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TRAFFIC ANALYSIS OF E-COMMERCE WEBSITES: EXPLORING THE MEDIATING EFFECT OF CONSUMER BEHAVIOR

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Abstract

This study uses Google Analytics 4 as the analytical tool, with the Google Merchandise Store as the data collection. A total of 300,000 active user data points from January 1, 2024, to June 30, 2024, were collected and analyzed to observe the relationships between website traffic, consumer behavior parameters, and their impact on website performance. The following research findings were obtained: First, Website Traffic has a positive impact on Total Revenue. Second, consumer behavior mediating parameters such as Sessions, Engaged Sessions, Event Count, and Conversions mediate the relationship between Website Traffic and Total Revenue. Among these, Engaged Sessions exhibit a full mediating effect, while Sessions, Event Count, and Conversions demonstrate a partial mediating effect. However, Engagement Rate and Average Engagement Time do not show a mediating effect between Website Traffic and Total Revenue. These findings can serve as a valuable reference for e-commerce website operators and digital marketers, helping to guide decisions regarding content creation, SEO optimization, user journey design, shopping experience, checkout processes, as well as planning promotional activities and keywords.

Key Words: E-commerce, Website Traffic, Consumer Behavior, Mediating Effect, Google Analytics

Introduction

Since the emergence of online stores, e-commerce websites have provided a platform enabling transactions between buyers and sellers, facilitated by the active participation and communication of both parties. Scholars in the fields of marketing and information decision systems have recognized that high satisfaction ratings significantly influence consumers' intentions for continued use or repeat purchases (Bhattacherjee, 2001, Gustafsson et al., 2005), and are one of the primary factors affecting individual intentions to persist in using a product (Bhattacherjee, 2001). However, past literature on e-commerce platforms has predominantly focused on aspects such as community characteristics (As noted by Muniz & O'Guinn, 2001 and McAlexander et al., 2002), community value (Eggert & Ulaga, 2002), and factors like community identification and loyalty (Farquhar & Rowley, 2006), with limited research exploring the relationship between e-commerce websites and consumer behavior.

However, the outbreak of COVID-19 in 2019 significantly accelerated consumer adoption of online shopping. According to forecasts by eMarketer, the global e-commerce market is expected to reach $6.4 trillion in 2024, accounting for 22% of the global retail market. By 2027, this market size is anticipated to surpass $8 trillion. These figures indicate that e-commerce not only drives growth in the retail sector but also serves as a key force in global economic development. As the core of digital consumption, e-commerce is reshaping consumer shopping behaviors, making an in-depth examination of the consumer decision-making process behind it highly valuable for both academic research and commercial applications.

The primary research objectives are as follows: (1) to analyze whether e-commerce website traffic impacts total revenue; (2) to explore whether consumer behavior parameters have a mediating effect on the relationship between website traffic and total revenue; and (3) to provide concrete recommendations and managerial insights aimed at improving website quality and enhancing operational effectiveness.

Literature Review

Consumer decision-making is the behavior by which consumers evaluate various aspects of service quality before making an actual purchase (Walters & Paul, 1970). The design of service processes can aid in formulating strategies for service improvement and developing new services (Korsching & El-Ghamrini, 2003). This section thus conducts a literature review on e-commerce website service quality, consumer decision-making models, and mediating effects.

Service Quality of E-commerce Websites

Website service quality can be categorized into platform quality (Wu et al., 2012), information quality (Chen, 2013), relationship quality (Bloemer et al., 2013), and interaction quality (Wang & Judy, 2010). The rise of the internet has increased the importance of e-commerce (Molla & Licker, 2005), ena-

bling consumers to make purchases according to their needs, unrestricted by time or location (Woo et al., 2004). This study thus uses consumer behavior as the primary data source to identify the elements of website service quality that consumers value most.

Understanding and appropriately managing website service quality can effectively enhance customer relationship management. Consumers often prefer a particular transactional website not only due to product pricing but also due to the emphasis on website service quality (Sun & Lin, 2009). E-commerce increasingly values website service quality (Molla & Licker, 2005), as website services are inherently interactive, conveying messages that instill trust in the quality of service perceived by customers.

In summary, there is currently no unified perspective among scholars regarding website service quality. Some focus on the functionality of online information platforms, others on the characteristics of information provided on transactional websites, while others emphasize customer relationship management. Therefore, this study draws from past research on website service quality factors, utilizing Google Analytics 4 as an analytical tool to collect and analyze traffic data from the Google Merchandise Store. Through quantitative statistical analysis, it examines the interrelationships between website traffic and consumer behavior parameters and their impact on website performance.

Consumer Decision-Making Models

Consumer decision-making models refer to the processes consumers engage in when searching for, purchasing, using, evaluating, and disposing of products and services (Schiffman & Leslie, 1993). These processes involve both the decision-making stages and the actual behaviors related to acquiring, using, and disposing of products or services (Walters & Paul, 1970). In a narrow sense, consumer decision-making encompasses the various stages of individual decisions aimed at obtaining goods or services, while the broader definition includes consumption behaviors of non-profit organizations, industrial organizations, and intermediaries.

Additionally, (Yue & Stuart, 2009) points out that virtual community transactions involve a range of factors, each impacting different stages of the decision-making process. These factors—such as goal selection, information processing, memory, involvement level, attitude, interference, and consumer attributions—affect decision-making at each stage (Puccinelli et al., 2009).

Mediating Effect

According to the theory proposed by Reuben M. Baron and David A. Kenny (1986), in a three-variable system, the independent variable (X) has two causal pathways leading to the dependent variable (Y). The effect of X directly on Y is referred to as the direct effect (X → Y path). The other pathway, where X affects Y through a mediating variable (M), is known as the indirect effect (X → M → Y path). To interpret mediation effects, the following coeffi-

cients must be obtained: (1) the coefficient from X to M, denoted as *a*; (2) the coefficient from X to Y, denoted as *c*; (3) the coefficient from M to Y, denoted as *b*; and (4) the coefficient from X to Y when both X and M are included, denoted as *c'*. The mediation effect is determined by examining the significance of *c'*. If *c'* is significant, it indicates a partial mediation effect; if *c'* is not significant, it indicates a full mediation effect.

Data and Method

This study utilizes Google Analytics 4 as the analytical tool to compile and explain the traffic sources and key metrics of the target website, as shown in Table 1. The traffic sources and metrics entering the Google Merchandise Store are quantitatively summarized in the Traffic Development Report (Table 2). Subsequently, IBM SPSS Statistics 25 is used for multiple regression analysis to examine whether website traffic sources (ie. X parameter), consumer behavior (ie. mediating parameter), and total revenue (ie. Y parameter). Consumer behavior parameters are employed as mediating variables to test for mediation effects, including sessions, engaged sessions, engagement rate, average engagement time per session, event count, and conversions. The research framework is illustrated in Figure 1.

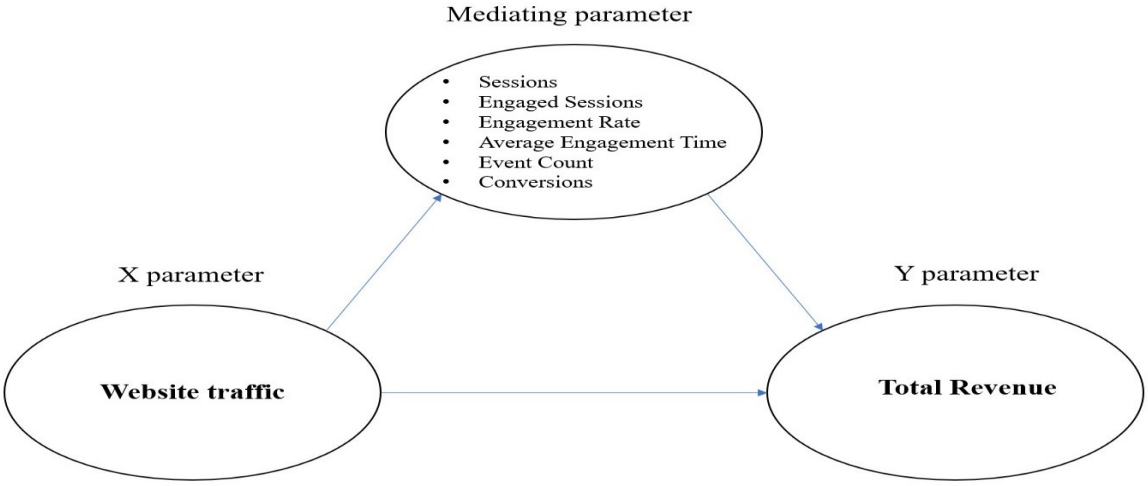

Figure 1. Research Framework

Based on the literature review and mediating effect model by Baron & Kenny (1986), the hypotheses for this study are as follows:

H1: Website Traffic has a positive impact on total revenue.

Table 1: Website Traffic Variables

Variables	Description
Website Traffic	Website Traffic are including organic traffic and paid traffic. Organic traffic from users accessing the website through unpaid search engine results. Examples include Direct, Organic Search, Referral, Email, Organic Social, Organic Shopping, and Organic Video. Paid traffic generated by users accessing the website through clicks on paid search advertisements. Examples include Paid Search, Cross-network, Paid Other, Display, and Paid Shopping.
• Sessions	The number of sessions initiated on the website or application.
• Engaged Sessions	The number of sessions lasting more than 10 seconds, including a conversion event, or containing more than two screen or page views.
• Engagement Rate	The percentage of engaged sessions, calculated as ("Engaged Sessions" divided by "Sessions").
• Average Engagement Time	User engagement time per session.
• Event Count	The number of times users trigger events.
• Conversions	The number of times users trigger conversion events.
Total Revenue	The total revenue generated from purchases, subscriptions, and advertisements.

Data Source: Google Analytics 4 (Compiled by this study)

H1-1: Sessions mediate the relationship between website traffic and total revenue.
H1-2: Engaged Sessions mediate the relationship between website traffic and total revenue.
H1-3: Engagement Rate mediates the relationship between website traffic and total revenue.
H1-4: Average Engagement Time mediates the relationship between website traffic and total revenue.
H1-5: Event Count mediates the relationship between website traffic and total revenue.
H1-6: Conversions mediate the relationship between website traffic and total revenue.

Empirical Analysis

According to analysis of H1, the positive Impact of Website Traffic on Total Revenue. The regression analysis data for website traffic and total revenue are presented in Table 3. The β-value is 0.996, with a p-value of $0.000 < 0.01$, indicating that website traffic has a positive impact on total revenue.

Table 2. Traffic Development Report

Traffic Source	Users	Sessions	Engaged Sessions	Engagement Rate	Average Engagement Time	Event Count	Conversions	Revenue
Direct	220657	345644	168736	48.80%	38	3498717	216001	431724.39
Organic Search	55185	77627	55757	71.80%	49	930885	87242	137520.38
Referral	13109	16270	12334	75.80%	44	198172	22373	15451.59
Paid Search	3644	6986	1985	28.40%	4	30842	1071	401.48
Email	3365	6862	5677	82.70%	82	116712	13079	30711.38
Organic Social	3431	4499	3380	75.10%	70	62637	6588	8220.24
Organic Shopping	686	794	714	89.90%	64	11799	1519	317.68
Cross-network	141	260	146	56.20%	57	2849	167	298.8
Organic Video	48	75	36	48.00%	37	770	32	0
Paid Other	34	35	12	34.30%	12	209	1	0
Display	10	15	3	20.00%	0	70	2	0
Paid Shopping	1	1	1	100.00%	182	45	2	176
Total	300311	459068	248781	54.20%	53	4853707	348077	624821.94

Data Source: Google Analytics 4 (Compiled by this study)

According to analysis of H1-1 to H1-6, the mediating effect of Consumer Behavior sub-dimensions on the relationship between Website Traffic and Total Revenue. The regression analysis data for the mediating effect of sessions on the relationship between website traffic and total revenue are presented in Table 4. Models 1 through 4 are all significant, indicating that Sessions partially mediate the relationship between website traffic and total revenue.

The regression analysis data for the mediating effect of engaged sessions on the relationship between website traffic and total revenue are presented in Table 5. The significance of Models 1 through 3, with Model 4 being non-significant, indicates that Engaged Sessions fully mediate the relationship between traffic and total revenue.

The regression analysis data for the mediating effect of engagement rate on the relationship between website traffic and total revenue are presented in Table 6. The non-significance of Model 1 and Model 3 indicates that Engagement Rate does not have a mediating effect on the relationship between website traffic and total revenue.

The regression analysis data for the mediating effect of average engagement time on the relationship between website traffic and total revenue are presented in Table 7. The non-significance of Model 1 and Model 3 indicates that Average Engagement Time does not have a mediating effect on the relationship between website traffic and total revenue.

The regression analysis data for the mediating effect of event count on the relationship between website traffic and total revenue are presented in Table 8. The significance of Models 1 through 4 indicates that Event Count has a partial mediating effect on the relationship between website traffic and total revenue.

The regression analysis data for the mediating effect of conversions on the relationship between website traffic and total revenue are presented in Table 9. The significance of Models 1 through 4 indicates that Conversions partially mediate the relationship between website traffic and total revenue.

Conclusion

This study primarily examines the relationship between website traffic and total revenue, using consumer behavior parameters as mediating variables. Through data analysis and organization, the following conclusions were obtained, as shown in Table 10. The analysis in the table confirms a positive correlation between the sources of website traffic and total revenue for e-commerce websites. Website traffic significantly influence total revenue. Consumer behavior parameters, including Sessions, Engaged Sessions, Event Count, and Conversions, exhibit mediating effects between website traffic and total revenue. Engaged Sessions exhibit a full mediating effect, while Sessions, Event Count, and Conversions demonstrate partial mediating effects. However, Engagement Rate and Average Engagement Time do not demonstrate mediating effects on the

Table 3. Regression Analysis of Website Traffic and Total Revenue

	Total revenue
	Standard Coefficient β (Sig P-Value)
Website traffic	0.996***(0.000)

* p-value <0.1, ** p-value <0.05, *** p-value <0.01 Data Source: Compiled by this study

Table 4. Regression Analysis of the Mediating Effect of Sessions

	Sessions		**Total Revenue**	
	Standard Coefficient β (Sig P-Value)			
	Model1	Model2	Model3	Model4
Website traffic	1.000***(0.000)	0.996***(0.000)		2.324** (0.042)
Sessions			0.994***(0.000)	-1.329 (0.208)
Results	Significance	Significance	Significance	Significance

* p-value <0.1, ** p-value <0.05, *** p-value <0.01 Data Source: Compiled by this study

Table 5. Regression Analysis of the Mediating Effect of Engaged Sessions

	Engaged Sessions		**Total Revenue**	
	Standard Coefficient β (Sig P-Value)			
	Model1	Model2	Model3	Model4
Website traffic	0.997***(0.000)	0.996***(0.000)		0.077(0.754)
Engaged Sessions			0.998***(0.000)	0.922***(0.004)
Results	Significance	Significance	Significance	Not Significance

*p-value <0.1, ** p-value <0.05, *** p-value <0.01 Data Source: Compiled by this study

Table 6. Regression Analysis of the Mediating Effect of Engagement Rate

	Engagement Rate		**Total Revenue**	
	Standard Coefficient β (Sig P-Value)			
	Model1	Model2	Model3	Model4
Website traffic	-0.578(0.174)	0.996***(0.000)		0.999***(0.000)
Engagement Rate			-0.077(0.812)	0.027(0.386)
Results	Not Significance	Significance	Not Significance	Significance

*p-value <0.1, ** p-value <0.05, *** p-value <0.01 Data Source: Compiled by this study

Table 7. Regression Analysis of the Mediating Effect of Average Engagement Time

	Average Engagement Time		**Total Revenue**	
	Standard Coefficient β (Sig P-Value)			
	Model1	Model2	Model3	Model4
Website traffic	-0.111(0.730)	0.996***(0.000)		0.998***(0.000)
Average Engagement Time			-0.095(0.770)	0.017(0.599)
Results	Not Significance	Significance	Not Significance	Significance

*p-value <0.1, ** p-value <0.05, *** p-value <0.01 Data Source: Compiled by this study

Table 8. Regression Analysis of the Mediating Effect of Event Count

	Event Count		**Total Revenue**	
	Standard Coefficient β (Sig P-Value)			
	Model1	Model2	Model3	Model4
Website Traffic	1.00***(0.000)	0.996***(0.000)		-2.490***(0.000)
Event Count			0.998***(0.000)	3.487***(0.000)
Results	Significance	Significance	Significance	Significance

*p-value <0.1, ** p-value <0.05, *** p-value <0.01 Data Source: Compiled by this study

Table 9. Regression Analysis of the Mediating Effect of Conversions

	Conversions		**Total Revenue**	
	Standard Coefficient β (Sig P-Value)			
	Model1	Model2	Model3	Model4
Website traffic	0.989***(0.000)	0.996***(0.000)		0.537***(0.002)
Conversions			0.995***(0.000)	0.464***(0.005)
Results	Significance	Significance	Significance	Significance

*p-value <0.1, ** p-value <0.05, *** p-value <0.01 Data Source: Compiled by this study

Table 10: Results of Hypothesis Testing

	Hypotheses	Results	Types of Mediation
H1	Website Traffic has a positive impact on total revenue.	Supported	
H1-1	Sessions have a mediating effect on the relationship between website traffic and total revenue.	Supported	Partial Mediation
H1-2	Engaged Sessions have a mediating effect on the relationship between website traffic and total revenue.	Supported	Full Mediation
H1-3	Engagement Rate has a mediating effect on the relationship between website traffic and total revenue.	Not Supported	No Mediation
H1-4	Average Engagement Time has a mediating effect on the relationship between website traffic and total revenue.	Not Supported	No Mediation
H1-5	Event Count has a mediating effect on the relationship between website traffic and total revenue.	Supported	Partial Mediation
H1-6	Conversions have a mediating effect on the relationship between website traffic and total revenue.	Supported	Partial Mediation

Data Source: Compiled by this study

relationship between website traffic and total revenue.

Based on the research findings, website traffic has a positive impact on total revenue. It is recommended that e-commerce website operators actively develop traffic sources such as Direct, Organic Search, Referral, and Paid Search. Additionally, using Google Analytics 4 for further analysis of the relative impact of different traffic sources on total revenue can provide valuable insights. These findings can serve as a reference for strategizing and optimizing website traffic development efforts.

Furthermore, consumer behavior parameters such as Sessions, Engaged Sessions, Event Count, and Conversions have a mediating effect between website traffic and total revenue. In addition to developing website traffic, e-commerce website operators should actively optimize website content and design pages that enhance sessions, engaged sessions, event counts, and conversions. By prioritizing customer experience and encouraging consumer browsing and purchase intent, these strategies can contribute to increased total revenue. These research findings can serve as a valuable reference for e-commerce website managers and digital marketers. The results provide insights for content creation, SEO optimization, user journey design, shopping experience, checkout process, and planning promotional activities and keywords, aiding in more effective website management and marketing strategies.

With rapid advancements in technology and the fast-paced updates in the digital world, smart marketing is gradually emerging as a mainstream approach and is poised to become the future of marketing. The technologies and analytical methods related to smart marketing represent promising areas for future research and development. Researchers interested in smart marketing are encouraged to explore this topic further in subsequent studies.

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