

The Ecology of X (Twitter) Discourse on the Domestic Debt Exchange Program in Ghana: Public Sentiments Analysis

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Abstract

A great volume of discourse on the Domestic Exchange Program (DDEP) emerged on X (formerly Twitter) when Ghana announced the measures to secure \$ 3 billion bailouts from the International Monetary Fund (IMF)

to resolve the post-COVID-19 economic crisis. Keywords and a search query were used to crawl tweets (n=5788) on the DDEP between February 1, to 28, 2023. X users' sentiments and emotions, positive, neutral, or negative were analyzed using NRCLex, and Tone Analyzer by IBM. The emotional portrayal and categories such as sadness, fear, anger, disgust, trust, and happiness were also analyzed. The findings suggest that the dominant categories of sentiments expressed were mostly negative rather than positive. The findings further suggested that the sentiments and emotions expressed by the tweets were against the inclusion of pensioners' bonds, and pension funds in the DDEP. Also, the results from the emotional portrayal were disgust, sadness, surprise, anger, and fear on the introduction of the DDEP. The study concluded that the overall portrayal of the emotions on the DDEP was that of total public rejection.

Keywords: *X(Twitter); discourse; domestic debt; exchange; program; sentiment analysis; emotions*

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1. Introduction and Background

Ghana is currently going through a massive economic recession. The daily rise in exchange, ex-pump petroleum prices, interest rates, inflation, interest rates, depreciation of the cedi, crude oil, and food prices, as well as the spillover effects of COVID-19, and the Russia -Ukraine war on the macroeconomics, have been a subject of a lot of discussion on social media platforms, especially X [formerly Twitter] (Malindini, 2022; Ramírez and Durón, 2022; World Bank, 2023; WorldRemit, 2023). X discourse on Ghana's public debt which is over GHS 575 billion as of January 2023, and Debt- to Gross Domestic Product (GDP) of over 100% (Ministry of Finance of Ghana, 2023). According to current statistics by the Ministry of Finance, over 90% of the government's annual revenue is used to service public debt which is about GHS 576 billion a year. Ghana's tax revenue is over 80%. As measures to salvage the economy from total collapse and restore growth, fiscal, and debt sustainability, in the second quarter of 2022, the Ghanaian government announced its intention to request a \$3 billion bailout from the International Monetary Fund (IMF) to resolve the post-COVID-19 economic crisis (IMF,2022). Ever since this decision to seek an IMF bailout, citizens resorted to X as a preferred avenue to influence the government's decisions to forfeit that move.

The discourse on X intensified when IMF-Ghana staff-level agreements were reached in late November 2022. As part of the precondition for qualification for the credit facility, the fund requested the government to carry out some structural reforms for the restoration of fiscal, and debt sustainability for the speedy recovery of the economy. These preconditions for accessing the fund from IMF, also included Debt Sustainability Analysis (DSA) to demonstrate the government's ability to bring Ghana's debts to sustainable levels. The Debt Sustainability Analysis aims to ensure macroeconomic structural changes and a demonstration of the government's ability to reduce debt to GDP to about 55% by 2028. On November 5, 2022, the Finance Ministry announced its plan to embark on a Debt Exchange Program. The Debt Exchange Program is targeted at reducing the government's debt burden and servicing matured debts owed to both domestic and foreign creditors

including government bondholders and other institutional debts (Altayligil & Akkay, 2013; IMF, 2022). The Debt Exchange Program is to enable rapid recovery of the Ghanaian economy from the present crisis.

On the 4th of December, 2022, the Ministry of Finance officially launched the debt exchange program. The exchange program includes domestic government bondholders and international investors. The program also included Domestic Debt and International restructuring. The Domestic Debt Exchange Program (DDEP) requested the citizens holding Ghana government bonds exchange them with coupons for 10% interest on their principles to be paid by 2024, with no payment of interest at maturity in 2023. The program further announced that all existing bonds procured from December 1, 2022, will have to be exchanged for new coupons that will mature in 2027, 2029, 2032, and 2037 respectively. The category of government bondholders included individual and institutional creditors. The announcement and arrangements for the Debt Exchange Program did not go down with Ghanaians, especially the venerable groups like pensioners, and the labour unions which have sparked a lot of discourse on X. In an attempt to rescind its decision for adequate consultations, Ghana took social media platforms especially X discourse to register their displeasure with the Domestic Debt Exchange Program (DDEP). X campaigns and discourse were launched by all stakeholders in February 2023 to press home their demands for the government to reconsider the terms and conditions of the Debt Sustainability Program as a prerequisite for the \$ 3 billion from the IMF.

1.1. The trend of Social media use in Ghana

The current statistics show that Ghanaians who use social media are on the rise, and usage is expected to double in the coming years. According to Statista as of February 2023, about 8.8 million Ghanaians are social media users. The dominant social media platforms according to Statista report in February 2023 are Facebook (52.3%), X (15.26%), and YouTube (9.86%) respectively (Statista, 2023). X and Facebook book is the preferred platform for engaging in online discourse on issues of national crisis (Ansah, 2022). The demographics also show that the middle class, educated and youth dominate in the usage of social media platforms. Since 2012, the adoptions of X and Facebook platforms for activism among civil society, the middle class, and the youth have seen exponential increases (Nartey and Yu, 2023)

Civil society, citizens, and social activists over the last decade have resorted to X to conduct several social media campaigns and express their opinions on critical social, political, and economic issues like democracy, unemployment, bad governance, corruption, high cost of living, food price hikes, depreciation of the local currency, education, among others which affects the daily lives of the poor masses (Agbozo and Spassov, 2019; Brobbery et al., 2022; Nartey and Yu, 2023). Activists believe this social media platform is a powerful tool for achieving extraordinary things and giving a voice to the voiceless. Digital and Social media campaigns like those on X are the preferred new trend in getting the political class to rescind their anti-poor decisions and policies (Allmann, 2014; Foos et al., 2021; Hestres, 2017; Schaeffer, and Miller, 2021). Several social media campaigns have been held in the past, but the most recent one is the Introduction of the DDEP, as a precondition for

securing a \$3 billion bailout from the IMF. Public X users' campaign on the DDEP is aimed at getting the government to exclude vulnerable groups like pensioners, pension funds, and individual bondholders from the DDEP.

1.2. X Discourse

Over the past three decades, social media platforms such as X, and Facebook have been employed by millions of citizens across the globe to express their opinions on issues of public concern (Burbach et al., 2020; Nartey and Yu, 2023). Social media users can comment and share their thoughts on policies and programs of governments that affect their livelihoods (Torregrosa et al., 2022). Among the many social media platforms available for use, Twitter's discourse seems to be the most preferred medium of communication for public campaigns for purposes of exerting pressure on duty bearers to change some policy decisions (Wicke and Bolognesi, 2021). The upper class, academics, pressure groups, and civil society organizations have over the period employed X discourse to press home their demands, which scholars like Nartey and Yu (2023); Schöne et al. (2021); Wicke and Bolognesi (2021) have admitted have yielded some considerable positive feedback on the actions of government policies.

In the context of less developing countries in Africa, especially Ghana, X online campaigns in recent years have become the preferred channel for embarking on social, economic, and political activist programs. Though a few of these social media campaigns on government policies have received considerable success, actors believe there is much room for improvement. X discourse and other social media campaigns have gained popularity among the Ghanaian public, civil society organizations, and other pressure groups that have fully resorted to X as a means of resistance to unfavorable government policies. The following are a few online campaigns via X from 2012 to date; “#DropThatChamber#”, “#DumsorMustStop#”, “#DropThatChamber”, and “#fix the country#” (Brobbery et al., 2022; Nartey and Yu, 2023). All these online campaigns are aimed at underdevelopment, national reconstruction, corruption, and the need to fix the economic hardships that the citizens are currently going through due to the twin global crisis of COVID-19 and the COVID-19, and Russia-Ukraine invasion.

1.3. Sentiment Analysis

Many scholars have described sentiment analysis as a medium of assessing public opinion, or agreement levels of topics of interest in the public domain (Gorodnichenko et al., 2021). The measurement of opinions may include service provision, as well as the emotional levels of the population (Stracqualursi and Agati, 2022). To conduct effective sentiment analysis, scholars like Shanmugavadivel et al. (2022); Vicari and Gaspari (2021) have proposed two main methods or approaches. The approaches include algorithms from machine learning and natural language processing. Opinions and emotions are extremely difficult to measure, hence past studies on sentiment analysis adopted the paper-based approach (Omuya et al., 2022). However, with the advent of varied social media platforms, researchers can now easily extract or crawl online users' opinions or feedback (negative or positive) on any topic of interest for further sentiment analysis (Omuya et al., 2022; Srikanth et al., 2022).

As cited by Shanmugavadivel et al. (2022), the study of constructions, and algorithms to learn about data from the scientific perspective or decline is what is described as Machine Learning (ML). For X users' sentiment analysis, the machine learning method is preferred by many researchers (Srikanth et al., 2022). Ray & Chakrabarti, (2022), adopted machine learning techniques like semi-supervised, supervised, and rule-based to analyze the tweets' opinions, and sentiments of X users on the attack on the capitol after the presidential elections of 2020 in the United States of America (Macrohon et al., 2022).

Other approaches like the "Latent Dirichlet Allocation Model" are also used to extract varied words or datasets from tweets for sentiment analysis on current and future topics (Mishra, 2022). Human-computer interactions are what is mostly described as Natural Language Processing (Chaurasia et al., 2021). For the result-oriented assessment of X users' sentiments, scholars recommend sentiment annotations as the most effective tool. Past studies on opinions and emotions largely adopted positive, neutral, and negative variables or labels to conduct tweet analysis. Tweets were sampled to investigate public response and sentiments to the introduction of the DDEP in Ghana due to the data availability as well as the professional nature of users.

1.4. Theoretical Framework

The launch of Ghana's Domestic Debt Exchange Program has raised concerns relating to the impact of such a political decision on the economic welfare of Ghanaians. To critically examine this, the persuasive discourse was adopted in assessing the reactions, emotions, and sentiments of public X users to the Domestic Debt Exchange Program. For much understanding of the persuasive impact of X discourse on the Domestic Debt Exchange Program, and assessing public sentiments, this study appraised Persuasive Theory, particularly Social Justice Theory as the theoretical framework underpinning this study (Colton and Holmes, 2018). Social Justice Theory postulates that when people hear or read a message, they are entitled to comply, accept, or reject such information (Colton and Holmes, 2018; Killen et al., 2021; Littlejohn and Foss, 2009). The attitudes and values of people are a basis for processing any incoming message or messages on a particular issue or topic of national characteristics (Killen et al., 2021). According to Gil de Zúñiga et al., 2018, during the processing of information or messages, there is a likelihood that people's or individuals' attitudes towards such topics may attract large acceptance, while small rejections are attributed to characteristics of those messages. For a sensitive and unpopular topic like the Domestic Debt Exchange Program introduced in Ghana and is regarded by the public as a political decision, people's economic welfare brings high levels of fear, panic, uncertainty, disgust, sadness, surprise, anger, and anticipation, among the public, hence the rates of acceptance are small (Elkobaisi et al., 2022).

The general public or stakeholders process this kind of message from the perspectives of the threat, perceived severity, and the perceived efficacy of the information on their economic well-being (Di Crosta et al., 2021). Leary (2021) has suggested the decisions of people's appraisal of any message or information for its acceptance or rejection is premised on the threat levels (low, moderate, or high) of the message. The general motivation for

acceptance or rejection of these kinds of information might also be influenced by the efficacy or the ability of the people to overcome impending threats (Biggsby and Albarracin, 2022). A critical review of related studies and the theoretical framework on the above subject about public X users' discourse on DDEP, the assessment of emotions and sentiments of X users shows some gaps in the previous literature. An evaluation of available literature also suggests that this study could be the first on the DDEP discourse on Twitter. Therefore, this study aims to investigate the public sentiments, emotions, and reactions of X users, between February 1, to 28, 2023, towards the Domestic Exchange Program (DDP) initiated by the governments of Ghana to secure a 3 billion bailouts from the International Monetary Fund (IMF) for the restoration of the current economic crisis. The following questions guide this study.

1.5. Research Questions(RQs):

RQ1: What is the most dominant sentiment category, employed concerning DDEP discourse on Twitter?

RQ2: To what extent are different emotion categories represented on X discourse on the DDEP?

RQ3: How did the emotional categories portray acceptance or rejection of the DDEP?

2. Materials and Methods

The descriptive bar and pie chart analysis was carried out to aid a graphical representation of the multivariate data on the multi-dimensional three or more quantitative variables starting at a particular same point. The data processing and collection of data are indicated below;

2.1. Data Collection and Processing

X users' posts and comments on the Domestic Exchange Program (DDEP) were used as the data for this study. Various keywords like “Domestic Exchange Program (DDEP)”, “IMF bailout”, “bonds”, “individual bondholders”, “pensioner’s funds”, “debt sustainability” “government of Ghana”, and “finance minister” were used in searching data. The data for the Tweets commenced on February 1 to 28, 2023, and a total of over (N=6440) posts were published for the period. The data included tweets that were quoted, retweets, and reactions or replies to those tweets. To be sure the keywords were specific, and associated URLs related to the subject under investigation, the toolkit for tweet processor was used. The data processing process also maintained the associated hashtags to help in identifying tweets on the DDEP. After curing and processing the tweets, a total of (n=5788) corpus of tweets relating to citizens’ concerns and reactions relating to the DDEP.

To carry out the sentiment analysis of the tweets, the text emotions process was used to understand the emotions associated with the dataset (Ekmekci and Shihab, 2022). The learning-based and word-based methods as proposed by Murthy and Anil Kumar (2021) were used in detecting the emotions of the various posts. For the learning-based methods, the coded tweets are identified by the algorithm for measuring the conciseness of large

tweet datasets on emotions, while, the word-based method, is based on words or emotions that are predefined, and the specific function in the structure of the sentence. The study also made use of data processing tools like NRCLex and Tone Analyzer by IBM which is a word-based approach to emotion analysis to identify emotions like disgust, happiness, sadness, surprise, anger, fear, joy, trust, and anticipation, Elkobaisi et al. (2022), as well as adverbs and adjectives used in the tweets. Latent Diricuch Allocation (LDA) was used to carry out the sentiment analysis.

3. Results

Based on the research questions, the findings of the study were analyzed using the spider web to show the high and low scores or points of the emotions and sentiments of the text of the tweets.

RQ 1: Dominant Sentiment Category Discourse on X about DDEP

The analysis of the tweets on the general dormant sentiments of X users on the DDEP reported that the “negative” sentiment category dominated the public discourse on the DDEP. The finding indicated that the public tweets discourse and sentiments were not in support of the government’s decision to include vulnerable groups like individual bondholders, especially the pension funds of workers and retirees. The tone of the tweets accuses the government of being irresponsible and insensitive to the plight of the ordinary poor Ghanaian bondholders. Some of the tweets read *“In such a harsh economic situation, instead of the government introducing social safety nets to cushion the vulnerable”*. The comments from the X posts accuse the government of plunging the country into the current economic recession and robbing hardworking citizens of their life savings, hence, the government has no right to shift the blame to the poor citizens”. The tweets recommended the *“downsizing of the number of government appointees”* as a recommendation for satisfying the conditions of the DDEP. Social media platforms, particularly X are predominantly used as informal mediums by actors such as the civilian population, social activists, and civil society to communicate and carry out online campaigns against unpopular policies initiated by governments. Social media platforms are used as a compliment to the traditional media channels, by the public to press home their demands on issues of national concern, like the DDEP. The hybrid nature of these media platforms has created many avenues for stakeholders to influence public discourse and get duty-bearers to rescind some unpopular policies. The spider web analysis in **Figure 1** gives a further of the highest and lowest values of sentiments categories on the DDEP;

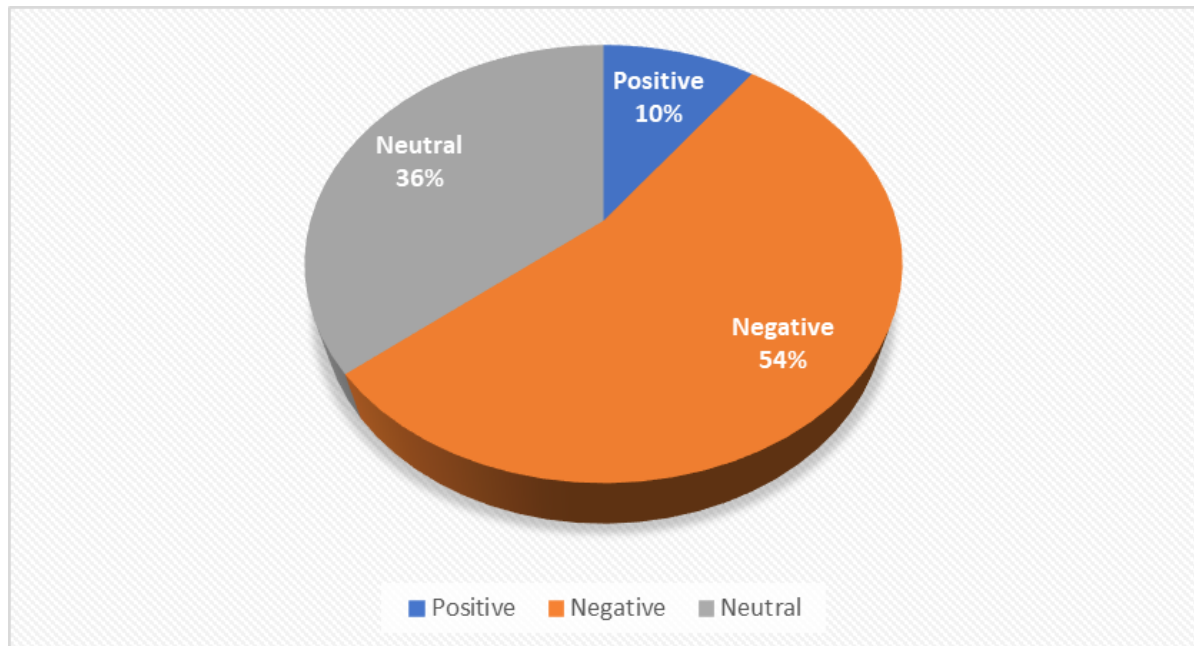


Figure 1: Dominant Sentiment Categories

Note: Tweets on the DDEP are the unit of analysis, while, the horizontal axis represents the tweet's appearance in thousands and the vertical axes for the month under review

RQ2: Different Emotional Categories Represented on X Discourse on the DDEP

The emotion analysis of the tweets by the Ghanaian public identified emotional categories like disgust, happiness, sadness, surprise, anger, fear, joy, trust, and anticipation Gündem et al.(2022); Nandwani & Verma (2021), on X the introduction of the DDEP. The emotional analysis was performed to identify the specific reactions to the text of the tweets. The emotions of X were used to ascertain the sentiments of the users based on the issues, posts, and topics raised on the introduction of the DDEP. After performing a cleaning of the dataset extracted from the tweets the researchers, used NRCLex to carry out the analysis. The bar charts in **Figure 2**, show the analysis, and findings of different emotional categories coded every two days at the peak of the DDEP debate in February. The comparisons of the different emotional categories from the tweets for every day of the month. The bar chart shows the highest as well as the lowest emotions. The findings showed that “*anger*”, “*fear*”, “*sadness*”, “*disgust*”, and “*surprise*” respectively were the detected emotions of the Ghanaian X users about the DDEP. Emotions of “*happiness*”, “*trust*”, “*joy*” and “*anticipation*” were recorded as the lowest value about the introduction of the DDEP. This clearing shows that the majority of tweeter users did not have faith in the government’s decision to introduce DDEP as a measure to restore the ailing economy. Hashtag Tweets like *#irresponsible government#*, *#corruption#*, *#expenditure controls#*, *#losses in government revenue#*, *#low to tax to GDP#*, and *#cut down the big size of government appointees #*, *#fascial expenditure discipline#* were some of the tweets put forth by X users as causes of the current economic recession facing the country.

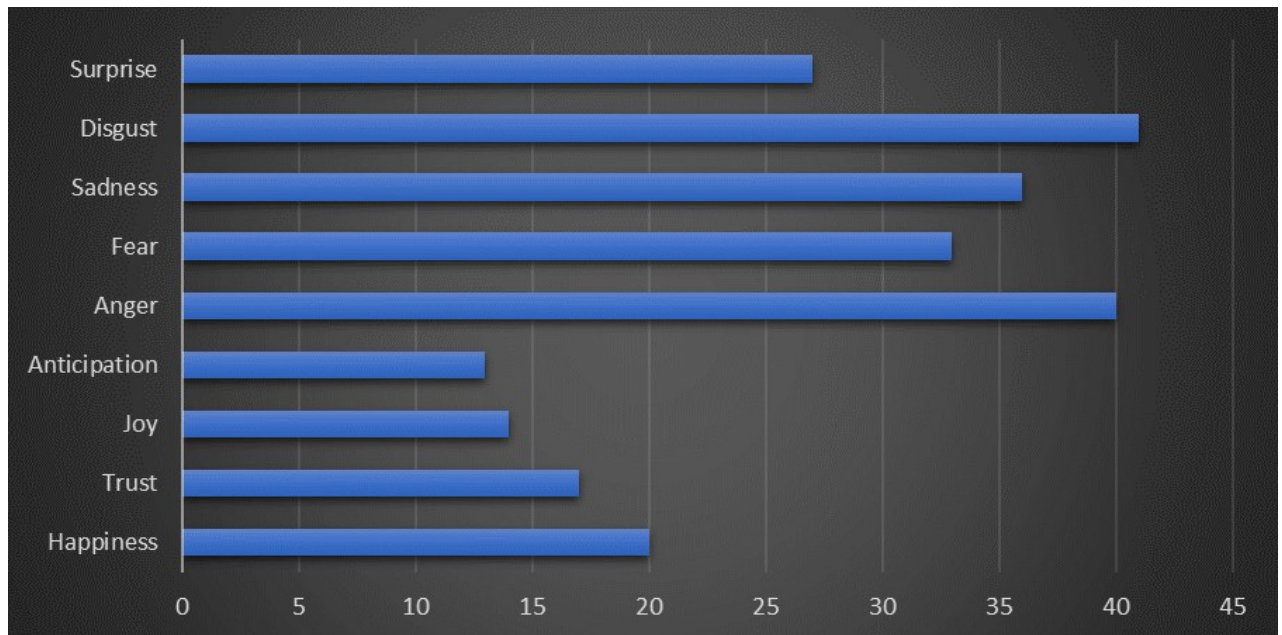


Figure 2: Different Emotional Categories

*Note: X on the DDEP are the unit of analysis, while, the horizontal axis represents the tweet's different emotional categories and the vertical axes for the tweets in in percentages**

RQ3: Emotional Categories Portrayal, Acceptance or Rejection of the DDEP

The study also analyzed the emotional categories of how the tweets by the public portray the DDEP discourse on X to evaluate the level of acceptance and rejection of the DDEP. The sentiment analysis conveyed in the text of the tweets showed that a great number of X users were generally not in support of the government's decision to introduce the DDEP. The emotional portrayal analysis of the public sentiments toward the DDEP gave enough indications that public X users had a very negative perception of the introduction of the DDEP, and the contents of the tweets were generally rejected. Based on the analysis the vocabulary of the content tweets, and messages was aggressive, insulting, and harsh. The tweets were generally based on irresponsibility and insensitive on the part of the government including pensioners and bondholders in these hash economic times. The emotions of the public toward national economic policies are central and closely related to the successful outcomes of policy decisions. The evaluation of the feelings and emotional portrayal of Ghanaian X users as stakeholders in governance are, therefore, necessary and informed public perceptions. The X discourse on the DDEP is described as an unprecedented influencer that has close relations to the trajectory of public discourse online and important social mobilization campaign tool. The spider web analysis in **Figure 3**, showed the high and low levels of acceptance and rejection of the DDEP. The analysis shows that X public users' rejection of the introduction of the DDEP had the highest score, while acceptance of the program was

very low. The results of the analysis of the tweets suggest that a greater number of domestic bondholders were totally against the DDEP.

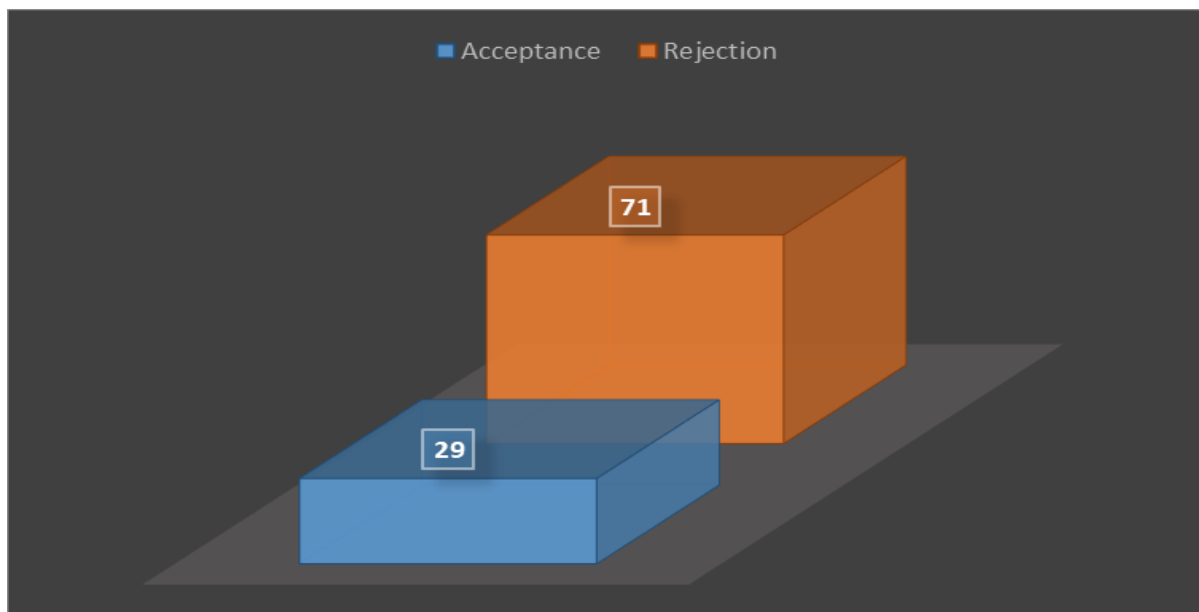


Figure 3: Emotional categories portrayal, Acceptance or Rejection

**Note: Tweets on the DDEP are the unit of analysis, while, the horizontal axis represents the tweet's emotional categories portrayal and the vertical axes for the emotional portrayal in percentages **

4. Discussion

The findings from the study indicated that the predominant sentiments and emotions expressed by the tweets were generally negative opinions. Most of the Tweets were against the introduction of the DDEP and proposed other measures like cutting down government expenditure and reducing corruption in public institutions to restructure the economy. The inclusion of individual bondholders and pensioners received the highest tweets and demanded their exclusion from the debt restructuring program. The negativity associated with the DDEP tweets is blamed on the government's mismanagement and irresponsibility hence, the reason for the low positive and neutral sentiments score on the DDEP. The findings from this study align with previous by Ekmekci and Shihab (2022); Leary (2021); Nandwani and Verma (2021); Ponder, and Haridakis, (2018); Torregrosa et al. (2022), who investigated how powerfully X and other social media platforms could be used to carry out online social activism and policy publicity campaigns.

The second research question also aimed to investigate the reactions and emotional categories of X users on the DDEP. The Emotional categories like disgust, happiness, sadness, surprise, anger, fear, joy, trust, and anticipation analyzed as proposed by Gündem et al. (2022) were used as a guide. The analysis of the public discourse posts of emotions indicated that *disgust, sadness, surprise, anger, and fear* dominated with higher

scores as indicated in the bar chart in **Figure 2**. The findings from this study are in line with Burbach et al. (2020); Nartey and Yu (2023), which investigated social media use for public campaigns. The low score for other tweets' emotional categories like *happiness, trust, joy, and anticipation* is attributed to the lack of faith in the government's ability to help resolve the current economic challenges. Finally, the third research question on the portrayal of emotional categories on the levels of acceptance and rejection was also analyzed. The findings show that X users generally rejected the introduction of the DDEP.

The overall findings depict that, the use of X discourse as an agenda-setting mechanism for public sentiments on controversial issues of national interest has increased over the past years in Ghana. This article is aimed at examining the emotions and sentiments of Ghanaian X discourse relating to the DDEP. Trending issues on X either from economic, social, or political perspectives have the consequence of influencing government agenda or policies in recent years. Based on the objectives, and findings of this study, this article has diagnosed sentiments of the Ghanaian public and their adoption of X to respond to the introduction of the DDEP as a precondition for seeking a bailout from the IMF. The critical discussions below are derived from the results and findings that came out of the analysis of the extracted tweets data. The findings showcased differences in the emotions, sentiments, and reactions of the Ghanaian public about the DDEP. The impact of X and other social media discourse on the emerging or trending national discourse, and the reactions from socio-political movements or pressure groups have evolved on varied social media channels, and expectations of actors have always been impactful (Brobbery et al., 2022; Di Crosta et al., 2021; Nartey and Yu, 2023). The study utilized extracted data from X due to the rate at which citizens employed X to express their perceptions, and sentiments on the introduction of the DDEP, as well as acceptance and rejections.

5. Conclusions

This study highlighted how the sentiments of X users were expressed since the introduction of the DDEP in Ghana. The findings showed that X over the years has evolved in Ghana and is a vital tool for expressing public feelings in crisis, such as the current economic recession. The citizen's reactions and sentiments on Twitter, and subsequent changes made to the DDEP have indicated that social media platforms such as X right avenue for online campaigns and public awareness, on national issues. The discourse on X centered on the emotions and sentiments of Ghanaian X users, and the pressure that needed to be put on the government to reconsider some of the clauses in the DDEP that had the potential to affect the economic lives of government bondholders of all categories. The sentiments were generally negative and emotional expressions and such as sadness, fear, anger, disgust, were portrayed in the sample tweets analyzed for the study. The online social activism expressed by the tweets received great impact and had the government make major changes to the final DDEP submitted for consideration by the IMF. The X discourse embarked on the Ghanaian X is considered one of the most successful civil campaigns in the history of Ghana. The findings from this study further demonstrate X affordance is a powerful tool for activism on the press national discourse. The practical implication of this study is that the positive outcomes of using X as a tool for public campaigns for the DDEP, future users of X the

findings could be used to explain the opinions of Ghanaian X users, may adopt this strategy to get their concerns attended to. Using X discourse within the public sphere for debates on social, economic, and political fronts among the general public on pressing issues of national interest has gained a lot of popularity in developing countries over the past few decades. The empirical analysis and findings from this study have demonstrated the effects social media platforms like X can have used mobilized citizens to compel governments to change unpopular public policies.

5.1. Practical Implication

The polarity in the findings like negative, positive, and neutral may help the political authorities to understand the sentiments of citizens.

5.2. Research Limitations

A limited number of Ghanaians used X, and the limited tweets used for this study, serve as a limitation, hence the findings cannot be generalized, and represent the sentiments of t the entire Ghanaian population. With a large sample size, other social media platforms like Facebook could be employed by future researchers to have a full understanding of the sentiments of other social media users. The study, therefore, concludes that X is an ideal platform for conducting online sentiment analysis and propagating social media campaigns, on issues of national interest, the introduction of the DDEP.

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