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Enhancing Community Understanding and Behavioral Action to PHIVOLCS Alert Levels Through Web-Based Infographic in Agoncillo, Batangas

Erica Mae H. Mantaring, Mikaela Kim R. Marquina, Jan Joseph M. Martinez, Crisie Mae G. Mendoza, Ace Vincent L. Montejo, Meiry Adrienne S. Oabel, Marc Andrei D. Pajar, Godwin Morris T. Villamater
Bachelor of Sciences in Geodetic Engineering Batangas State University, The National Engineering University, Batangas City, Philippines

Abstract: ***Communities near Taal Volcano face recurring risks due to periodic volcanic activity, yet many locals still lack clear understanding about PHIVOLCS (Philippine Institute of Volcanology and Seismology) Alert Levels and appropriate safety actions. Ineffective communication and limited access to accurate information often cause delayed evacuation and low preparedness, while government warning signals often arrive late. Web-based infographics offer a modern, accessible tool to improve public awareness and guide proper behavioral responses during volcanic hazards. This action research examined the effectiveness of a web-based infographic in enhancing community understanding and promoting appropriate behavioral actions toward PHIVOLCS Alert Levels among residents of Agoncillo, Batangas. A quantitative-descriptive design was employed using convenience sampling, and survey questionnaires were distributed to 100 residents to evaluate their awareness, risk perception, information accessibility, and assessment of the infographic's completeness, readability, visual layout, and accessibility. Findings show high levels of awareness and strong risk perception, with consistent dependence on official sources for volcanic information. Respondents strongly agreed that the infographic provided complete, organized, visually clear, and relevant information through its design, layout, images, and visual elements, though, some noted difficulties in readability and accessibility due to small text size and poor internet connectivity. The website was updated with feature larger, more readable typography. Respondents also expressed that barangay officials and local government units rarely conduct seminars or awareness campaigns. The study concludes that the web-based infographic is a highly effective tool for enhancing understanding of PHIVOLCS Alert Levels and improving preparedness and behavioral response. It is recommended to further revise the infographic by enhancing accessibility, and future initiatives should integrate and expand continuous community education efforts to strengthen disaster preparedness.***

Keywords: Public awareness, Taal volcano, Behavioral Responses, PHILVOCS Alert Levels, Disaster Preparedness, Web-based Infographic, Information Accessibility, Agoncillo Batangas, Volcanic Hazards, Risk Perception

I. INTRODUCTION

Natural disasters present significant risks and potential harm to communities worldwide, particularly in regions prone to geological hazards. Since the Philippines is located along the Pacific Ring of Fire, the country often experiences natural threats such as earthquakes and volcanic eruptions. Taal Volcano, known as one of the most active volcanoes in the Philippines, has erupted more than 30 times since 1572. Its eruption displaced over 376,000 people and caused significant damage to agriculture, infrastructure, and local livelihoods, emphasizing the community's vulnerability to recurring volcanic unrest. As the alert level of the volcano continues to rise, recent reports have highlighted its potential threat to nearby communities.

In Agoncillo, Batangas, where the threat of volcanic activity looms, understanding and responding appropriately to warnings from the Philippine Institute of Volcanology and Seismology (PHIVOLCS) is critical. Despite frequent monitoring and warnings from PHIVOLCS, many residents remain unclear about what each alert level signifies and what safety measures should be implemented. Despite the scientific severity of the PHIVOLCS monitoring system, recent volcanic crises–such as the 2020 Taal Volcanic Eruption, revealed significant problems in the last-mile announcement of alert levels and related preventative measures.

Post-incident studies, such as those by Kurata et al. [1], indicate that a large number of people in at-risk communities, particularly those outside the immediate Permanent Danger Zone, often showed hesitation and postponed their evacuation because they lacked experience and a thorough awareness of rising volcanic threat. This lack of understanding often results in delayed evacuations and poor preparedness, which in turn exacerbate the eruption's negative impacts on livelihoods, displacement, and long-term socio-economic stability, PHIVOLCS [2].

To effectively close this gap, the use of accessible digital tools, such as web- based infographics, as stated by Lim & Anabo [3], provides an essential opportunity to deliver timely, accurate, and consistent information to communities that are at risk, increasing trust among the public and facilitating quick, well-informed decision-making. Considering that digital infographics significantly increase individuals' awareness of sudden volcanic eruptions, as stated by Cobar [4], it is undeniable that they serve as a vital foundation for influencing behavioral action.

The future geodetic engineers' duty is to provide precise geospatial data, generate detailed hazard and risk maps, and contribute to land-use and evacuation-route planning. Through the integration of geographic information systems (GIS), satellite imagery, and topographic mapping, geodetic engineers can help identify high-risk zones and develop safer settlement and evacuation plans. The volcano's most recent eruption is a phreatomagmatic eruption that happened on October 26, 2025, as per the report of PHILVOCS. Despite prior warnings issued to mitigate the effects of such eruptions, some residents in high-risk areas remain unaware of the dangers or reluctant to evacuate when advised. Ultimately, the goal of this research is to develop an accessible web-based infographic that delivers comprehensive information on safety guidelines, dos and don'ts, emergency routes, and hotline numbers. Through this platform, the study seeks to enhance residents' understanding and improve their preparedness and behavioral response towards a volcanic eruption.

II. OBJECTIVES

This study aims to determine the effectiveness of a web-based infographic in enhancing community understanding and behavioral action to PHIVOLCS alert levels in Agoncillo, Batangas. Specifically, it seeks to answer the following questions::

1) What is the demographic profile of the residents in Agoncillo, Batangas, in terms of:
- 1.1 Age
- 1.2 Gender
- 1.3 Occupation
- 1.4 Location (Proximity to high-risk areas)

2) What are the factors influencing the behavioral actions of the residents in Agoncillo, Batangas, in terms of:
- 2.1 Level of Awareness
- 2.2 Risk Perception
- 2.3 Information Accessibility

3) What features of the web-based infographic are suitable for improving community-based risk to enhance the residents' overall awareness and risk perception towards volcanic hazards in terms of:
- 3.1 Completeness of information
- 3.2 Readability and clarity of text
- 3.3 Visual appearance and overall layout
- 3.4 Accessibility

III. MATERIALS AND METHODS

A. Research Design

This study utilized a quantitative-descriptive research design to systematically collect and analyze numerical data that provided objective answers to the research questions. This design aimed to quantify the research problem and describe the relationship between the community's understanding and behavioral actions toward the PHIVOLCS Alert Levels as presented in the web-based infographic in Agoncillo, Batangas. Through this design, the researchers obtained data that addressed the study's objectives and determined the possible impact of the infographic on the community's awareness and behavior. This ensured objectivity, validity, and reliability in the interpretation of results.

B. Subjects of the Study

The participants involved in this study comprised individuals from a wide demographic profile. There were no specific criteria for participant selection aside from being a current resident of Agoncillo, Batangas. The researchers used convenience sampling to select participants in the study. Said sampling was conducted to fill in and meet the quota of 100 respondents

The demographic profile of the participants included age, gender, occupation, and location relative to high-risk areas. Participants were categorized according to age groups:

TABLE I . AGE GROUPS OF PARTICIPANTS

Age Groups
15–25
26–30
31–40
41 - above

Their occupations and proximity to identified high-risk zones were also recorded to provide a broader understanding of how these variables may influence their perceptions and preparedness levels.

C. Data Gathering Instrument

This study will employ a quantitative research approach, specifically utilizing a survey method as the primary research instrument. A structured questionnaire will be developed to gather relevant data from the respondents efficiently and objectively. This instrument will allow the researchers to collect measurable data that can be statistically analyzed to achieve the study's objectives.

To interpret the computed weighted mean, a 4-point Likert scale interpretation will be used to translate the numerical findings into meaningful verbal descriptions. This scale is essential for establishing the respondents' level of awareness by assigning a specific verbal analogy to a corresponding mean score range, as shown in Table II.

TABLE II. LIKERT SCALE INTERPREATION

Scale	MEAN RATING INTERVAL	Adjectival Rating
4	3.26 - 4.00	Always/Strongly Agree
3	2.51 - 3.25	Often/Agree
2	1.76 - 2.50	Rarely/Disagree
1	1.00 - 1.75	Never/Strongly Disagree

D. Data Gathering Procedure

The data-gathering process began when the researchers created a survey questionnaire to assess the effectiveness of a web-based infographic in enhancing community understanding and behavioral action toward PHIVOLCS alert levels among residents of Agoncillo, Batangas. The researchers then prepared a formal request letter to conduct the study within the community. After receiving approval to administer the survey, the researchers distributed the questionnaire to the selected residents of Agoncillo, Batangas.

IV. RESULTS AND DISCUSSION

A. Demographic Profile of Respondents

The demographic profle of the residents in Agoncillo, Batangas was categorized by their age, gender, occupation, and location.

TABLE III. DEMOGRAPHIC PROFILE OF RESPONDENTS

Particulars	Category	Frequency	Percentage
Age	15-20	21	21
	26-30	18	18
	31-40	18	18

	41-ABOVE	43	43
	Total	100	100
Gender	Male	57	57
	Female	43	43
	Prefer Not To Say	0	0
	Total	100	100
Occupation	Construction Worker	6	6
	Housewife	23	23
	Student	14	14
	Vendor	6	6
	Hog raiser	6	6
	Others	23	23
	None	22	22
	Total	100	100
Location	Agoncillo, Batangas	100	100
	Total	100	100

The findings of the study revealed that the age bracket of 41 and above with amean percentage of 43 percent have a more experienced perspective in volcanic awareness and preparedness. Meanwhile, the research locale— Agoncillo, Batangas is geographically located within the proximity or the danger zone of the Taal Volcano which makes the location of the respondents a critical site for a volcanic eruption assessment. In terms of occupation, housewives attained the highest mean percentage of 23 percent among the 100 participants which reflects that female spouses are generally active in terms of disaster preparedness.

B. Factors influencing the behavioral actions

The factors influencing the behavioral actions assessed by their level of awareness, risk perception, and information accessibility.

1) Level of Awareness

TABLE IV. FACTORS INFLUENCING THE BEHAVIORAL ACTIONS IN TERMS OF LEVEL OF AWARENESS

INDICATORS	WM	VI
1. I am aware of the existence of PHIVOLCS (Philippine Institute of Volcanology and Seismology).	4	A
2. I am familiar with the different alert levels issued by PHIVOLCS	4	A
3. I understand what each alert level signifies in terms of potential volcanic activity.	3.5	A
4. I understand the potential impact of a volcanic eruption on our community.	3.5	A
5. I have received information about PHIVOLCS alert levels through community seminars or workshops.	3.5	A
COMPOSITE MEAN	3.7	A

The study found high volcanic hazard awareness (overall weighted mean 3.7, with top indicators at 4.0) and strong community preparedness, with a clear positive correlation between the two. This finding is supported by Jr & Dollete [5], who reported a similar preparedness mean of 3.68, and Hidayat et al. [6], whose research on Indonesia's Mount Gamalama showed that nearby residents have solid specific knowledge and take proactive measures. Together, these results highlight the importance of geographic context, disaster education, and targeted information dissemination for building sustained readiness.

2) Risk Perception

TABLE V. FACTORS INFLUENCING THE BEHAVIORAL ACTIONS IN TERMS OF RISK PERCEPTION

INDICATORS	WM	VI
1. I believe that a volcanic eruption poses a serious threat to the safety of my community.	4	A
2. I am aware that detection systems and technologies (such as satellites, early warning sensors, and volcanic monitoring networks) help in identifying potential volcanic activity.	3.5	A
3. I believe that the intensity levels and past eruption simulations indicate how strong and destructive a volcanic eruption could be.	3.5	A
4. I believe that our community is vulnerable to the effects of volcanic hazards.	3.5	A
5. I believe that having accurate and timely information, as well as access to necessary resources such as vehicles, shelters, or temporary accommodations, can help reduce the risks during a volcanic eruption.	3.5	A
COMPOSITE MEAN	3.6	A

These results indicate strong positive risk perceptions among residents, reflecting Mercado's [7] statement that "Risk Perception is anchored in the present moment only and is not forward looking," and showing that while high perception positively affects preparedness behavior and intention, it does not always perfectly correlate with disaster preparedness and awareness. The findings also align with Brata et al. [8], who reported that higher perception of natural hazard risks significantly increases the likelihood of adopting protective measures such as disaster microinsurance, and with German et al. [9], who found that perceived severity and vulnerability lead to very high preparedness and intention to evacuate. Together, these studies affirm that the strong positive mean perception among residents of Agoncillo, Batangas, motivates proactive preparedness and protective behaviors, prompting residents to anticipate hazards and participate in resilience-building measures. Thus, awareness of risks affects residents' willingness to prepare.

3) Information Accessibility

TABLE VI. FACTORS INFLUENCING THE BEHAVIORAL ACTIONS IN TERMS OF INFORMATION ACCESSIBILITY

INDICATORS	**WM**	**VI**
1. I immediately seek information from official sources after a Taal Volcano alert.	4	A
2. I easily find the official risk information regarding Taal Volcano.	4	A
3. I always follow the actions advised in Taal Volcano warnings	4	A
4. I delay actions if the information about Taal Volcano is confusing.	1	N
5. I verify Taal Volcano information with neighbors or community members.	3.5	A
COMPOSITE MEAN	3.3	A

The results revealed that respondents' proactive preparedness and safety activities during Taal Volcano alerts are greatly improved by information accessibility. With a composite mean of 3.3, the results show that their high reliance on official and credible sources encourages immediate information seeking, informed decision-making, and adherence to recommended proactive measures, demonstrating strong trust in government communication channels Dehghani et al [10] . Martinez-Villegas [11] emphasized the importance of timely and reliable information for effective evacuation and preparedness. As a result, easily accessible, clear, and trustworthy risk information is critical in shaping communities' response and overall resilience to volcanic hazards.

C. Features of web-based infographic

The features of web-based infographic was assessed by its completeness of information, readability and clarity of text, visual appearance and overall layout, and accessibility.

1) Completeness of Information

TABLE VII. FEATURES OF WEB-BASED INFOGRAPHIC IN TERMS OF COMPLETENESS OF INFORMATION

INDICATORS	WM	VI
1. The infographic provides sufficient information about volcanic hazards and their alert levels.	4	SA
2. The content covers all necessary details to understand the risks and safety measures.	4	SA
3. The information presented is accurate and up-to-date.	4	SA
4. The infographic includes both scientific data and practical guidelines for the community.	4	SA
5. The overall content helps enhance awareness and understanding of volcanic hazards.	4	SA
COMPOSITE MEAN	4	SA

The findings indicate that respondents hold a very positive attitude toward the web-based infographic, particularly regarding the completeness and accuracy of its information on alert levels and volcanic hazards. This suggests that the infographic effectively serves as an informative tool that enhances public awareness, understanding, and disaster preparedness among the residents of Agoncillo, Batangas. These results reinforce the points of White [12], who highlights that credible and successful websites provide valuable and high-quality content that supports informed decision-making, and align with Ahmad et al. [13], who demonstrate that infographics effectively reach and engage diverse audiences by simplifying complex information through clear visuals and concise explanations.

2) Readability and clarity of text

TABLE VIII. FEATURES OF WEB-BASED INFOGRAPHIC IN TERMS OF READABILITY AND CLARITY OF TEXT

INDICATORS	WM	VI
1. The text in the infographic is easy to read and comprehend.	**3**	**A**
2. The language used is simple and appropriate for the general public.	**3**	**A**
3. Important terms or technical words are clearly defined or explained	**3.5**	**SA**
4. The size and font style of the text are readable and consistent throughout.	**3.5**	**SA**
5. The message of the infographic is clearly communicated without confusion.	**3.5**	**SA**
COMPOSITE MEAN	**3.3**	**SA**

The results show that respondents have a positive perception of the web-based infographic in terms of readability and clarity, indicating that the text effectively communicates its intended message and supports awareness and risk perception related to volcanic hazards. Although most indicators reflect clear and accessible content, some items rated only as “Agree” suggest that improvements are still needed to ensure the language and readability fully meet the needs of a broader audience. This aligns with So et al. [14], who emphasize that emergency preparedness materials must match the public’s literacy capabilities, and with Abdullah et al. [15], who stress the importance of considering audience literacy to prevent misinterpretation. Ensuring that infographics use simple language, culturally sensitive visuals, and easily understandable elements can further enhance clarity and accessibility for diverse communities.

3) Visual appearance and overall layout

TABLE IX. FEATURES OF WEB-BASED INFOGRAPHIC IN TERMS OF VISUAL APPEARANCE AND OVERALL LAYOUT

INDICATORS	WM	VI
1. The colors and graphics used are visually appealing and appropriate for the topic.	3.5	SA
2. The layout of information is organized in a logical and easy-to-follow manner.	4	SA
3. Images, icons, or symbols effectively support the content presented.	3.5	SA
4. The infographic design attracts and maintains the viewer’s attention.	3.5	SA
5. The overall visual presentation enhances understanding of the topic.	3.5	SA
COMPOSITE MEAN	3.6	SA

The results show that respondents have positive feedback on the visual appearance and layout of the web-based infographics, with an overall mean of 3.6 indicating that they "Strongly Agree" the design is engaging and captures attention. This suggests that the information is well-structured, clear, and easy to understand, although some indicators with a mean of 3.5 show there is still room for improvement. The feedback highlights that an organized layout, appropriate images, and appealing visuals enhance readability and comprehension, supporting Morales' [16] view that effective infographic design—including simplicity, visual hierarchy, and consistency—helps audiences understand complex information, demonstrating the infographic's effectiveness as a visual communication tool.

4) Accessibility

TABLE X. FEATURES OF WEB-BASED INFOGRAPHIC IN TERMS OF ACCESSIBILITY

INDICATORS	**WM**	**VI**
1. The infographic is easy to access on different devices (e.g., phone, tablet, computer).	3.5	SA
2. The webpage or platform loads quickly and displays the infographic properly.	3	A
3. The infographic can be easily shared or downloaded by users.	3	A
4. Navigation through the infographic is smooth and user-friendly.	4	SA
5. The infographic remains readable and functional even with limited internet connection.	2	D
COMPOSITE MEAN	3.1	SA

As illustrated in the table, the results show that respondents have a favorable evaluation of the web-based infographic's accessibility, with an overall mean of 3.1 indicating that they "Strongly Agree" it is easy to access, navigate, and use, and that the webpage is smooth and user-friendly. However, some users may experience delays or difficulties with certain features, such as loading images or interacting with dynamic elements, particularly if their internet connection is slow or unstable. Despite these occasional issues, most respondents still find the infographics generally easy to access, navigate, and share, indicating that the platform remains largely user-friendly and effective for delivering information. According to Yildirim [17], digital infographics are preferred because they can be accessed independently from specific tools or environments, and the findings show that the infographic largely meets accessibility standards and remains practical for users with stable internet.

V. CONCLUSIONS

In connection with the findings of the study, the following conclusions were drawn:

1) The community of Agoncillo, Batangas, are highly aware of volcanic hazards, indicating vigilance in facing volcanic risks.
2) The community's risk perception is strong, indicating that residents actively seek and respond to official information about Taal Volcano.
3) Results indicated that residents have confidence in authoritative sources, take immediate action upon warnings, and do not wait even when the information is not well understood.
4) The results revealed that the the web-based infographic delivered accurate and complete information on volcanic hazards.
5) The study concludes that the web-based infographic enhanced awareness, accessibility, and preparedness in building a more informed and resilient community against volcanic threats.

VI. RECOMMENDATIONS

Based on the findings mentioned above, the researchers recommended the following:

1) Use a more readable and visually clear font style in the web-based infographics to enhance text clarity, overall readability, and better viewing specially to those users with poor eyesight.
2) Conduct a more comprehensive interview or survey in a qualitative approach which caters to needs, perception and perspective, response and preparation of a community located within the proximity of a high risk disaster.
3) Make the web-based more accessible in terms of availability offline specifically for those located in areas with limited internet access or signal.
4) Provide more studies regarding the relation of Geodetic engineering in risks and hazards associated with volcanic eruption and public awareness.

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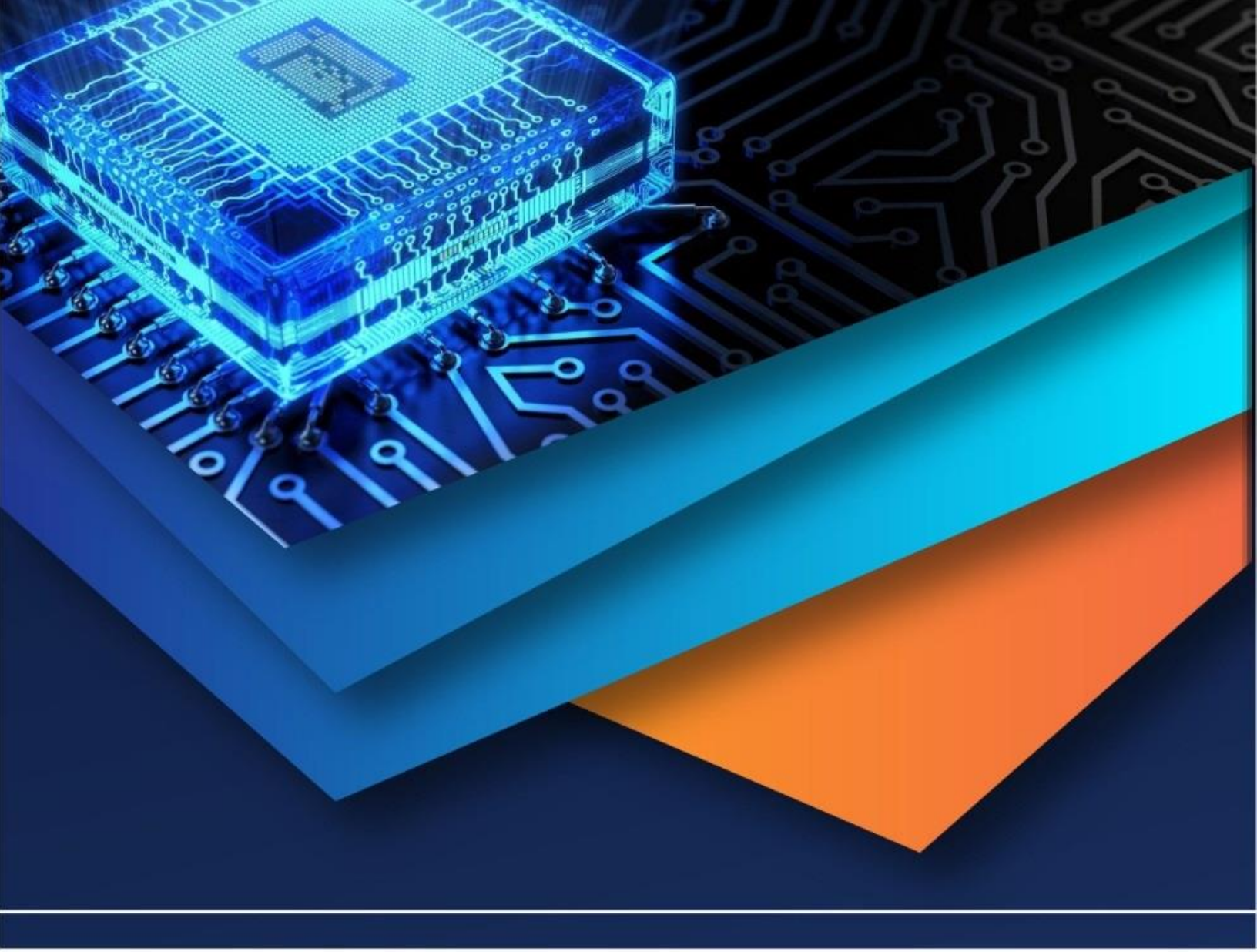

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