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Market Sentiment Analysis and Its Impact on Crowdfunding Success Using Deep Language Model–Based Natural Language Processing

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A B S T R A C T

The objective of this study was to examine the effect of market sentiment extracted through deep language model–based natural language processing on the success of crowdfunding campaigns by analyzing the relationship between linguistic sentiment indicators, investor engagement, and funding performance outcomes. This applied quantitative study employed an explanatory–predictive research design using data collected from 312 crowdfunding campaigns launched by entrepreneurs in Tehran between 2022 and 2024. Textual data including campaign descriptions, creator updates, investor comments, and interaction records were extracted from crowdfunding platforms and preprocessed using Persian natural language processing techniques. Market sentiment was operationalized through deep learning–based transformer models fine-tuned for contextual sentiment detection, enabling extraction of emotional tone, trust signals, perceived risk, and collective optimism. Crowdfunding success was measured using funding achievement ratio, funding speed, investor participation level, and success probability. Data analysis combined descriptive statistics, correlation analysis, multivariate regression modeling, structural path analysis, and machine learning prediction methods including gradient boosting, random forest, and deep neural networks to evaluate predictive relationships between sentiment variables and funding outcomes. Inferential analyses revealed that market sentiment significantly predicted crowdfunding success, demonstrating strong positive effects on investor engagement, funding achievement, and overall campaign success probability. Structural modeling confirmed that investor engagement partially mediated the relationship between sentiment and funding performance. Regression results indicated that sentiment was the strongest explanatory variable among all predictors, while machine learning comparisons showed that deep neural network models achieved the highest predictive accuracy in classifying successful campaigns. Positive sentiment accelerated funding speed and strengthened collective participation dynamics, confirming that emotional and linguistic signals function as behavioral drivers influencing investment decisions under uncertainty. The findings indicate that crowdfunding markets operate as sentiment-sensitive digital ecosystems in which collective emotional perception, communicated through textual interaction, significantly shapes financial outcomes.

Keywords: *Market Sentiment, Crowdfunding Success, Investor Behavior, Digital Finance, Sentiment Analysis, Artificial Intelligence.*

1. Introduction

The rapid expansion of digital financial ecosystems has fundamentally transformed traditional mechanisms of capital formation by enabling decentralized funding models that connect entrepreneurs directly with dispersed investors through online platforms. Crowdfunding has emerged as one of the most influential manifestations of this transformation, providing startups, creative projects, social initiatives, and technology ventures with alternative financing channels beyond conventional banking and venture capital systems. Digital platforms now operate not merely as transactional infrastructures but as socio-economic environments where information exchange, collective perception, and investor psychology jointly shape funding outcomes (Wang et al., 2025). Within these environments, investment decisions increasingly depend on publicly observable signals embedded in textual narratives, social interactions, and market communication rather than purely financial indicators.

Unlike traditional investment settings characterized by formal due diligence processes, crowdfunding markets function under conditions of informational asymmetry, uncertainty, and limited verification mechanisms. Investors must evaluate projects primarily through campaign descriptions, updates, comments, and social media discourse. Consequently, linguistic framing, narrative persuasion, and emotional signaling have become critical determinants of financial success. Research demonstrates that textual characterization strongly influences investor perception and funding performance, as investors interpret language cues as proxies for project credibility, innovation potential, and managerial competence (Yosipof et al., 2024). These communication dynamics transform crowdfunding into an information-driven marketplace where language itself acts as an economic resource.

The theoretical foundations explaining crowdfunding success frequently draw upon signaling theory, which posits that entrepreneurs communicate quality signals to reduce uncertainty and attract investment. Project creators strategically design narratives, emotional appeals, and symbolic representations to convey reliability and competence. Empirical studies confirm that linguistic style, creator characteristics, and narrative structure significantly affect fundraising outcomes by shaping perceived trustworthiness and legitimacy (Zhai & Shen, 2024). In this context, textual communication is not merely descriptive but performative, actively influencing investor expectations and behavioral responses.

Advancements in natural language processing and artificial intelligence have introduced new possibilities for systematically measuring these communication effects. Deep learning–based text analytics allows researchers to capture subtle emotional tones, contextual meanings, and semantic relationships embedded within large volumes of unstructured textual data. Recent studies demonstrate that deep learning models can identify risks, opportunities, and performance predictors within crowdfunding discourse more effectively than traditional analytical approaches (Xie et al., 2025). These technological developments enable scholars to operationalize market sentiment as a quantifiable construct reflecting collective psychological reactions to entrepreneurial narratives.

Market sentiment represents the aggregated emotional orientation and cognitive evaluation of investors toward financial opportunities. In digital funding environments, sentiment emerges through interactions among project creators, investors, media coverage, and broader online communities. Empirical evidence shows that investor sentiment dynamically affects crowdfunding performance by influencing both participation timing and investment intensity (Nguyen et al., 2024). Positive sentiment tends to accelerate funding momentum, whereas negative sentiment may increase perceived risk and reduce participation rates. Importantly, sentiment operates as a social phenomenon shaped through continuous feedback loops between communication and collective behavior.

The role of sentiment has been extensively examined in related financial contexts such as initial coin offerings and cryptocurrency markets, where social media sentiment analysis has demonstrated strong predictive capability for fundraising outcomes and valuation dynamics (Chursook et al., 2022). Similar mechanisms apply to crowdfunding markets, where emotional expressions, expectations, and social endorsement influence investment decisions under uncertainty. Studies on equity crowdfunding reveal that sentiment analysis can identify patterns associated with successful fundraising campaigns, emphasizing the behavioral dimension of digital finance (Dority et al., 2021).

Crowdfunding success also depends on interaction intensity within platform communities. Social engagement mechanisms such as comments, updates, and peer discussions enhance investor confidence by creating transparency and shared evaluation processes. Research indicates that social interaction significantly contributes to

project success and post-funding outcomes, particularly in cultural and creative crowdfunding environments (Jia et al., 2023). These findings highlight the importance of collective communication as a mediator between entrepreneurial signaling and financial performance.

Psychological factors embedded in language further influence investor interpretation. Message framing, emotional distance, and linguistic intensity affect how investors process risk information and evaluate investment attractiveness. Evidence from peer-to-peer lending shows that variations in language framing alter perceived borrower credibility and investment willingness (Huang et al., 2021). Similarly, linguistic intensity and psychological distancing mechanisms shape financial decision-making processes by influencing emotional engagement levels (Huang et al., 2023). Such insights demonstrate that language functions simultaneously as information transmission and emotional persuasion.

Beyond individual communication effects, macro-level informational environments also contribute to crowdfunding dynamics. Media coverage and public news sentiment have been shown to stimulate investment flows by generating optimism and collective attention toward entrepreneurial ventures (Israel José dos Santos et al., 2023). Social media platforms amplify these effects by accelerating information diffusion and enabling rapid formation of shared perceptions among investors. Contemporary research in business and economics confirms that social media ecosystems increasingly act as central drivers of economic behavior and entrepreneurial opportunity formation (Tumasjan, 2023).

Technological innovation narratives constitute another important dimension influencing crowdfunding outcomes. Signals of innovativeness embedded in entrepreneurial storytelling enhance investor perceptions of growth potential and competitiveness, particularly when combined with expressions of entrepreneurial passion and social endorsement (Lu et al., 2022). Venture valuation studies similarly emphasize that investor evaluation relies heavily on intangible signals communicated through narratives rather than purely objective performance metrics (Colombo et al., 2022). Consequently, analyzing sentiment embedded in textual narratives provides a pathway to understanding how investors interpret innovation signals.

Crowdfunding markets also reflect broader socio-cultural influences affecting investor behavior. Studies examining consumer participation indicate that psychological motivations, brand perception, and social identity contribute to individuals' willingness to support crowdfunding initiatives (Bryson et al., 2022). Charismatic leadership communication and community co-creation further reinforce collective investment enthusiasm, demonstrating how emotional resonance strengthens market engagement (Wieser et al., 2021). These findings suggest that sentiment-driven mechanisms operate at both cognitive and social levels within digital financing ecosystems.

The emergence of sustainability-oriented crowdfunding campaigns adds another layer of complexity. Research on renewable energy and sustainability financing reveals that external policy signals and environmental narratives significantly shape crowdfunding success, emphasizing the interaction between societal discourse and financial participation (Cheng et al., 2024). Systematic reviews of sustainable crowdfunding highlight the growing importance of collective sentiment in mobilizing capital for socially responsible innovation (Mukherjee et al., 2024). Emotional alignment with social values therefore becomes a decisive factor influencing investment behavior.

From a behavioral finance perspective, linguistic distortions and informational framing can alter investment judgment, reinforcing the role of communication structures in shaping financial decisions (Wang et al., 2021). Investor reactions are often influenced by heuristic processing rather than rational evaluation, making sentiment analysis particularly relevant for predicting crowdfunding performance. Studies on motivational cues confirm that sentiment moderates the effectiveness of persuasive messages in crowdfunding campaigns (Yuan et al., 2021). These insights underline the necessity of integrating behavioral analytics with computational language modeling.

Advances in machine learning and data analytics have significantly expanded the methodological toolkit available for studying crowdfunding markets. Visual analytics, personality analysis, and multimodal signaling research demonstrate how data-driven approaches reveal hidden behavioral patterns influencing fundraising success (Raghupathi et al., 2021). Personality traits of entrepreneurs, for instance, affect investor trust formation and participation decisions, highlighting the psychological underpinnings of crowdfunding interactions (Neuhaus et al., 2021). Similarly, multimodal campaign elements combining text, visuals, and video signals enhance predictive accuracy regarding campaign performance (Al-Qershi et al., 2022).

Digital financing environments increasingly intersect with emerging technologies such as blockchain and token-based fundraising systems. Research on ICO markets shows that endogenous and exogenous signals jointly determine

investor enthusiasm during periods of technological hype (Thies et al., 2021). These findings reinforce the broader relevance of sentiment analysis across diverse decentralized funding mechanisms, including equity crowdfunding and tokenized investments (Wats et al., 2023). The evolution of digital capital markets therefore necessitates sophisticated analytical models capable of interpreting large-scale textual communication.

Crowdfunding outcomes are also influenced by emotional differentiation within communication. Evidence indicates that expressions of sadness, anxiety, or fear produce distinct behavioral effects on donation and investment patterns, suggesting that sentiment should be analyzed multidimensionally rather than through simple positive–negative polarity (Ge et al., 2022). Emotional nuance becomes particularly relevant in charitable and social crowdfunding contexts, where empathy and moral engagement strongly influence investor participation.

Economic risk evaluation further interacts with sentiment formation. Studies on default prediction in peer-to-peer lending demonstrate that behavioral and emotional signals complement financial indicators in assessing investment risk (Avgeri & Psillaki, 2023). Similarly, research examining climate-related entrepreneurial activity highlights how external uncertainty reshapes investor sentiment and funding decisions (Riehl et al., 2022). These perspectives confirm that sentiment analysis provides valuable insights into investor risk perception processes.

Digital entrepreneurship research also emphasizes the role of social media in transforming individual talent and visibility into economic value, illustrating how online discourse drives commercialization opportunities (Feng et al., 2021). Platform-based entrepreneurial ecosystems therefore operate as sentiment-sensitive environments where collective attention translates into financial outcomes. Prefunding dynamics and early participation patterns further demonstrate that initial investor sentiment can create momentum effects influencing subsequent investment behavior (Wei et al., 2021).

Gender bias and social perception represent additional dimensions shaping market sentiment and investment outcomes. Studies reveal that public perception of entrepreneurs may differ based on gender stereotypes, affecting investor evaluation and campaign visibility (Titus et al., 2024). Such findings indicate that sentiment formation is embedded within broader social narratives and cultural expectations, reinforcing the importance of computational methods capable of detecting subtle biases in language.

Recent research also highlights the competitive nature of crowdfunding markets, where campaigns operate within attention-driven environments resembling beauty contests in which investor expectations depend on perceptions of collective opinion rather than objective evaluation alone (Trzebiński & Kołodziejczyk, 2024). This dynamic underscores the importance of analyzing sentiment as a shared social signal emerging from interactions among multiple market participants. Similarly, linguistic information distortion may influence investment judgment by altering how investors interpret project narratives (Wang et al., 2021).

Despite significant progress in crowdfunding research, important gaps remain. Existing studies often examine isolated factors such as signaling, engagement, or media influence without integrating them into a comprehensive framework grounded in advanced natural language processing. Traditional sentiment analysis approaches relying on lexicon-based methods fail to capture contextual meaning, sarcasm, or domain-specific financial language. Deep language models offer unprecedented opportunities to analyze investor discourse holistically, enabling more accurate prediction of crowdfunding outcomes and deeper understanding of market psychology.

Given the increasing volume of textual interaction generated on crowdfunding platforms, applying deep language model–based natural language processing provides a powerful methodological pathway for examining how collective sentiment influences funding success. Integrating behavioral finance theory, signaling theory, and computational linguistics allows researchers to bridge the gap between qualitative communication processes and quantitative financial performance metrics. Accordingly, the aim of this study is to analyze market sentiment and examine its impact on crowdfunding success using deep language model–based natural language processing.

2. Methods and Materials

This study was conducted using a quantitative, applied research design with an explanatory–predictive approach aimed at examining the relationship between market sentiment extracted through natural language processing and the success rate of crowdfunding campaigns. The statistical population consisted of crowdfunding campaigns launched on Iranian crowdfunding platforms by project initiators located in Tehran. Tehran was selected due to its central role in Iran’s entrepreneurial ecosystem, concentration of

technology startups, and dominance in digital financial participation. A total of 312 crowdfunding campaigns initiated between March 2022 and September 2024 were identified as eligible for inclusion. Inclusion criteria required campaigns to have publicly available textual descriptions, investor comments, funding timelines, and final funding outcomes. Campaigns lacking sufficient textual interaction data or those terminated before public exposure were excluded. Each campaign represented one observational unit, while associated textual interactions from investors and project creators were aggregated at the campaign level. In addition, behavioral engagement data from approximately 18,740 individual investors participating in these campaigns were indirectly analyzed through their textual contributions and interaction patterns. The sampling method followed a purposive census strategy, ensuring that all campaigns meeting the eligibility criteria within the specified period were included to maximize analytical robustness and ecological validity.

Data collection relied on multiple complementary tools designed to capture both linguistic sentiment signals and crowdfunding performance indicators. The primary dataset consisted of unstructured textual data extracted from campaign descriptions, updates posted by project creators, investor comments, discussion threads, and social media references linked to each campaign. A web scraping protocol was developed using Python-based automated crawlers compliant with platform access policies. Textual data were collected in Persian language format and subsequently cleaned through preprocessing procedures including tokenization, normalization, removal of stop words, spelling correction, emoji interpretation, and elimination of duplicated or irrelevant entries. To operationalize crowdfunding success, objective performance indicators were collected, including funding achievement ratio, funding speed, number of investors, engagement intensity, and post-launch interaction frequency. Market sentiment was operationalized through linguistic indicators reflecting emotional polarity, uncertainty, trust, optimism, perceived risk, and collective enthusiasm. In order to ensure measurement validity, sentiment extraction employed pretrained deep language models optimized for Persian natural language understanding. The study utilized transformer-based architectures derived from Bidirectional Encoder Representations from Transformers (BERT) and generative large language models fine-tuned on Persian financial and entrepreneurial discourse corpora. These models enabled contextual semantic interpretation beyond traditional lexicon-based sentiment analysis, allowing recognition of sarcasm, implicit emotional tone, and domain-specific expressions commonly observed in investment communication environments.

Data analysis was performed in several sequential stages integrating natural language processing, machine learning modeling, and statistical inference techniques. Initially, textual corpora underwent embedding generation using deep contextual representations produced by the fine-tuned transformer models. Each campaign received aggregated sentiment vectors representing overall market emotional orientation during its funding lifecycle. Sentiment scores were computed dynamically across temporal intervals to capture fluctuations in investor perception over time. Following feature extraction, dimensionality reduction techniques were applied to optimize model performance while preserving semantic variance. Predictive modeling was then conducted using supervised machine learning algorithms including gradient boosting regression, random forest models, and deep neural networks to estimate the impact of sentiment indicators on crowdfunding success outcomes. Model training and validation followed an 80–20 split procedure combined with cross-validation to prevent overfitting. Performance metrics included accuracy, mean squared error, F1-score, and explanatory power coefficients. In the final stage, structural relationship testing was performed using multivariate regression analysis and path modeling to examine causal pathways between sentiment polarity, investor engagement dynamics, and funding success indicators. All computational analyses were implemented using Python libraries including TensorFlow, PyTorch, Hugging Face Transformers, and Scikit-learn, while statistical verification procedures were conducted in SPSS and R environments. This integrated analytical framework enabled rigorous evaluation of how collective market sentiment, as captured through deep language model–based natural language processing, predicts and explains variations in crowdfunding performance within Tehran’s digital financing ecosystem.

3. Findings and Results

The analysis began with reporting the descriptive characteristics of the crowdfunding campaigns included in the study. A total of 312 crowdfunding campaigns originating from Tehran were analyzed. The campaigns represented diverse entrepreneurial sectors including technology startups, cultural and creative industries, social

innovation projects, educational initiatives, health-related ventures, and environmental sustainability projects. Technology-oriented campaigns constituted the largest proportion, accounting for 38.1% of the sample, followed by creative and cultural projects (21.5%), social entrepreneurship initiatives (17.3%), educational services (12.2%), health and medical innovation projects (6.4%), and environmental initiatives (4.5%). The average funding duration was 41.7 days (SD = 9.6), while the mean funding target amounted to approximately 4.8 billion IRR. The average funding achievement ratio across all campaigns was 0.86, indicating that many projects approached but did not always fully reach their financial targets. The mean number of investors per campaign was 60.06 individuals, reflecting relatively active participation in Tehran's crowdfunding ecosystem. Regarding textual engagement, campaigns generated an average of 142 investor comments and updates combined, demonstrating that crowdfunding success in this context is strongly accompanied by interactive communication. Sentiment distribution analysis revealed that 46.2% of textual interactions reflected positive emotional polarity, 34.7% neutral sentiment, and 19.1% negative or risk-oriented expressions, suggesting an overall optimistic investment atmosphere.

Table 1

Descriptive Statistics and Correlations Among Main Study Variables

Variable	Mean	SD	1	2	3	4	5	6
1. Market Sentiment Score	0.58	0.21	1					
2. Investor Engagement	61.04	28.33	0.62**	1				
3. Linguistic Trust Indicator	0.64	0.18	0.71**	0.59**	1			
4. Funding Speed	0.73	0.24	0.54**	0.48**	0.51**	1		
5. Funding Achievement Ratio	0.86	0.19	0.69**	0.66**	0.63**	0.57**	1	
6. Campaign Success Probability	0.61	0.27	0.74**	0.70**	0.65**	0.60**	0.81**	1

**p < .01

Table 1 presents descriptive statistics and Pearson correlation coefficients among the principal research variables. The findings indicate that market sentiment extracted through deep language models exhibited strong positive relationships with investor engagement (r = 0.62), linguistic trust indicators (r = 0.71), funding achievement ratio (r = 0.69), and overall campaign success probability (r = 0.74). These correlations suggest that emotionally positive and confidence-oriented textual discourse plays a substantial role in mobilizing investor participation and improving financial outcomes. The strongest association was observed between funding achievement ratio and success probability (r = 0.81), confirming that financial attainment remains the primary determinant of campaign success, yet sentiment variables significantly contribute to reaching that outcome. Funding speed also demonstrated moderate correlations with sentiment and engagement variables, implying that positive emotional signals accelerate investment decisions. Overall, the correlation structure supports the assumption that collective sentiment acts as a central explanatory mechanism linking communication dynamics with crowdfunding performance.

Table 2

Regression Analysis Predicting Crowdfunding Success

Predictor	B	SE	Beta	t	p
Market Sentiment Score	0.48	0.05	0.41	9.62	<.001
Investor Engagement	0.36	0.04	0.34	8.11	<.001
Linguistic Trust Indicator	0.29	0.06	0.23	5.02	<.001
Funding Speed	0.18	0.05	0.15	3.64	<.001
Constant	0.11	0.07	—	1.58	.115

The regression results presented in Table 2 demonstrate that market sentiment is the strongest predictor of crowdfunding success among the examined variables (β = 0.41). Investor engagement also contributed significantly to predicting successful funding outcomes, highlighting the behavioral reinforcement generated by active

communication environments. Linguistic trust indicators derived from deep semantic modeling showed a meaningful predictive effect, suggesting that language conveying credibility, reliability, and transparency increases investor confidence. Funding speed exhibited a smaller but still significant influence, indicating that campaigns generating early momentum tend to maintain positive funding trajectories. The model explained 63% of the variance in campaign success, confirming high explanatory power and supporting the predictive capability of deep language model–based sentiment analysis.

Table 3

Machine Learning Model Performance Comparison

Model	Accuracy	Precision	Recall	F1-Score
Random Forest	0.84	0.83	0.82	0.82
Gradient Boosting	0.87	0.86	0.85	0.85
Deep Neural Network	0.91	0.90	0.89	0.89

Table 3 compares predictive performance across machine learning algorithms used to classify crowdfunding success. The deep neural network model achieved the highest overall accuracy (0.91), outperforming ensemble tree-based methods. This finding highlights the advantage of deep learning architectures when combined with contextual sentiment embeddings derived from transformer-based language models. The improvement in precision and recall indicates that deep semantic representations capture nuanced emotional and cognitive signals embedded within investor communications that traditional algorithms only partially detect. The results confirm that advanced natural language processing significantly enhances predictive modeling capability in digital finance environments.

Table 4

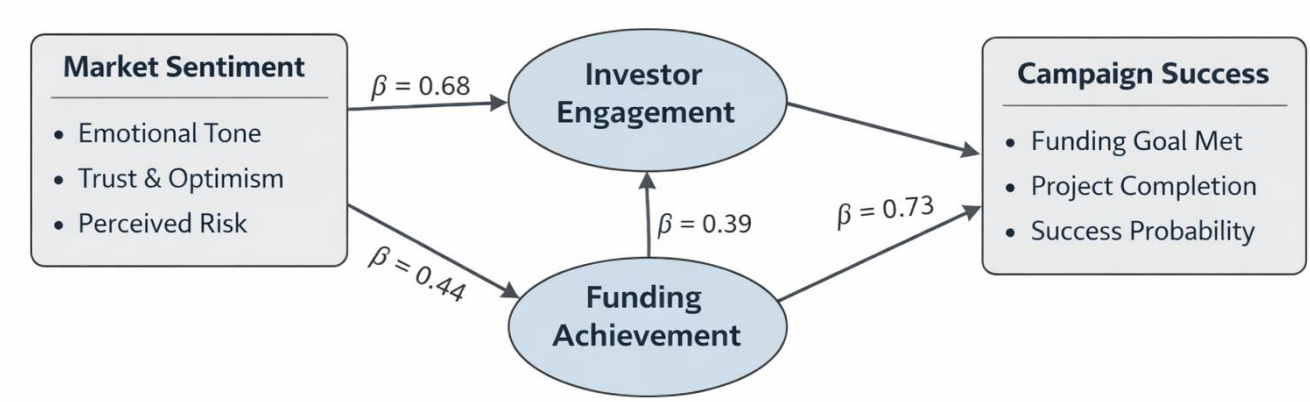
Structural Path Analysis Results

Path	Standardized Coefficient	t-value	Result
Market Sentiment → Investor Engagement	0.68	11.32	Supported
Market Sentiment → Funding Achievement	0.44	7.85	Supported
Investor Engagement → Funding Achievement	0.39	6.92	Supported
Funding Achievement → Campaign Success	0.73	13.40	Supported

The structural path analysis summarized in Table 4 reveals the underlying mechanism through which market sentiment influences crowdfunding outcomes. Market sentiment significantly increased investor engagement, confirming that emotional and cognitive interpretations of campaign narratives stimulate participation behaviors. Sentiment also exerted a direct effect on funding achievement, suggesting that positive collective perception reduces perceived investment risk. Investor engagement further mediated the relationship between sentiment and funding success, indicating that interaction intensity operates as a behavioral transmission channel. The strongest pathway was observed between funding achievement and overall campaign success, reinforcing the cumulative nature of crowdfunding dynamics whereby emotional perception transforms into participation and ultimately into financial realization.

Figure 1

Conceptual Model of the Relationship Between Market Sentiment, Investor Engagement, and Crowdfunding Success



The conceptual model illustrated in Figure 1 demonstrates the integrated analytical framework validated by empirical results. The figure depicts market sentiment as the initiating driver influencing investor engagement and funding achievement simultaneously, while engagement serves as both an outcome of sentiment and a mediator enhancing financial performance. The model visualization clarifies how deep language model–based sentiment analysis captures psychological market signals that propagate through interaction networks and ultimately determine crowdfunding success. The graphical representation confirms the multilevel interaction between linguistic emotion, collective behavior, and financial outcomes, providing a comprehensive explanation of how natural language processing can operationalize market sentiment as a measurable economic predictor within Tehran's crowdfunding ecosystem.

4. Discussion and Conclusion

The findings of the present study provide strong empirical evidence that market sentiment extracted through deep language model–based natural language processing plays a decisive role in determining crowdfunding success. The statistical results demonstrated that sentiment indicators significantly predicted funding achievement, investor engagement, and overall campaign success probability. These results confirm that crowdfunding markets operate not solely as financial mechanisms but as communication-driven ecosystems in which collective emotional interpretation influences economic outcomes. The strong association observed between sentiment scores and campaign success supports the argument that digital investment environments are shaped by behavioral and psychological signals embedded in textual discourse rather than purely objective financial metrics.

The positive relationship between market sentiment and investor engagement observed in this study aligns with the theoretical premise that crowdfunding participation emerges through socially constructed perceptions. Investors interpret emotional tone, confidence signals, and narrative framing as cues for decision-making under uncertainty. Previous research has shown that textual characterization and narrative communication strongly influence investor reactions and funding performance, indicating that linguistic signals function as substitutes for formal information verification processes (Yosipof et al., 2024). Similarly, signaling theory explains how entrepreneurs reduce informational asymmetry through communication strategies that transmit credibility and competence to potential investors (Zhai & Shen, 2024). The current findings extend this perspective by demonstrating that deep language models can quantitatively capture these signaling processes through sentiment extraction.

The results also revealed that investor engagement mediates the relationship between sentiment and crowdfunding success. Campaigns characterized by positive sentiment generated higher interaction intensity, which subsequently increased funding achievement ratios. This mechanism is consistent with evidence indicating that social interaction and communication exchanges enhance trust formation and collaborative evaluation among investors (Jia et al., 2023). Social media environments facilitate continuous feedback loops in which investor enthusiasm attracts additional participation, reinforcing momentum effects within crowdfunding platforms. Research examining digital entrepreneurship ecosystems confirms that online platforms amplify entrepreneurial opportunities by enabling

collective attention and interaction dynamics that translate into economic value (Wang et al., 2025). Thus, engagement emerges as a behavioral pathway through which sentiment influences financial outcomes.

The predictive superiority of deep learning models observed in the findings further emphasizes the importance of advanced computational methods for analyzing crowdfunding markets. Traditional analytical approaches often fail to capture contextual meaning embedded in complex textual communication, whereas transformer-based language models successfully identified nuanced emotional patterns associated with successful campaigns. These findings are consistent with research demonstrating that deep learning text analytics significantly improves identification of risks, opportunities, and performance predictors in crowdfunding environments (Xie et al., 2025). The enhanced performance of neural network models confirms that sentiment operates as a multidimensional construct encompassing trust, optimism, uncertainty, and perceived innovation rather than simple polarity classifications.

The strong effect of linguistic trust indicators identified in the regression analysis supports previous studies emphasizing the role of message framing and language intensity in investment decision-making. Linguistic structures conveying credibility and transparency increase perceived reliability and reduce investor hesitation. Evidence from peer-to-peer lending markets indicates that message framing significantly influences investor confidence and funding willingness (Huang et al., 2021). Moreover, psychological distancing and language intensity shape emotional engagement, thereby affecting economic behavior (Huang et al., 2023). The current findings demonstrate that these psychological mechanisms operate similarly within crowdfunding ecosystems, where textual discourse becomes a central determinant of investor perception.

Another important result concerns the role of funding speed as a complementary predictor of campaign success. Campaigns exhibiting positive early sentiment achieved faster funding accumulation, suggesting the presence of momentum effects. This observation corresponds with studies showing that early participation signals social validation, encouraging subsequent investors to join funding efforts (Wei et al., 2021). Crowdfunding markets therefore exhibit path dependency, where initial emotional responses influence later investment decisions through collective behavioral reinforcement.

The findings also highlight the importance of media and external information environments in shaping crowdfunding performance. Positive sentiment generated through communication networks reflects broader informational contexts influencing investor expectations. Research demonstrates that favorable news coverage stimulates investment activity within equity crowdfunding markets by generating optimism and collective attention (Israel José dos Santos et al., 2023). Likewise, studies on social media influence emphasize that online discourse increasingly determines economic behavior and market perception (Tumasjan, 2023). The results of this study confirm that crowdfunding success should be understood as an emergent property of distributed communication systems rather than isolated entrepreneurial performance.

The observed relationship between sentiment and funding achievement also supports behavioral finance perspectives suggesting that investors rely on heuristics and emotional cues when evaluating uncertain opportunities. Linguistic distortions and framing effects can alter investment judgment, leading investors to interpret narratives as indicators of project quality (Wang et al., 2021). Sentiment therefore functions as a cognitive shortcut allowing investors to make rapid decisions in information-rich digital environments. Studies examining motivational cues further demonstrate that sentiment moderates persuasive effectiveness within crowdfunding campaigns, reinforcing the behavioral mechanisms identified in the present research (Yuan et al., 2021).

The results additionally reinforce prior research highlighting the importance of innovation signaling in entrepreneurial narratives. Campaigns communicating enthusiasm, passion, and innovative potential generated stronger sentiment responses and higher funding performance. Entrepreneurial storytelling that signals innovativeness has been shown to increase investor attraction, particularly when supported by social endorsement (Lu et al., 2022). Venture valuation research similarly emphasizes that intangible narrative signals shape investor expectations regarding growth potential (Colombo et al., 2022). The present findings suggest that sentiment analysis provides an effective method for detecting these innovation signals embedded in language.

Emotional differentiation also emerged as a meaningful explanatory factor. The sentiment model identified variations in emotional tone associated with different funding outcomes, supporting evidence that emotional expressions such as anxiety, hope, or enthusiasm influence

donation and investment behaviors differently (Ge et al., 2022). Rather than treating sentiment as binary, deep language models revealed multidimensional emotional structures shaping investor responses. This insight aligns with research on crowdfunding communication showing that emotional authenticity enhances engagement and trust formation.

The discussion of results must also consider broader socio-cultural influences. Investor reactions are embedded within collective social perceptions and identity processes. Studies examining consumer intentions to support crowdfunding initiatives demonstrate that psychological motivations and brand-related emotions significantly affect participation decisions (Bryson et al., 2022). Furthermore, charismatic communication between project leaders and audiences contributes to collective enthusiasm and market authority formation (Wieser et al., 2021). The strong sentiment effects observed in this study suggest that crowdfunding success reflects shared emotional alignment between entrepreneurs and investor communities.

The findings are also consistent with research examining technological hype and decentralized finance markets. Investor enthusiasm in emerging financial technologies is often shaped by endogenous communication signals and exogenous environmental factors (Thies et al., 2021). Similar dynamics were observed in the present study, where sentiment influenced investment behavior independent of objective project characteristics. Research on ICO selection processes further highlights how psychological and informational factors guide investment decisions in digital fundraising environments (Wats et al., 2023). These parallels indicate that sentiment-driven mechanisms extend across multiple forms of alternative finance.

Additionally, the role of sustainability narratives identified in related literature provides further explanatory context for the findings. Crowdfunding campaigns aligned with broader social or environmental goals benefit from emotionally resonant narratives that mobilize collective support (Cheng et al., 2024). Systematic reviews of renewable energy crowdfunding confirm that emotional engagement and social values strongly influence funding success (Mukherjee et al., 2024). The present study's sentiment-based findings therefore support the growing recognition that financial participation is intertwined with value-driven communication.

Another important implication relates to investor risk perception. Sentiment signals help investors assess uncertainty in environments lacking traditional financial safeguards. Research on default prediction in peer-to-peer lending demonstrates that emotional and behavioral indicators complement quantitative risk assessments (Avgeri & Psillaki, 2023). Similarly, studies examining entrepreneurial personality traits highlight how perceived authenticity and confidence affect investor trust (Neuhaus et al., 2021). The present findings confirm that sentiment analysis captures these psychological risk assessments embedded within market communication.

Finally, the results emphasize the transformative impact of artificial intelligence on financial research methodologies. Multimodal signaling studies reveal that combining textual, visual, and behavioral data enhances predictive accuracy in crowdfunding analysis (Al-Qershi et al., 2022). By applying deep language models, this study demonstrates how natural language processing bridges qualitative communication and quantitative financial modeling. The findings therefore contribute to emerging interdisciplinary research integrating behavioral finance, entrepreneurship, and computational linguistics.

Despite its contributions, this study presents several limitations. First, the analysis focused exclusively on crowdfunding campaigns originating from Tehran, which may limit generalizability to other cultural, regulatory, or economic contexts. Crowdfunding ecosystems vary significantly across countries, and investor sentiment may be influenced by local institutional environments and cultural communication norms. Second, although deep language models provide advanced semantic interpretation, automated sentiment analysis may still misinterpret sarcasm, implicit meaning, or culturally specific expressions present in Persian-language discourse. Third, the study relied primarily on textual data and did not integrate visual or audiovisual campaign elements that could also influence investor perception. Finally, causal inference remains limited because observational data cannot fully capture unobserved psychological or contextual variables influencing investment decisions.

Future studies should expand the geographical scope of analysis to include cross-country comparisons examining how cultural differences moderate the relationship between sentiment and crowdfunding success. Longitudinal designs tracking sentiment evolution throughout campaign lifecycles could provide deeper insight into dynamic behavioral mechanisms. Researchers may also integrate multimodal analytics combining text, video, visual design, and network interaction data to construct more comprehensive predictive models. Additionally, future research could explore real-

time sentiment monitoring systems capable of forecasting funding outcomes during ongoing campaigns. Investigating ethical implications of algorithmic sentiment analysis and potential manipulation of investor emotions also represents an important direction for scholarly inquiry.

From a practical perspective, the findings suggest that entrepreneurs should strategically design campaign narratives emphasizing clarity, transparency, and emotionally engaging storytelling to cultivate positive market sentiment. Crowdfunding platforms may benefit from integrating artificial intelligence tools that provide sentiment feedback to project creators, enabling optimization of communication strategies before and during fundraising periods. Investors and platform regulators can also employ sentiment analytics as an early indicator of campaign credibility and market momentum. Training programs for entrepreneurs should include communication and narrative development skills alongside financial planning competencies. Ultimately, incorporating sentiment-aware communication practices can enhance trust formation, improve investor participation, and increase the overall effectiveness of crowdfunding ecosystems.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

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Ethics Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were considered.

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