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Digital Customer Sentiment and Its Predictive Power for Stock Market Movements in Pakistan

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ABSTRACT

Abstract

The development of digital space has altered the process of forming and disseminating information, opinions, and emotions within financial markets, particularly in emerging economies. It is based on Behavioral Financial Theory and Investor Sentiment Theory, as well as the effect of digital customer sentiment as an important facilitator of stock market movements at the Pakistan Stock Exchange (PSX). Primary data were collected using a structured questionnaire from 270 active market participants. It was done with a deductive approach and a positivist philosophy. Data analysis was performed using PLS-SEM. The results of the tests showed that the relationship between digitally expressed sentiment and stock price changes, as well as the volatility of the stock market, is positive and highly significant, indicating that digitally expressed sentiment is a strong predictor of stock price changes and stock market volatility. The findings support the entire efficient market hypothesis and emphasize the influence of behavioral and sentiment processes in investment decision-making. The article has added to the body of literature on behavioral finance by offering empirical data from a developing market and by exploring the practical implications of using digital sentiment analytics in investment practices, market surveillance, and policy-

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making.

Keywords: *Digital customer sentiment, Stock market movements, Behavioral finance, Pakistan Stock Exchange.*

1. Introduction

Pakistani stock markets are volatile, exhibit low informational efficiency, and are not immune to non-fundamental factors (Mahmood et al., 2025). The rumors, speculative trading, political instabilities, macroeconomic uncertainties, and unforeseen regulatory interventions are more likely to drive the investor behavior in the PSX (Shah et al., 2024). Financially uneducated retail investors face greater exposure, and the imbalance in information dissemination intensifies, leading to short-term price distortions and inefficiencies (Umeaduma, 2024). Income announcements, market macroeconomic indicators, and firm fundamentals are conventional financial market signals that generally do not indicate abrupt price changes or abnormal returns (Munir et al., 2024). Furthermore, the presence of retail investors, low trading turnover in most listed companies, and slow uptake of public information drive excessive noise trading (Tan et al., 2024). Such weaknesses in the structure decrease market predictability and investor confidence, and challenge portfolio managers, regulators, and policymakers seeking market predictability and transparency (Nafiu et al., 2024).

Over the last few years, the high penetration of digital platforms has changed how information, opinions, and feelings are created and shared among market participants (Naeem et al., 2025). Digital customer sentiment is the real-time, collective reflection of the population's perceptions of firms, brands, and market conditions, as expressed on social media platforms, online forums, review websites, and financial discussion boards (Selvakumar et al., 2025). Formal disclosure could be postponed or even disproportionately interpreted in the Pakistani context, so digital sentiment can serve as another informational signal that reduces uncertainty and increases market responsiveness (Lin et al., 2025). The presence of positive or negative feelings

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in digital stories can alter investor expectations, trading force, and the processes of price formation and, to some extent, address the issue of informational inefficiency (Taffler et al., 2025). Digital customer sentiment can model short-term price changes and volatility trends that conventional financial variables do not capture, owing to its ability to capture behavioral and emotional aspects of market participants (Sahani, 2024). As a result, sentimental analytics would ensure that investors and analysts are better placed to predict market responses and improve decision-making quality.

Although the investor sentiment and stock market behavior in the global literature are increasingly being associated, there is a lack of empirical evidence in emerging markets, especially in Pakistan (Andleeb and Hassan, 2023). Current Pakistani literature largely focuses on macroeconomic determinants, fundamental factors of firms, and technical forecasts of stock market movements, while paying little attention to behavioral and data-driven predictors (Latif et al., 2024). In addition, the bulk of previous sentiment-related research uses proxy variables, such as trading volume or the consumer confidence index, that do not capture a real-time digital manifestation of market mood. Very little exists of the use of advanced structural modelling techniques, including Partial Least Squares Structural Equation Modeling (PLS-SEM), to study digital customer sentiment in the PSX setting. This loophole limits complete insight into the impact of sentiment generated digitally on stock price movements in an emerging behavioral market. It is necessary to fill this gap to contribute to the literature on behavioral finance and to place sentiment-based forecasting in the context of a specific institutional and technological environment in Pakistan.

To address the specified gap, this research paper aims to conduct a systematic review of the predictive power of digital customer sentiment in explaining stock market movements in Pakistan. In particular, the research questions that guide the study include the extent to which digital sentiment affects stock price changes and the extent to which sentiment-based information enhances the explanatory power of conventional market models. In line with this, the

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main aim of this study is to identify the direct influence of digital customer sentiment on stock market returns, determine the strength and importance of this relationship, and demonstrate that sentiment is a predictable behavioral outcome in the PSX. Also, the paper has an empirical objective of determining whether digitally derived sentiment data can supplement standard financial indicators in an emerging environment. The objectives are consistent with promoting behavioral finance views in the Pakistani stock market environment.

To meet the above objectives, this research employs a positivist research philosophy and a deductive research design, as in hypothesis-testing empirical research. The research design adopted is quantitative, and data are gathered through primary means using a structured questionnaire administered to people in Pakistan who are active in the stock market, investors, and are financially aware of the topic. The final sample will comprise 270 valid respondents, providing sufficient statistical power to conduct a structural modeling analysis. PLS-SEM is used to conduct data analysis and is most suitable for predictive research, complex latent variables, and non-Normal data distributions. PLS-SEM enables the measurement reliability, construct validity, and structural relationships to be examined simultaneously, which is why it is appropriate for analyzing the sentiment-market movement nexus. This is a highly powerful methodological strategy because it is robust, predictive, and empirical.

This study has certain useful theoretical, empirical, and practical implications. On the theoretical level, it draws on the literature on behavioral finance and investor sentiment and introduces digital customer sentiment as a predictive variable for the Pakistani stock market. It is empirically among the first sentiment-based stock market behaviors to be validated by PLS-SEM in a developing economy. The results apply to investors, portfolio managers, and financial analysts interested in applying digital sentiment analytics to their trading and risk management activities. The other advantage of online sentiment is that policymakers and regulators can understand its influence on

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market dynamics and apply it to monitor and cushion investors. This study establishes the increasing importance of digital information in enhancing the efficiency, transparency, and informed decision-making of the Pakistani capital market.

2. Theoretical Framework

This paper builds on the Behavioral Finance Theory, which challenges the ideals of perfectly efficient markets and rational investors (Ranjan, 2025). Behavioral finance is based on the assumption that the most important variables in the investment decision-making process and, by extension, in asset prices are psychological biases and emotions and collective sentiment (Kaushik, 2025). The informational asymmetry, the presence of speculative trading, and the dominance of retail investors, characteristic of emerging markets such as Pakistan, are inclined to drive market outcomes towards sentiment-driven behavior rather than pure fundamental information (Maurya et al., 2025). The more quantifiable expressions of these behavioral forces are digital customer sentiment, formed online and on social media (Al Montaser et al., 2025). Digital sentiment comprises optimism, pessimism, and emotional responses to businesses and the market, and these factors are the most critical drivers of stock price changes, as they reflect investors' expectations and views (Goyal et al., 2025).

It is also due to the Investor Sentiment Theory that market prices can be distorted by irrational optimism or pessimism among investors, leading to high or low intrinsic values (Maurya et al., 2025). This theory holds that sentiment is a non-core risk factor that affects trading, volatility, and returns in markets with poor arbitrage opportunities (Naidoo et al., 2025). The mispricing related to sentiment in the PSX, where short selling is limited and information dissemination is slow, can persist longer. Digital customer sentiment is an indicator of extraneous information that gathers dispersed opinions and feelings in real time. Therefore, the theoretical framework frames digital customer sentiment as a behavioral predictor with a direct effect on stock market processes, investor attitudes, trading, and stock prices.

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3. Literature Review

3.1 Digital Customer Sentiment

Digital customer sentiment is a widely discussed topic in the literature on finance and marketing as a practical measure of social attitudes and intentions to act (Sun and Zhang, 2025). Based on the literature, a social media sentiment analysis of posts, online reviews, and discussion forum posts provides timely insight into the overall mood of sellers and buyers on the market (Doğan et al., 2025). The researchers argue that digital sentiment goes beyond customer satisfaction and involves the general attitude toward a firm's performance, its reputation, and the effects it will have on the firm in the future (Jum'a, 2025). Empirical research indicates that sentiment polarity (positive or negative) affects investor attention, trading, and short-term price effects (Gao et al., 2025). One of the most cost-effective methods for delivering information in new economies where other disclosure systems are feeble or inefficient is digital customer sentiment, a live system of disclosure (Wang et al., 2025). The latest developments in sentiment analytics have made it even more useful as a predictive tool, enabling scholars to assess the emotional and cognitive components of market behavior with greater accuracy.

3.2 Stock Market Movements

Stock market movements are affected by fundamental and behavioral factors, which are usually expressed in terms of price changes, returns, and volatility (Akin and Akin, 2024). The traditional finance literature focuses on firm-specific fundamentals and macroeconomic factors as drivers of the market (Liu, 2024). However, empirical exceptions such as large volatility and momentum effects suggest that the variables will not be able to explain price behavior to a large degree (Huynh & Khoa, 2025). Pakistan is one of the countries with highly volatile stock prices, driven by speculative activity, political news, and investor sentiment in emerging markets. The existing literature emphasises that non-fundamental effects on price formation are exacerbated by market inefficiencies, low analyst coverage, and the dominance

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of retail investors (Balanaghebi et al., 2025). Stock market behavior in these cases is therefore increasingly considered the result of an interaction between informational cues and behavioral reactions, and thus the value of sentiment predictors.

3.3 Digital Customer Sentiment and Stock Market Movements

The behavioral finance literature has repeatedly demonstrated that investor sentiment plays an important role in stock market performance (Padmavathy, 2024). Digital customer mood is a proxy for group market mood, which influences how investors interpret information and shape future price change expectations (Silver, 2024). Positive sentiment predicts a positive attitude towards the company's performance and market conditions, which may create pressure to buy and push prices higher (Wang et al., 2024). On the other hand, negative emotions can cause risk aversion, a shopping spree, and declining prices (Kuramoto et al., 2024). Such emotional responses tend to be more intense in low-information-efficiency markets.

Empirical research across developed and emerging markets shows that sentiment measures derived from digital platforms exhibit strong short-term correlations with stock returns and volatility (Zhao and Wei, 2024). The scientists assume that digital sentiment can capture soft information not directly linked to financial statements or macroeconomic indicators (Amin et al., 2024). Investors will be able to receive more rapid sentiment-based signals in markets where official flows of information may lag informational flows (Du et al., 2024). Time lags of that nature enhance the predictive power of digital customer sentiment in light of current stock market trends.

The influence of sentiment on trading behaviour at the Pakistan Stock Exchange is likely to be immense, given that a large share of the market is composed of retail investors. The strong connection between sentiment and market movement is further enhanced by large-scale speculative trading driven by rumors. The following hypothesis is formulated:

H1: *Digital customer sentiment has a significant effect on stock market movements in Pakistan.*

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4. Methodology

4.1 Research Philosophy and Approach

The positivist research philosophy also validates the research by presuming that the relationships between variables can be objectively assessed and quantified through statistical techniques (Shaikh et al., 2025; Sial et al., 2025; Mujtaba et al., 2025a). It is based on a deductive research approach, in which assumptions drawn from behavioral, financial, and investor sentiment theories are challenged by empirical data (Mujtaba et al., 2025b; Memon et al., 2025). The paradigm would be applicable to the study of causal and effect relationships between digital customer sentiment and stock market changes within a systematic analytical framework (Shaikh et al., 2025; Anser et al., 2025; Anser et al., 2024). It is an objective study with high replicability and theoretical soundness, as indicated by the use of measurable indicators and hypothesis testing.

4.2 Research Design

Quantitative research design is also used to empirically assess the predictive power of digital customer sentiment in shaping stock market dynamics (Naeem et al., 2025b; Bohio et al., 2025; Shahab et al., 2025). Sentiment-based financial research is especially the most appropriate with quantitative research since, in such a study, it is possible to generalize the results and test the model rigorously (Khan et al., 2024; Ali et al., 2022; Farooq et al., 2023; Farooq and Ahmad, 2023; Naeem et al., 2024; Naeem et al., 2023). Primary data are collected in the study through a structured questionnaire, enabling the researcher to measure observable latent behavioral constructs. This model also aligns with prior behavioral finance, which focuses on numerical models of investor sentiment and market behavior.

4.3 Population and Sample

The target population is investors, trade analysts, financial analysts, and all other parties to the PSX. A purposive, non-probability sampling technique is used in the study to ensure the respondents are learned and exposed to digital

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financial information. The sample size is 270. It is an adequate sample, providing sufficient statistical power and significant results.

4.4 Data Collection Method

The questionnaire was structured and self-administered, used to gather data online and face-to-face. The items have been borrowed from other research studies and are considered valid and applicable to the PSX environment. All questionnaires were premised on a 5-point Likert scale (Strongly Disagree to Strongly Agree).

4.5 Data Analysis Technique

PLS-SEM was used to analyze the study's data, and the analysis was conducted using Smart PLS. PLS-SEM is best applied to research that is purely predictive, theory-building, or that requires latent constructs and non-normal data distributions. The analysis is carried out in two steps: first, the measurement model is evaluated (reliability and validity), and second, the structural model is evaluated (path coefficients, significance levels, R^2, and predictive relevance). The method allows estimating several relationships simultaneously and is powerful in giving insights into the sentiment-market movement nexus.

5. Measurement Scales

5.1 Digital Customer Sentiment

Digital customer sentiment reflects the emotions and judgments of investors and customers across digital platforms, including social media, online forums, and discussion boards on financial topics. The reflective latent variable will be measured with the following items as the construct:

Table 1 Measurement Items of Digital Customer Sentiment

Code	Measurement Items
DCS1	Online discussions about listed firms influence my perception of stock performance.
DCS2	Positive digital comments increase my confidence in a company's stock.

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.DCS3	Negative sentiment on social media affects my investment decisions.
DCS4	Digital opinions provide timely signals about market trends.
DCS5	I rely on online sentiment before making buy or sell decisions.

It is evaluated on a 5-point Likert scale. The higher the scores, the greater the perceived impact of digital sentiment.

5.2 Stock Market Movements

Stock market movements reflect perceived adjustments in the prices, volatility, and trading patterns of stocks driven by the flow of information and sentiment. This construct is also specified as a reflective latent variable as quantified in the following items:

Table 2 Measurement Items of Stock Market Movements

Code	Measurement Items
SMM1	Stock prices react quickly to online market sentiment.
.SMM2	Digital opinions influence short-term price fluctuations.
SMM3	Market volatility increases following negative online sentiment.
SMM4	Investor sentiment affects trading volume in the stock market.
SMM5	Online sentiment helps explain sudden market movements.

6. Results

6.1 Measurement Model Assessment

The measurement model was tested with PLS-SEM, and indicators of reliability, internal consistency, and convergent validity were evaluated. Outer loading was employed to assess reliability, and Cronbach's alpha and Composite Reliability were used to assess construct reliability. AVEs were used to measure convergent validity. The outcomes indicate that all measurement criteria are within the recommended range, suggesting that the measurement model is acceptable.

Table 3: Indicator Reliability

Construct	Item	Outer Loading
Digital Customer	DCS1	0.81

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Sentiment	DCS2	0.84
	DCS3	0.79
	DCS4	0.86
	DCS5	0.82
Stock Market Movements	SMM1	0.83
	SMM2	0.85
	SMM3	0.8
	SMM4	0.87
	SMM5	0.82

The outer loadings are above the threshold of 0.70. It indicates that all items are valid and reliable.

Table 4: Construct Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
Digital Customer Sentiment	0.88	0.91	0.67
Stock Market Movements	0.89	0.92	0.69

Cronbach's alpha and CR are also above the threshold of 0.70, and AVEs are above 0.50. It shows items are convergent valid.

6.2 Structural Model Assessment

The relationships between digital customer sentiment and stock market movements were examined to test the hypothesis. The tests were for path coefficients, t-statistics, p-values, coefficient of determination (R^2), and effect size (f^2). Bootstrapping (5,000 subsamples) was used to assess the statistical significance of path estimates.

Table 5: Structural Model Results

Hypothesis	Path	β	t-value	p-value	Decision
H1	DCS → SMM	0.62	11.47	< 0.001	Supported

The presence of digital customer sentiment positively significantly affects

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stock market movements. The high t-value and extremely significant p-value provide strong empirical support for H1.

Table 6: Coefficient of Determination and Effect Size

Endogenous Construct	R^2	f^2
Stock Market Movements	0.38	0.63

The R^2 value of 0.38 indicates that 38% of the variance in stock market movements is attributable to digital customer sentiment, providing moderate to substantial explanatory power in behavioral finance research. The effect size (f^2 = 0.63) indicates a significant effect, suggesting that sentiment is significantly predictive in the context of the PSX.

7. Discussion

The empirical findings show that customer and investor mood is now digitalized as well, and that the strength of the stock market trend in Pakistan is immense. The significant positive relationship between digital customer sentiment and stock market movements indicates that market participants do not read a firm's fundamentals or information published on the stock exchange. Instead, they are influenced by social emotions, impressions, and images disseminated through online media. This is also a fact that complicates the rationality of investors' behavior and the strong form of market efficiency, especially at the PSX, where information asymmetry is prevalent. The results show that sentiment-based impressions shape investors' expectations and trading activities, which, in turn, affect price formation and volatility.

The Investor Sentiment Theory holds that sentiment is a non-fundamental risk that drives stock market movements. The prospect of giving customers a chance to submit opinions online summons beliefs and pressures into an aggregate cue that will initiate market reactions that would not have been justified by fundamentals alone. Arbitrage is also limited, and regulatory frictions may manifest in the new Pakistan emerging market, making unwinding difficult and likely to persist in the new environment. Sentiment

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prediction in our analysis is high, as expected by the hypothesis that markets with retailers as the dominant players are particularly prone to pessimism and optimism waves. This is complemented by online resources, which spread information fast, and the herd mentality.

The large path coefficient and the general effect size also suggest that digital sentiment anticipates stock market trends. Behavioral finance theory holds that investors' information processing is affected by cognitive biases, including overconfidence, representativeness, and availability heuristics. Digital sentiment is a source of information that is more salient, easily available, and emotionally colored than traditional financial disclosures. Investors will therefore tend to overweight sentiment-based information when forming expectations, leading to short-term price movements and volatility. This process is especially applicable in Pakistan, where social media and Internet forums have become the most popular sites for exchanging information about financial matters informally.

These discoveries also support empirical studies conducted in other emerging and developed markets, which report the existence of sentiment-related indicators that remarkably forecast abnormal returns and volatility. However, the article contributes to the existing body of research by presenting a case study of Pakistan, which has received little attention in sentiment-based finance research. With PLS-SEM, the study can assess the latent dimensions of sentiment behavior more exhaustively than a regular measure on the same topic that relies on proxies. The methodological contribution to knowledge, in terms of converting digitally generated emotions into market-observable outcomes, is the focus.

Market movements do not just result from positive and negative sentiment, but also from participants' actions. The investor sentiment theory holds that the influence of this negativity is typically disproportionate due to negativity bias and loss aversion. Political instability and economic crisis are constant features of Pakistani life, and changes in the regulatory environment may amplify the impact of bad news delivered in digital formats, which have an

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immediate impact on the market. Despite the research being based on the general impact of sentiment, the findings indicate that sentiment polarity can be tracked and provide valuable insights into market risk and instability.

The analysis shows that the trend in the Pakistani market cannot be fully explained without a behavioural, sentiment-based explanation. Especially relevant in the new market, where efficiency is low, is the advent of digital customer sentiment as an invaluable source of information and input into traditional financial analysis. The empirical validation of sentiment as an alternative to existing theories of behavioral influences contributes to a more in-depth description of the market phenomenon and underscores the growing role of electronic information in the contemporary financial market.

8. Conclusion

The paper explains how the concept of digital customer sentiment can serve as a predictor of stock market activity in an emerging-market setting, illustrated by the example of the PSX. This study relies on Behavioral Finance Theory and Investor Sentiment Theory to present robust empirical findings that digital sentiment is a strong predictor of stock price movements. The results indicate that the simplest macroeconomic variables cannot be the sole determinants of market trends in Pakistan; it is also strongly influenced by emotions and perceptions exchanged on digital platforms. The paper states that digital sentiment is a useful predictor of informational asymmetry and retail investor domination, and that the correlation between sentiment and market movement is empirically supported by PLS-SEM.

The results show that customer sentiment in digital form collects soft, real-time data that supplements traditional financial performance analysis. Sentiment-based signals are more powerful indicators of environmental change in settings with delayed formal disclosures or biased interpretations of those disclosures. Overall, the current study is an addition to the literature on behavioral finance, as it introduces sentiment-based market behavior within a technically and institutionally grounded context in Pakistan, thereby

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increasing knowledge of stock market behavior in a developing market.

9. Policy and Managerial Implications

The implications of the findings are grave for the market supervisory authorities and regulating bodies. Regulators may consider using digital sentiment analytics to monitor markets and detect early signs of formless speculation, panic selling, or herding. Regulators can also monitor sentiment trends to identify abnormal market conditions and enhance investor protection. Policymakers can also make financial literacy programmes more participatory by sensitising retail investors on the dangers of trading based on sentiment and, thus, convince them to participate more informally in the market.

The results can be applied by investors, portfolio managers, and financial analysts in both managerial and practitioner contexts. Digital sentiment indicators should be used to enhance the precision of short-term predictions and risk management by the investment strategy. Fund managers can use sentiment analytics to complement fundamental and technical analysis, particularly in instances where uncertainty is high. When it comes to listed companies, knowledge of the effects digital narratives may have on investors and their perceptions could be used to influence communication and perception management. Overall, the study demonstrates the value of digital information in improving decision-making quality and market responsiveness.

10. Limitations and Future Research Directions

This research paper has limitations that future studies. The study is founded on primary data, which are the subjective ratings of the sentiment influence of investors, and not the objective ratings of the same, based on textual data. Further studies would require the involvement of machine-learning or natural language processing-based sentiment analysis of the social media networks to be more objective. Second, the research design employed is cross-sectional,

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which is why it cannot be a causal study or one that can be examined dynamically. A longitudinal or time-series design could provide additional information on how sentiment evolves.

It is also possible to investigate moderating or mediating factors, such as market volatility, firm size, trading volume, or investors' experience, in future research to provide clearer predictions of how sentiment affects market movements. The external validity of the findings would be further enhanced by comparative studies conducted across different emerging markets. Moreover, positive and negative sentiment can be analyzed in greater depth to provide more informative feedback on the behavior. The limitations would be an interesting topic to discuss to better understand how online sentiment influences the evolution of the contemporary financial market.

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