentration analysis is significant because it provides information about the structure of competition between coffee producers and sellers. To the less monopolistic side, this will allow small local producers to have little opportunity of entry as a few firms operate in a fairly level oligopolistic practice giving way for anti-competitive behavior, whilst at the other end, there is more competition that could drive product differentiation, consumer welfare and innovation. The commonly-used concentration metrics based on four-firm ratios are the Concentration Ratio (CR4) and Herfindahl-Hirschman Index (HHI), which helps determine how competitive a market is or whether it would be optimal, monopolistically competing, or oligopolistically—one way to think about moving towards perfect competition. Market structure analysis is necessary for identifying strategies to formulate business and regional development policies in agribusiness sectors (Ariani et al., 2022; Rahmawati et al., 2023).

Besides, the spatial distribution of consumers is also a potential determinant for appropriate marketing and distribution strategies as well as dynamic pricing. In fact, consumer concentration in certain sub-districts can indicate economic activity centers, greater purchasing power, better access and/or a stronger coffee culture. GIS methods have been increasingly used in agribusiness and regional economics to map consumer behavior, partition market clusters, and support spatial-based decision making. In Indonesia, the positive effect of GIS-based market mapping has been proven to enhance the distribution efficiency of products and discover potential areas for local business expansion (Pratama et al., 2021; Nugroho & Fitriani, 2024).

This is very relevant given the current trend of developing local products and regional brands. The products of Madurese coffee that are marketed in Pamekasan can be developed to have a distinctive character following local taste and cultural values. With no data on consumer concentration or market competitiveness, producers and policymakers may find it hard to strategize instruments for marketing or to plan their development programs.

Based on the above problems, this research aims to find out about the market concentration level of coffee products in in Kab. The findings are anticipated to furnish empirical insights that aid local government, MSME players, and coffee entrepreneurs in developing marketing strategies for market expansion, product differentiation and synergistic growth of regional coffee thriving ecosystem. Moreover, the study adds toward the sparsely available body of literature on coffee market analysis at a sub-national level in Indonesia, especially at the regency level.

2. MATERIALS AND METHODS

2.1. MATERIALS AND METHODS

2.1.1. STUDY AREA AND RESEARCH PERIOD

This study was conducted in Kabupaten Pamekasan, East Java Province, Indonesia, covering all thirteen sub-districts (kecamatan). The research was carried out from January to April 2026. Kabupaten Pamekasan was selected as the study area due to the increasing development of local coffee businesses, the expansion of coffee consumption, and the growing importance of coffee-related economic activities within the region.

2.1.2. DATA SOURCES AND COLLECTION

This study employed both primary and secondary data sources. The structured survey directed to coffee consumers from thirteen sub-districts of Kabupaten Pamekasan supplied primary data. The questionnaire focused on information related to consumer buying behaviours and purchasing preferences. Some observed variables are: (1) purchase frequency, (2) Amount of coffee consumed?, (3) Coffee brands? and (4)purchasing regions and 5 product preferences. To perform the data accuracy and completeness, trained enumerators used a face-to-face interview process.

Secondary data were taken from some formal institutions, namely the Central Bureau of Statistics (BPS) of Pamekasan Regency, Department of Trade and Post Office, Department of Cooperatives and Small-Medium Enterprises, and administrative records per sub-district. This data informed the market structure and spatial mapping of coffee consumers.

2.1.3. POPULATION AND SAMPLING TECHNIQUE

The target population consisted of coffee consumers residing in Kabupaten Pamekasan. The sample size was determined using the Slovin formula with a 5% margin of error:

$$n = N / (1 + Ne^2)$$

(n) = sample size,

(N) = population size,

(e) = margin of error (0.05).

Based on the estimated population of 901,700 inhabitants, the minimum required sample size was approximately 400 respondents. After data cleaning and validation procedures, a total of 390 valid questionnaires were retained for further analysis.

To ensure proportional representation across the study area, respondents were distributed among the thirteen sub-districts using proportional sampling based on population size and accessibility.

2.2. DATA ANALYSIS

2.2.1. MARKET SHARE ANALYSIS

Market share analysis was employed to determine the relative market position of each coffee brand. Market share was calculated using the following equation:

$$MS = Q_i / Q_t \times 100$$

(MS) = market share (%),

(Q_i) = sales volume or consumer preference for brand (i),

(Q_t) = total sales volume or total consumer preference for all brands.

The results provide an overview of the competitive position of coffee products in the local market.

2.2.2. CONCENTRATION RATIO (CR4)

The Concentration Ratio of the four largest coffee brands (CR4) was used to measure market concentration and identify the degree of market dominance. The CR4 index was calculated as:

$$CR4 = \sum_{i=1}^4 MS_i$$

CR4 = Four-firm Concentration Ratio (%)

MS_i = Market share of the i -th largest coffee brand (%)

(S_i) represents the market share of each of the four largest brands.

A higher CR4 value indicates greater market concentration and lower competitive intensity, whereas a lower value reflects a more competitive market structure.

2.2.3. HERFINDAHL–HIRSCHMAN INDEX (HHI)

To complement the CR4 analysis, market concentration was further assessed using the Herfindahl–Hirschman Index (HHI). The HHI was calculated by summing the squared market shares of all identified coffee brands:

$$HHI = \sum S_i^2$$

criteria:

$HHI < 0.15$ = low competition

$0.15–0.25$ = moderate

0.25 = high competition.

where (S_i) denotes the market share of firm or brand (i).

The HHI provides a comprehensive measure of market concentration because it accounts for the distribution of market shares among all market participants.

2.2.4. SPATIAL ANALYSIS OF CONSUMER DISTRIBUTION

The utilization of Geographic Information System (GIS) techniques was used to analyze consumers that coffee spread out in Kabupaten Pamekasan. Data were processed and visualized spatially with ArcGIS and QGIS.

The spatial analysis takes place in 3 stages. To execute this, two-step consumer distribution maps of coffee consumers were created to visualize the spread and geographic presence of consumers between sub-districts. Secondly, to determine high and low concentration coffee consumers, we created density maps of the market. Third, hotspot analysis was employed to discover clusters of intensive coffee consumption and to identify potential areas for market development.

The combination of the market concentration indicators and GIS-based spatial analysis made it possible to fully evaluate both the competitive structure of the coffee market and the geographic distribution of consumer demand in this area.

3. RESULTS AND DISCUSSION

3.1. CHARACTERISTICS OF COFFEE CONSUMERS IN KABUPATEN PAMEKASAN

The results suggest that consumption of coffee in the District of Pamekasan is not separated from the characteristics of consumers. In total, 67.4% of the respondents were male and 32.6% were female consumers. This trend implies that coffee drinking is still common among men which corresponds to the results of a separate study where male consumers drink coffee due to work as well as social and lifestyle experiences (Hapsari et al., 2023; Nguyen et al., 2022). Additionally, 42.8% of consumers were in the productive age group of 26–40 years followed by those aged 17–25 years (34.6%). The results indicate that coffee consumption in Pamekasan is largely based on economically active individuals who increasingly tend to follow modern consumptive lifestyles and coffee culture. Coffee is being less of an adjunct to saying that is demonstrated by the high daily coffee consumers (58.2%),

TABLE 1 Characteristics Respondents

Characteristics	Percentage (%)
Male 67.4	Female 32.6
Age 17–25 years 34.6	26–40 years 42.8
>40 years 22.6	Daily consumption 58.2
Weekly consumption 41.8	
Male 67.4	Female 32.6
Age 17–25 years 34.6	26–40 years 42.8
>40 years 22.6	Daily consumption 58.2

3.1.1. MARKET SHARE OF COFFEE PRODUCTS IN KABUPATEN PAMEKASAN

The market share analysis reveals a relatively dispersed market structure. Coffee Brand A accounted for 15.42% of consumer preferences, followed by Brand B (12.75%), Brand C (10.38%), and Brand D (10.07%). On the other hand, Other brands accounted for 51.38% of the market share at once. The heavy proportion the category of other brands demonstrates there are numerous smaller players with various coffee products competing in the market. This discovery highlights the evergrowing phenomena of Pamekasan's coffee industry, where local players still competing in various markets although some big brands available. This situation is also observed in sales markets for coffee at the regional level in developing countries, where market fragmentation coexists with high local concentration by only a few dominant firms (Rahmawati et al., 2024).

TABLE 2 Market Share of Coffee

Brand	Share (%)
Local Coffee A	15,42
Local Coffee B	12,75
Local Coffee C	10,38
Local Coffee D	10,07
Others	51,38

3.1.2. MARKET CONCENTRATION ANALYSIS BASED ON CR4

The CR4 calculation results obtained by 48,62% which indicate that the coffee market in Kabupaten Pamekasan is classified as loose oligopoly. So while the big four have a lot of market share, they don't quite dominate as one. Competition is still quite open so smaller brands may enter and are competitive. These market conditions are typically conducive to innovation and product differentiation because firms need to continually enhance product quality and their marketing efforts in order to maintain their competitive positions. In recent research, it is reported that moderate concentration in the market encourages competition and benefits consumers by providing a larger range of product options and price competition (Chen & Li 2024).

$$CR4 = 15,42 + 12,75 + 10,38 + 10,07$$

$$CR4 = 48,62\%$$

3.1.3. MARKET CONCENTRATION ANALYSIS BASED ON HERFINDAHL–HIRSCHMAN INDEX (HHI)

Finally, the HHI value of 0.123 does support the finding that there are more than four firms in this market and therefore indicates an increasingly unconcentrated market structure observed due to openness. This value is less than the generally accepted threshold level of 0.15, indicating that there is no single brand in full control of consumer preferences. The fact that the CR4 is moderate while HHI values are relatively low indicates that consumers choose from very broad sets of coffee brands. As such, the competitive environment does remain and leaves room for new local coffee companies to grow in the market.

The results of spatial distribution show that coffee consumption at the sub-district level in Kabupaten Pamekasan has great fluctuations. Kecamatan Pamekasan occupied the largest proportion of consumers (18.46%), followed by Tlanakan (14,10%), Pademawu (13,33%) and Proppo (12,06%). The four sub-districts comprise nearly 58 % of total coffee consumption. Such a distribution was consistent with the GIS analysis, that marks these locations as great consumption clusters in its regency. The dominance of these locations can be explained by their higher population density, stronger economic activities, and better accessibility to retail markets and coffee shops.

TABLE 3 Spatial Distribution of Coffee Consumers in Kabupaten Pamekasan, 2026

Consumer Concentration (%)	Category	Distric
> 15.00	Very High	Pamekasan
10.01 – 15.00	High	Tlanakan, Pademawu, Proppo
5.01 – 10.00	Moderate	Palengaan, Pegantenan, Waru
2.01 – 5.00	Low	Pakong, Galis, Batumarmar, Larangan
≤ 2.00	Very Low	Kadur, Pasean

The spatial distribution of coffee consumers in Kabupaten Pamekasan was presented as a tabulated data in Table 2. Density analysis shows that most consumers are concentrated in the central and southern parts of the regency. The most dense zone is in Kecamatan Pamekasan with 18.46% of total respondent. This region is the administrative and economic center of the regency, so it boasts a higher overall density, better transportation networks to surrounding areas as well as more coffee shops and retail outlets. This way, it turns out that in terms of consumer access to coffee products is much higher than other sub-districts.

Other areas with high density consumers were Tlanakan (14.10%), Pademawu (13.33%) and Proppo (12.06%). The contiguous coffee market Jurisdictions surrounding the capital of the regency, suggest the dotting of an integrated spacial coffee-market among these sub-districts. The high density of consumers in these areas is probably due to their proximity to urban agglomerations, improved economic interactions and developed distribution networks. Earlier studies have shown, consumer density for food and beverage products tends to be higher in built environment areas with greater accessibility and commercial concentration (Rahman et al., 2022; Nugroho & Fitriani, 2024).

Average consumer densities were identified in Palengaan (9.74%), Pegantenan (8.46%) and Waru (6.67%). Even though these sub-districts do not represent the main consumption centers, they are big enough with populations high enough and local economies that should support some degree of localized consumerism. Turkish coffee producers targeting customers in secondary geography beyond the primary urban cluster

On the other hand, low-density regions were dominated in northern regency such as Kadur (1.79%) and Pasean (1.03%). Which these areas are lesser consumers, this may be due to fewer people living in them, as the population is lower, it means that there are less people who go shopping and even fewer shops. On the other hand, these regions are also considered unexploited areas of market potential as local coffee producers can likely expand their market coverage by improving distribution channels and marketing strategies.

In summary, density map indicates that the concentration of coffee consumer in Kabupaten Pamekasan has a clustered spatial pattern. The result points towards centering marketing and distribution initiatives around areas with high consumption density while scaling up expansion programs for lower density zones. The spatial distribution of demand estimated by density mapping informs both coffee policies and businesses about optimal market development routes in order to enhance local coffee products competitiveness.



FIGURE 1 Presents The Spatial Density Of Coffee Consumers in Kabupaten Pamekasan



FIGURE 2 Consumption Hotspot Map

Hot spot analysis for coffee consumption in Kabupaten Pamekasan is shown in Figure 3. The results show that coffee consumption is spatially grouped rather than randomly distributed and helps identify distinct geographic concentrations of consumer demand. The dominant hotspot is Kecamatan Pamekasan, totalling 18.46% of the total respondents. This sub-district, which serves as the regency's administrative, commercial, and service center attracts higher economic activity with homeowners having bigger purchasing power and more retail outlets and coffee shops. Such characteristics provide a good ground for developing an excellent culture of coffee consumption.

The hotspot analysis also shows that there are second hotspot areas in regency capital, such as Tlanakan (14.10%), Pademawu (13.33%), and Proppo (12.06%). This set of four sub-districts is merged into a single high consumption cluster with Kecamatan Pamekasan, representing about 58% of all coffee drinking locations. This result implies the existence of a regional market nucleus, whereby demand convergence occurs, and that more trade takes place between pairs of markets. Related spatial consumption clusters have also been revealed by studies on food and beverage markets that reported an increased demand for urban and peri-urban areas with their more accessible location, socioeconomic status, and commercial activity (Kurniawan et al., 2025; Putra et al.).

The hotspot areas detailed are inextricably related to the demographic characteristics identified in this study. The greater proportion among daily coffee drinkers (58.2%) is seen with the predominance of coffee consumers aged 17–40 years (77.4%), which suggests that daily consumption of coffee is associated with populations within the range of the productive age group living in urban and semi-urban regions. For example, younger and economically active consumers either consumed coffee more frequently or were more influenced by lifestyle-oriented products such as coffee (Hapsari et al., 2023; Silva et al., 2021). This means that the spatial concentration of productive-age consumers contributes directly to generating these coffee consumption hotspots.

Meanwhile, the northern sub-districts of Kadur (1.79 percent) and Pasean (1.03 percent) were categorised as coldspot areas. They tend to have fewer consumers and less strong market activity than southern- and center-located sites in the regency. The lesser intensity of coffee consumption in these regions may be explained by lower population densities, poorer transport connectivity, and fewer commercial amenities. While current demand is still low, these sub-districts are potential target markets for the extension of selective distribution and promotion programs.

Moreover, the hotspot pattern complements the evidence from market concentration analysis. Despite the fact that the CR4 value of 48.62% shows a loose oligopoly, and the HHI value of 0.123 indicates an overall competitive market structure, consumer demand is more concentrated in only a few sub-districts in a relatively small area. However, this does not imply that spatial concentration of consumers leads to high market concentration in markets for brands. However, many rival coffee brands continue to operate within the same geographic hotspots in a competitive market climate, as this demand remains clustered.

Practically, the hotspot map gives rich insights to coffee producers, distributors, and policymakers. By focusing resources into hotspot areas, we ensure a more efficient use of marketing budget, and expansion strategies can be applied in coldspot regions where new business potential exists. Thus, the combination of hotspot analysis with market concentration indicators provides a holistic framework to strengthen data-driven policy-making and encourage environmentally-friendly development of the coffee industry in Kabupaten Pamekasan.

4. CONCLUSION

The purpose of this study was to analyze the market concentration and coffee consumers spatially in Kabupaten Pamekasan using market structure indicators and geographic information system (GIS) analysis. The results show the characteristics of coffee consumption in the regency, dominated by productive-age consumers or those aged 17 – 40 years, and a higher proportion of daily coffee drinkers. Such characteristics indicate that coffee has become an important part of local consumption patterns and people's growing lifestyle.

The analysis of the market share indicates that 48,62% of the total consumer preferences are represented by half of the coffee brands. The CR4 indicates a loose oligopoly, although the market is still open enough for competition with each of several major brands possessing considerable market power. The value of the Herfindahl-Hirschman Index (HHI) is also 0.123, showing that the market structure remains unconcentrated and quite competitive, thereby strengthening this conclusion. As a result, while there are dominant brands, the market is still unfettered because no one brand controls everything, and such smaller local coffee producers find room to compete and grow.

The spatial analysis suggests that the coffee drinking habits are not evenly distributed in each of the 13 sub-districts in Kabupaten Pamekasan. Consumers were lined up in Kecamatan Pamekasan, Tlanakan, Pademawu, and Proppo, which are the top four, with a total of approximately 58% of all consumers. Through GIS-based density and hotspot analyses, these sub-

districts were found to be the main cluster of coffee consumption in the regency. Meanwhile, northern areas like Kadur and Pasean had very low densities of consumer activity, thus categorised as coldspot areas.

The spatial analyses on market concentration and consumer demand reveal that although the coffee market is still a competitive one, consumer demand is concentrated in particular urban and peri-urban locations. This result is significant in that it illustrates the need to adopt spatial perspectives in array development efforts. Hotspot areas should be the focus of coffee producers on product placement and sales, but they should also look towards growth in underserved regions. Moreover, local governments need to take advantage of GIS-based market information; it can be used for MSME development, enhance infrastructure distribution, and strengthen the competitiveness of local coffee products.

In general, this study adds to the understanding of the structure and spatial dynamics of the coffee market in Kabupaten Pamekasan and provides empirical evidence that should allow marketing and regional development strategies to be feasible.

MANAGERIAL AND POLICY IMPLICATIONS

This will facilitate coffee strategy – product differentiation, branding, and market segmentation requirements to also bolster competitiveness in high-demand locations and potentially increase demand for various coffee products. At the policy level, local authorities should assist in promoting MSME coffee-based programs through marketing support services and development-oriented training, as well as area-based development programming. These things are good for establishing a relatively balanced coffee market ecosystem in all sub-districts of Kabupaten Pamekasan.

LIMITATIONS AND FUTURE RESEARCH

Since this study used cross-sectional survey data from Jan–Apr 2026, it represents a snapshot of consumer behaviour at a single point in time. Future research should include longitudinal data, spatial autocorrelation techniques (such as Moran's I and Getis-Ord G_i^*) and an econometric approach to understand the factors that influence coffee consumption and expansion in a region. These approaches would yield broader perspectives on the evolving nature of local coffee markets and would facilitate more integrated policy responses.

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