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Segmentation of Local Skincare Consumers Based on Electronic Word of Mouth (e-WOM) Characteristics: A Hierarchical Cluster Analysis Approach

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Abstract: The rapid development of the local skincare industry in Indonesia has encouraged changes in consumer behavior in accessing and responding to digital information, particularly through electronic word of mouth (e-WOM). This study aims to map the e-WOM characteristics of local skincare consumers based on similarities in response patterns using cluster analysis. e-WOM was measured through three dimensions—intensity, valence of opinion, and content—adapted from Goyette et al. (2010), using six statements rated on a five-point Likert scale. A descriptive quantitative survey was conducted with 73 female students at Universitas Negeri Surabaya who actively used local skincare products and had been exposed to online reviews. The instrument was valid (item-total correlations ranging from 0.610 to 0.824, exceeding the critical value of 0.229) and reliable (Cronbach's Alpha = 0.843). Data were analyzed using Hierarchical Cluster Analysis with Ward's Method and Squared Euclidean Distance. The analysis identified three e-WOM clusters: Cluster 1 (High/Active e-WOM, 49.3%), Cluster 2 (Moderate e-WOM, 46.6%), and Cluster 3 (Low/Passive e-WOM, 4.1%). These findings indicate that consumers' responses to e-WOM are heterogeneous and form distinct behavioral patterns, providing a basis for consumer segmentation and more targeted digital marketing strategies.

Keywords: electronic word of mouth, e-WOM, cluster analysis, local skincare, consumer behavior, consumer segmentation

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1. Introduction

The local skincare industry in Indonesia has expanded rapidly alongside greater consumer awareness of skin care and the increasing use of digital technologies. Social media platforms, online communities, video-sharing services, and e-commerce marketplaces now serve not only as promotional channels but also as major information environments in which consumers search for product information, compare alternatives, and exchange experiences before and after purchase. In contemporary marketing, this shift requires firms to understand consumers as active participants in digital communication rather than merely as recipients of company-generated messages. [1]

One of the most influential forms of consumer-to-consumer communication in this environment is electronic word of mouth (e-WOM). e-WOM refers to product-related statements, experiences, opinions, and recommendations communicated by consumers through Internet-based channels. Because such information is generated by other users and is often perceived as less commercially controlled than firm-created communication, it can shape product evaluation, trust, information adoption, and purchase-related judgments. [2], [3]

The e-WOM construct can be examined through several behavioral characteristics. Goyette et al. developed an e-WOM measurement framework that includes intensity, valence, and content-related dimensions. In practical terms, consumers differ in how

frequently they seek or encounter reviews, how they interpret the direction and credibility of opinions, and how much they rely on review content for product understanding. Research on social-media e-WOM and online reviews also shows that information quality, usefulness, credibility, and adoption are important mechanisms through which digital reviews affect consumer decisions. [4], [5], [6]

However, consumers do not use digital information in the same way. Some consumers actively search for reviews, compare multiple sources, and share their own product experiences, while others use reviews selectively or remain skeptical of online opinions. This heterogeneity is consistent with consumer-behavior and marketing perspectives that emphasize differences in information processing, involvement, preferences, and decision-making patterns across individuals. [7], [8]

Most e-WOM studies in skincare and related consumer contexts have used causal approaches, such as regression or structural equation modeling, to test the influence of e-WOM on purchase intention, trust, loyalty, or purchasing decisions. Although those approaches are useful for explaining relationships among variables, they do not directly reveal naturally occurring groups of consumers with similar e-WOM response patterns. Market segmentation provides a framework for identifying meaningful consumer groups, while data-driven clustering offers an exploratory way to form segments based on multivariate similarities. Hierarchical clustering is particularly useful when the number and structure of groups are not specified in advance. [9], [10], [11]

Accordingly, this study addresses the limited use of cluster-based segmentation for local skincare e-WOM by mapping consumers according to similarities in their e-WOM characteristics. The study uses Hierarchical Cluster Analysis to identify groups based on intensity, valence of opinion, and content. The resulting segments are expected to enrich the understanding of heterogeneous e-WOM behavior and provide practical guidance for designing digital marketing communication that is better aligned with the characteristics of each consumer segment.

This study treats e-WOM as a single construct explored through three dimensions. Intensity captures the frequency of accessing and seeking online reviews; valence of opinion captures the direction of perceived opinions and trust in user reviews; and content captures the clarity and usefulness of information contained in reviews. Each dimension is measured by two items on a five-point Likert scale. The six item responses are then analyzed through Hierarchical Cluster Analysis to identify groups of consumers with similar e-WOM response profiles, as illustrated in Fig. 1. [4]

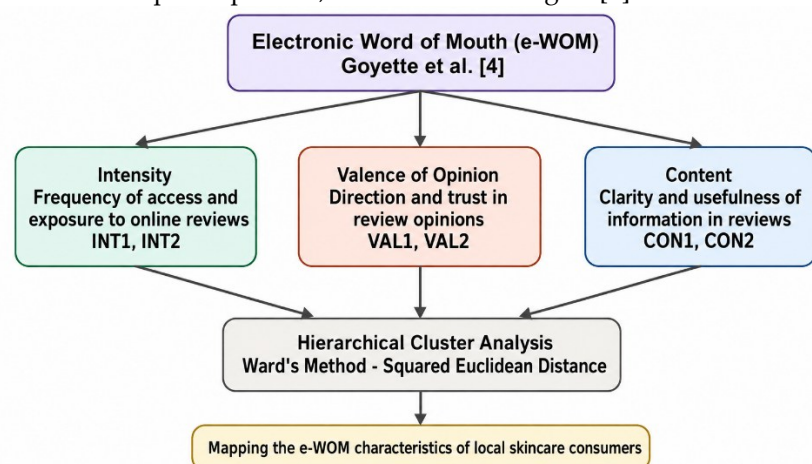


Figure 1. Conceptual framework for e-WOM-based consumer segmentation.

2. Materials and Method

This study employed a descriptive quantitative survey design. The research was exploratory because it aimed to map e-WOM characteristics and identify groups of respondents based on similarity patterns rather than test causal relationships. Therefore,

the study did not specify independent or dependent variables and did not formulate causal hypotheses. Cluster analysis was selected as an appropriate multivariate technique for exploratory classification of observations. [12]

The population consisted of female students at Universitas Negeri Surabaya who were active consumers of local skincare products. A total of 73 respondents were selected using purposive sampling with the following criteria: (1) active female students of Universitas Negeri Surabaya; (2) had purchased or used local skincare products; (3) had seen or read local skincare reviews on social media; and (4) were willing to participate in the study. The sample exceeded a common multivariate analysis rule of thumb of at least five observations per indicator; with six indicators, at least 30 observations were required. [12]

The study variable was e-WOM, operationalized through the intensity, valence of opinion, and content dimensions. The operational indicators are presented in Table 1. [4]

Table 1. Operationalization of the e-WOM variable

Variable	Dimension	Statement Item	Code	Scale
Electronic Word of Mouth (e-WOM)	Intensity	I often see reviews of local skincare products on social media.	INT1	Likert 1–5
		I often search for information about local skincare products through online reviews.	INT2	Likert 1–5
	Valence of Opinion	The local skincare reviews I read are more positive than negative.	VAL1	Likert 1–5
		I trust reviews from users of local skincare products on social media.	VAL2	Likert 1–5
	Content	Local skincare reviews provide clear information about the product.	CON1	Likert 1–5
		Local skincare reviews help me understand product quality.	CON2	Likert 1–5

Source: Adapted from Goyette et al. [4].

Before the main analysis, the instrument was tested for validity and reliability. Item validity was assessed using Pearson Product-Moment correlation with the criterion r -calculated $> r$ -table ($df = 71$, $\alpha = 5\%$, r -table = 0.229). Reliability was assessed using Cronbach's Alpha, with values of 0.60 or higher considered acceptable for this study. The results are presented in Table 2. [12]

Table 2. Validity and reliability test results

Code	Statement Item	r-calculated	r-table	Interpretation
INT1	I often see reviews of local skincare products on social media.	0.610	0.229	Valid
INT2	I often search for information about local skincare products through online reviews.	0.824	0.229	Valid
VAL1	Local skincare reviews are more positive than negative.	0.766	0.229	Valid
VAL2	I trust reviews from users of local skincare products.	0.758	0.229	Valid
CON1	Local skincare reviews provide clear information about the product.	0.784	0.229	Valid
CON2	Local skincare reviews help me understand product quality.	0.768	0.229	Valid
Cronbach's Alpha			0.843	Highly Reliable

Data were analyzed in SPSS through four stages: (1) descriptive analysis of the six e-WOM indicators; (2) Hierarchical Cluster Analysis using Ward's Method and Squared Euclidean Distance; (3) examination of the agglomeration schedule and dendrogram to determine the most interpretable cluster solution; and (4) interpretation of cluster characteristics using mean scores for each e-WOM dimension. Hierarchical clustering is suitable for progressively combining observations according to similarity and producing a nested cluster structure. [13], [14]

Ward's Method was used because it seeks to minimize the increase in within-cluster variance at each merging step. Squared Euclidean Distance was used as the dissimilarity measure, which is consistent with the variance-based logic of Ward's criterion and helps emphasize differences among response profiles. [15]

3. Result

Descriptive analysis was conducted on the responses of 73 participants across the six e-WOM indicators. The results are presented in Table 3.

Table 3. Descriptive statistics of e-WOM indicators (n = 73)

Code	Statement Item	Min	Max	Mean	Std. Dev.
INT1	I often see reviews of local skincare products on social media.	1	5	4.216	0.745

Code	Statement Item	Min	Max	Mean	Std. Dev.
INT2	I often search for information about local skincare products through online reviews.	2	5	4.405	0.701
VAL1	Local skincare reviews are more positive than negative.	2	5	4.027	0.793
VAL2	I trust reviews from users of local skincare products.	3	5	4.284	0.652
CON1	Local skincare reviews provide clear information about the product.	3	5	4.405	0.681
CON2	Local skincare reviews help me understand product quality.	3	5	4.203	0.662
Overall mean				4.257	

Table 3 shows that INT2 and CON1 recorded the highest mean values (4.405 each), indicating that respondents actively searched for product information through online reviews and perceived those reviews as providing clear product information. VAL1 had the lowest mean (4.027), although it remained high, suggesting that respondents did not always perceive local skincare reviews as predominantly positive. The overall mean of 4.257 indicates generally positive perceptions and high engagement with e-WOM concerning local skincare products.

Hierarchical Cluster Analysis using Ward's Method and Squared Euclidean Distance was applied to the 73 respondents. The number of clusters was determined by examining the change in agglomeration coefficients. The largest increase occurred from stage 71 to stage 72, where the coefficient rose from 114.432 to 205.836, a difference of 91.404. This sharp increase indicated that a three-cluster solution was the most appropriate before substantially dissimilar groups were merged. The visual pattern of the dendrogram also supported three clearly separated groups.

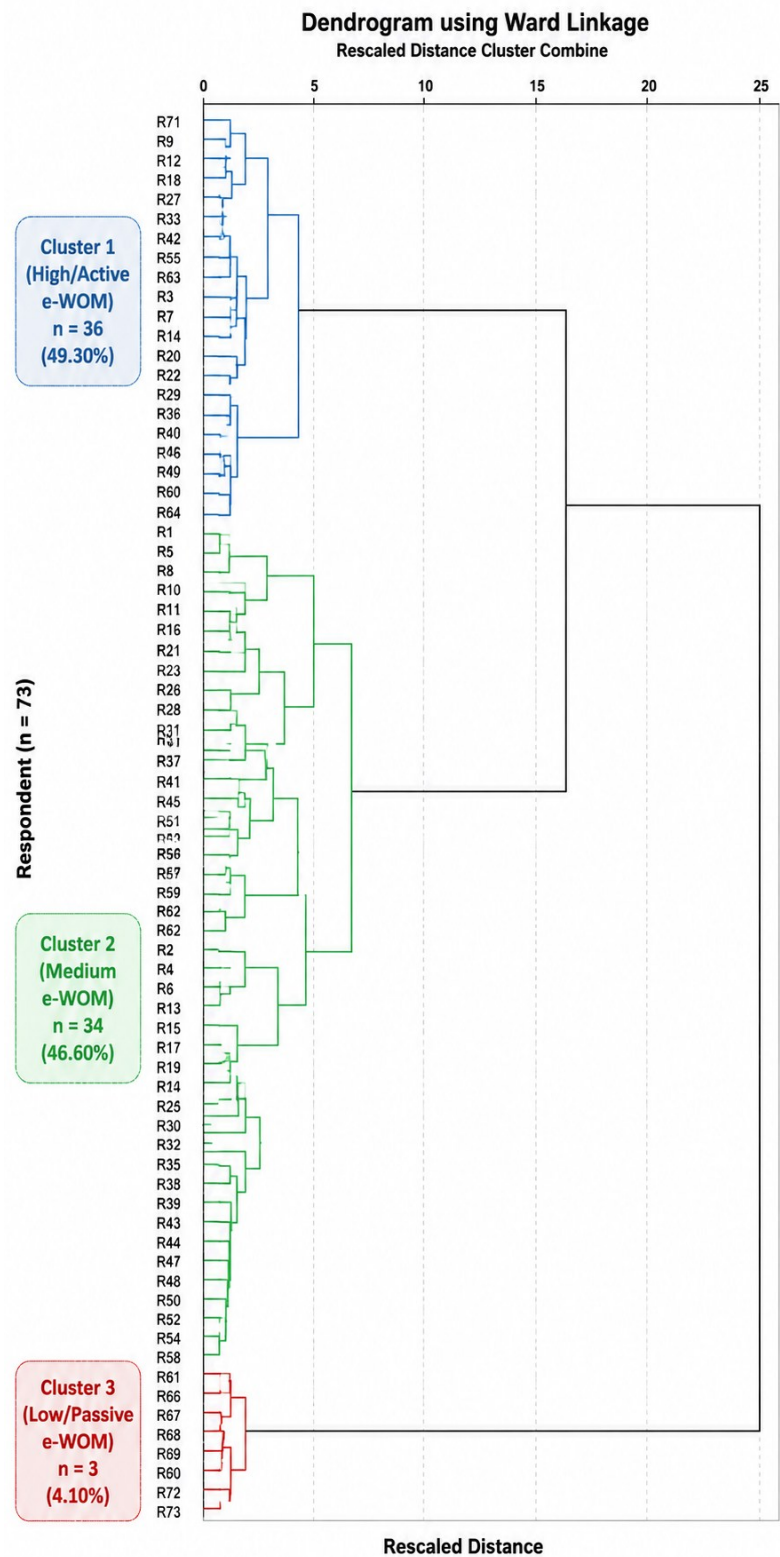


Figure 2. Dendrogram of the hierarchical cluster analysis using Ward linkage.

Based on the three-cluster solution, the distribution of respondents is presented in Table 4.

Table 4. Distribution of respondents by cluster

Cluster	Category	n	%
Cluster 1	High e-WOM (Active)	36	49.30%

Cluster	Category	n	%
Cluster 2	Moderate e-WOM	34	46.60%
Cluster 3	Low e-WOM (Passive)	3	4.10%
Total		73	100%

The mean scores of the three e-WOM dimensions for each cluster are presented in Table 5.

Table 5. Mean scores by e-WOM dimension and cluster

Dimension	Cluster 1 (High)	Cluster 2 (Moderate)	Cluster 3 (Low)
Intensity	4.806	3.926	3.167
Valence of Opinion	4.625	3.618	3.000
Content	4.708	3.971	3.000
Overall mean	4.713	3.838	3.056

Cluster 1 consisted of 36 respondents (49.3%) and had the highest level of e-WOM engagement. This group recorded the highest mean scores across intensity (4.806), valence of opinion (4.625), and content (4.708), with an overall mean of 4.713. Respondents in this cluster were highly active in searching for and reading local skincare reviews on social media, showed strong trust in the opinions contained in online reviews, and relied heavily on the completeness and usefulness of user-generated information when evaluating products.

Cluster 2 consisted of 34 respondents (46.6%) and showed a moderate level of e-WOM engagement. Its mean scores were 3.926 for intensity, 3.618 for valence of opinion, and 3.971 for content, with an overall mean of 3.838. Respondents in this group were exposed to local skincare reviews and used digital information in product evaluation, but they appeared more selective and did not treat e-WOM as the sole basis for decision-making.

Cluster 3 consisted of three respondents (4.1%) and showed the lowest e-WOM engagement. The group recorded mean scores of 3.167 for intensity, 3.000 for valence of opinion, and 3.000 for content, with an overall mean of 3.056. These lower scores indicate that the respondents accessed online reviews less frequently, expressed lower trust in review opinions, and relied less on review content when evaluating local skincare products.

4. Discussion

The three-cluster solution demonstrates that consumers are heterogeneous in how they access, trust, and use e-WOM. This result supports the central logic of segmentation: consumers with similar response patterns can be grouped into meaningful segments, while different groups may require different communication approaches. The nearly balanced proportions of Cluster 1 and Cluster 2 also suggest that high and moderate e-WOM engagement are both substantial patterns among the respondents rather than a single dominant behavior. [9], [10]

Cluster 1 can be interpreted as an active e-WOM segment. Its members search for reviews intensively, trust user opinions, and place strong value on review content. Such consumers may also have greater potential to contribute content and become organic information disseminators. This interpretation is consistent with research showing that consumers participate in e-WOM for motives such as helping others, social interaction,

self-enhancement, and economic incentives, and that active online articulation can extend the reach of consumer-generated information. [2]

Cluster 2 represents a more selective information-processing segment. These consumers use reviews as an additional source of information but do not rely on them uncritically. Their moderate scores are consistent with evidence that e-WOM effectiveness depends on how consumers evaluate the usefulness, credibility, and diagnostic value of information before adopting it. In this segment, clear and evidence-based review content is likely to be more influential than mere exposure to large volumes of reviews. [3], [6]

Cluster 3 is a small but important skeptical segment. Lower scores across all three dimensions suggest limited review exposure, lower trust in online opinions, and weaker reliance on review content. The existence of this group confirms that e-WOM does not have a uniform influence on all consumers. For skeptical consumers, information from alternative sources, including product evidence, official information, and credible expert communication, may be necessary to complement consumer reviews. [5], [8]

Methodologically, the results show the value of using cluster analysis alongside more common causal approaches. Regression and structural models can estimate the influence of e-WOM-related variables, whereas clustering identifies internally similar consumer profiles without requiring a dependent variable. In this study, Ward's hierarchical procedure produced an interpretable three-segment typology that directly describes differences in intensity, valence of opinion, and content perceptions. [11], [13], [15]

The findings therefore extend the practical interpretation of e-WOM from a single predictor of consumer behavior to a possible basis for behavioral segmentation. Rather than assuming that all consumers respond to digital reviews in the same way, marketers can distinguish active, selective, and passive/skeptical groups and align content, review management, and communication strategies with the informational needs of each segment. [4], [7]

For Cluster 1, local skincare companies should encourage constructive user-generated content and advocacy because these consumers are highly engaged with online reviews. Programs that invite authentic product reviews, social-media participation, community interaction, and experience sharing may help amplify organic e-WOM while maintaining transparency and credibility.

For Cluster 2, firms should improve the quality, clarity, and accessibility of product information. Educational content, informative demonstrations, credible testimonials, and detailed explanations of product use can support consumers who consult reviews selectively and compare them with other information before making decisions.

For Cluster 3, companies should focus on trust-building communication. Clear information about product safety, official certification, ingredients, testing evidence, and other verifiable product attributes can reduce uncertainty among consumers who are skeptical of online reviews. Credible expert communication may also complement user-generated opinions for this segment.

Overall, the segmentation results indicate that digital marketing communication should be adapted to the characteristics of each consumer group rather than applied uniformly. Segment-based communication can make marketing messages more relevant while helping firms manage online reviews and consumer information needs more effectively.

5. Conclusion

The e-WOM characteristics of the 73 local skincare consumers showed clear differences across intensity, valence of opinion, and content, although the overall mean score of 4.257 indicated generally positive perceptions and high engagement. Hierarchical Cluster Analysis using Ward's Method identified three distinct groups based on similarities in response patterns.

Cluster 1, the High/Active e-WOM segment, included 36 respondents (49.3%) and had an overall mean of 4.713. Cluster 2, the Moderate e-WOM segment, included 34 respondents (46.6%) with an overall mean of 3.838. Cluster 3, the Low/Passive e-WOM segment, included three respondents (4.1%) with an overall mean of 3.056. These results confirm that e-WOM behavior among the respondents is heterogeneous and can be mapped into meaningful consumer segments.

The study demonstrates that e-WOM can be used not only as a variable associated with consumer decision-making but also as a segmentation basis for understanding differences in digital information behavior. For local skincare firms, this segmentation offers a practical foundation for tailoring communication, review management, and trust-building strategies to different levels of consumer engagement.

Future research should broaden the sample to include consumers from different regions, age groups, educational backgrounds, and purchasing contexts so that the resulting segmentation reflects a more diverse population. Additional digital-behavior variables, such as social-media use intensity, customer engagement, brand loyalty, and platform preferences, may also be incorporated to develop richer consumer profiles.

Further studies may compare the current hierarchical solution with alternative segmentation techniques such as K-Means clustering, latent class analysis, or machine-learning-based clustering. Comparing multiple approaches can help assess the stability and consistency of the identified segments and improve the generalizability of the findings.

For local skincare companies, the findings can be used as an initial basis for segment-based digital marketing. Communication strategies should be adjusted to each segment's level of e-WOM engagement so that information delivery, review management, and digital marketing activities are more relevant and targeted.

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