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The Increasing Rate of Inappropriate Bangla Apps in Google Play Store

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Abstract: ***The increasing rate of inappropriate Apps in Google Play Store is a matter of concern as it is highly unethical and the increasing rate is alarming. The prime focus of the research is to explore the responsible determinants behind developing inappropriate apps in Google Play Store and the motive behind developing those apps. Applying the determinants and motive the researchers will construct a dynamic behavioral pattern which will be very understandable and helpful for the community who use Google Play Store. The study worked on quantitative data and it's a descriptive study. So, a personal interview was done to collect the data. After analyzing the data some reasonable determinants were detected and they are Large users' groups of inappropriate apps, easy money from ads, anonymity, and out of curiosity of the developers, ignorance of users of inappropriate apps. The study also found out less effort in developing inappropriate apps and not getting enough response to other creative develop are also a reason for developing inappropriate apps in Google Play Store. Taking the determinants, a dynamic behavioral pattern was offered and a connection between the determinants was measured. The dynamic behavioral pattern explores how determinants accelerate the rate of developing inappropriate apps. The result achieves the actual reason behind developing inappropriate Bangla apps in Google Play Store. This study can be helpful for not only the developers who involve in this industry but also the users of Google Play Stores.***
Keywords: determinants, analysis, increasing, pattern, coefficient, influence, awareness.

I. INTRODUCTION

In the last decades, just after the evolution of smartphones, the growth of smartphone applications was enormous. Nowadays many platforms develop smartphone applications. In Bangladesh, iOS and Google Play Store is very popular. In these popular platforms of smartphones application, there has been seen an unusual and unexpected issue which is "Inappropriate Apps". There are tons of inappropriate apps on these platforms. Day by day smartphones are reaching rural & urban areas and these apps are going along with. There are many categories of these apps. Some say it can make someone a millionaire, some go like "Be a doctor within 30 days". The unethical of these apps' developers is beyond the line. The increasing rate of these apps is quite alarming. It may have been a catastrophe in the coming days. Since these inappropriate apps become a matter of concern, the reason behind developing those apps need to be resolved. In this study, it will show that the motive of those inappropriate Bangla apps developers in developing those apps. Also, the social impact of these inappropriate apps. In the coming days, the government, ICT regulatory committee, and mobile application developing company would be interested in this study. The result of this study would help to ensure a healthy environment in the App stores. The focus is to reach out to the ways to develop the situation in Google Play Stores.

A. Background

Nowadays there have many studies on android applications (Apps) but there have few works on inappropriate Apps in Play Store. App Store identifies the detailed mature contents which make an App be rated as a specific maturity level[1]. Inappropriate content of Apps can increase unethical practice and also increase the negative impact on society. When Apps contain inappropriate content, this can harmful for children and some uneducated or less educated people or any type of people who want to get help from mobile Apps in their daily life. There were 66 reports about gaps in processes to design and build apps, including the lack of expert involvement, evidence base, and validation[2]. When App developer has few pieces of knowledge on developing Apps, they can make small Apps and for earning money from small Apps, they make it with inappropriate content.

B. Research Objectives

1) *Problem Statement*: In the past decades, Bangladesh has gained enormous progress in digitalization. The more it gets digital the more this related problem arises. The number of internet users in Bangladesh exceeded 100 million for the first time to reach 103.253 million users, according to newly released data from the country's regulator, the Bangladesh Telecommunication

Regulatory Commission (BTRC) of 103.253 million subscribers, 95.168 million access services through mobile – an increase of 7.8 million users' year on[3]. This number is getting bigger & bigger. The Internet gets access everywhere. Both in Urban & rural areas, there is internet availability. Among 95 million mobile internet users in April 2020, Android represented 94.71 percent of the mobile operating systems market in Bangladesh[4]. In the Android operating system google play store contains apps. So, this app store & app development has become a major industry. In google play store there have several inappropriate Bangla apps & which is increasing day by day. A huge number of people use this platform including children & teenage people, and they easily get access to these apps which has become a serious problem and matter of tension. People's life has become more & more dependent on the internet thus google play store. Our day to day life gets easier through many useful apps of play store. But those inappropriate apps are gradually making the play store an inappropriate place for both children & adults. people often get offended by this kind of apps. What is it that makes the developers develop those apps & how it can be stopped or solved is still a mystery? There is a lack of knowledge in this particular area that needs to be fulfilled via this research.

2) Aim: This research explores the factors behind developing inappropriate Apps in Google Play Store.

3) Objectives

a) To observe the motive behind developing inappropriate Apps.
b) To characterize the social impact of inappropriate Apps.
c) To interpret the reason behind why other developers, refrain from developing inappropriate Apps.

C. Research Question

1) Related Work

The developers of these apps do not make any sense to ensure the quality and trustworthiness of these apps. As a result, Google reported the issue and provided a group of policies to regulate App developers. Therefore, a huge number of policy-violating apps have been removed by Google Play. A study found that almost half of the Apps have been removed by Google Play Store during the period from 2015 to 2017[5].

App advertisement is another concern in this field. It might contain violent and sexual content which is harmful to the children's mental health. Because mobile App-advertisements are not controlled by the content rating of Apps. The results from many experiments shown that a large amount of the in-app advertisements carry inappropriate content for children and there are no policies against this to resist these in-app advertisements[6].

Again, the mobile platforms provide rating policies to label the maturity levels and quality of those Apps. But research provided that the policies are insufficient to prevent building those apps. Because of expensive manually labeling or inappropriate. So, no significant difference has been made by those steps[1].

The rate of growth of mobile Apps is getting higher and higher therefore many developers are attracted to build mobile Apps. Many developers have been successful in their Apps. There are both high-rated Apps and low-rated apps to be differentiated. But the percentage of low-rated Apps is greater which is a concern[7].

Being a solution to mobile platforms decentralization many renowned companies or institutions and a growing community of developers back *Hybrid mobile Apps* development. Hybrid mobile Apps are web-based and compatible across many platforms. How these Apps are performing in production and building in a large number is still a big question[8].

2) Main Questions

Why do the developers develop inappropriate apps in the Google Play Store?

3) SubQuestions

a) How do developers get benefited by developing inappropriate Apps?
b) What factors of inappropriate Apps have a great significance on society?
c) How they (inappropriate App developer) come to know to make inappropriate Apps?
d) How they (inappropriate App developer) feel about their work?
e) Why other developers refrain themselves developing inappropriate Apps?

D. Limitations of the Study

However, some limitations should be noted here. This study has interacted with few developers and the number of participants is not satisfactory so that the study might not get the conventional output. The data was collected from interviews and the study is quantitative, so there might be some little sample bias in the study. An exception can happen as the researchers didn't have enough resources.

II. METHODOLOGY

In this specific part of the research, the method will be discussed. In which method the data of the research shall be taken. There are some methods to take the data. Here, it shall be discussed. The primary goal for collecting data is from the developers. But if needed the data might be collected from some other resources also. The researchers will try to collect the data as accurately as possible. It is very important part of the research, so the researchers need to be unprecedently clean and understandably designed. Well, the researchers are going with the qualitative method for data collection for this study to get enrich and accurate data.

A. Data Collection Methods

For this study, the researchers choose the qualitative method to collect data. Now the question arises why did the researchers choose this method. Well, this study is about inappropriate apps in the Google Play store. To find the motive behind developing these apps, the researchers need to communicate with the developers of these kinds of apps, which means the researchers need to communicate with them face to face approach. So, the researchers are talking about non-numerical data where the only qualitative method works with non-numerical data.

1) *Qualitative Approach as Data Collection:* It is collected and analyze non-numerical data which can be text, video, or audio file. It is the purpose to understand the concept of the study also conclusion and experiences. It can also be utilized to assemble in-depth experiences into a problem statement and generate some informative thoughts for inquiring about. This is why the researchers are going with the qualitative method.
2) *Interview as a Qualitative Method:* Interviews can be preferable for conducting qualitative research because it can able to take in such a way and diverse outcome from respondents. They can generate a researcher's consciousness of insights in a wonderful way. The qualitative methods are using to get useful data and accurate results. the researchers may need both interviews and surveys for our study.
3) *Advantage of the Qualitative Approach:* The qualitative approach is so flexible to collect data. Data acquisition and review process can be adjusted as new approaches or models appear. They are not rigidly selected previously. Following by, data gathering happens in practical-world circumstances or naturalistic forms. Accurate records of people's experiences, reactions, and observations can be applied in outlining, inquiring, or advancing methods. This method generates new ideas. This method can reveal novel queries or possibilities that people wouldn't have thought of differently.
4) *The weakness of the Qualitative Approach:* The researchers are considering practical and theoretical limitations in analyzing and interpreting our data in the qualitative method. The real-world environment usually makes qualitative research unpredictable because of independent factors that modify the data. Due to the researcher's fundamental position in examining and evaluating data, the qualitative study cannot be replicated. The researcher determines what is necessary and what is unnecessary in data review, so representations of the same data can vary considerably. Although software can be applied to control and read massive quantities of text, data inquiry usually has to be controlled or operated manually.

The researchers are not taking the quantitative method for this study because there are no experiments or systematic observations in our study, also the quantitative method does have some limitations in this study which is superficiality. For example, the idea of mood may be described with only a sign in quantitative research but described with discussion in qualitative research. There are also narrow focus, structural biases, and lack of context in the quantitative method.

The researchers also didn't take paper studies as a method. As a matter, a fact that there is no such study is taking place in recent years that is why the researchers couldn't approach paper studies.

B. Participants/ Sampling

For this research, the strategy of data collection is a semi-structured interview that can help to reach the aim and fulfill the objectives. Interview can give a depth of information, flexibility, high response rate, validity, etc. [9, p. 192]. So, the researcher can observe and investigate the situation properly. Also, researchers can find valuable insights from the interview [9, p. 192]. From the interview, data can check from recordings, and then it can ensure the validity of data.

The interview also can ensure a convenient time, so that it can give a high response rate. In this study researchers followed stratified sampling. In this method the population is first divided into subgroups (or strata) who all share a similar characteristic. For this study, the participants are random App developers of Bangladesh. Before taking the interview, the App developer got a consent form.

The App developer population was huge, and the sample size was 11 where 7 are refrain from and 4 are involved with inappropriate App development. The study did not use an automated collection of instruments, so there have no biases. The prime goal of the research is to gain deep knowledge about the factors and reason behind developing inappropriate Apps, so that researchers conducted the interview process.

C. Data Analysis

To reach the aim of this study is to need to analyze data. So, it needs a proper way that people can understand and visualize this properly.

There has a huge technique for analyzing data. For this study, the researchers think "The quantitative analysis of qualitative data" can be the proper way for analyzing data.

As per the quantitative studies, it is very important to analyze the patterns and the relationship of the data that would be collected from the interview. So, the data would be quantitative for presentation and better to understand. And there could be a graphical presentation of those data, such as a table, charts, graph etc. For this study, a recorder, Google Meet will be used for collecting qualitative data and then transferred to Microsoft excel for the next analysis.

D. Research Ethics

The researcher did ensure the animosity of the interviewee. The researcher did sign up a consent form with the interviewee. It will make sure that none of the data of anyone's interest will ever reveal. This has been done for ethical issues.

III. RESULTS

A. Data Collection and Analysis

The data was collected from the developers who are involved in making inappropriate apps and also from them who are refrain from making inappropriate apps. The data was collected via face to face offline interview using a phone recorder and online interview also using a call recorder. It took 2 and a half weeks to collect the data. For offline interviews, the researchers used a recorder and for the online interview, they used a call recorder.

In both ways, pen and paper were used to take the data from the interview record. For offline interviews, the researchers were asked to visit the place where the developers feel comfort to give the interview. The researchers provided an inform consent form to the developers, and only if the participants consented to the terms and condition that was given, the following step for data collection was completed.

Approximately 32 developers were approached by asking them if they were interested to participate in the interview. Of them, 11 developers agreed to participate. The data has been collected by face to face offline interview and online interview. The collected data was raw. The data was being written down in paper by hearing the interview record and also it was written in Microsoft word file.

The numerical data was in qualitative form, later it was converted into numerical data for quantitative data analysis [9, p. 245]. The data has been checked twice to detect garbage value and confusing data. The collected data was unprepared, and only by such data, the objectives and research question answer could not be achieved. For gaining the result, some analysis procedure was done by the researchers. For obtaining the research objectives such as the motive behind that are responsible for developing inappropriate apps and the social impact of these apps. After the analysis of the data, the results were interpreted by the visualization process such as the pie chart and graphs. In order to express the objectives and factors some Scatter plots and contingency tables would be helpful in demonstrating the result[9, p. 267]. Some tools for data preparation and analysis were used. "Microsoft Excel" and Rapid Table was used for data analysis.

B. Results

There was 11 interviewee who did participate in the interview process. From the result of the interview, 7 of them refrains from developing inappropriate apps and 4 of them develop inappropriate apps from certain ages of their life. From the 11 developers, 7 of them are freelancer developers and 4 of them work in different developing farms.

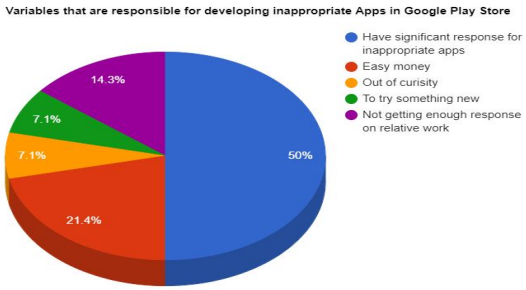


Fig. 1. Variables that are responsible for developing inappropriate apps in Google Play Store

Fig. 1 shows, 50% of the participant developers think having a huge amount of response for inappropriate apps is a reason for the developers who develop these apps. 21.4% of them think inappropriate apps bring easy money. “Out of curiosity” and “trying something new” both variables get the same percentage 7.1. 14.3% of them think after not getting enough and positive response on their other work may lead them towards making inappropriate apps. Figure 1 shows the prime motive behind developing inappropriate apps in Google Play Stores in recent years.

Table I Representation of social impact of inappropriate apps in Google Play Store

Social impact of inappropriate apps in Google Play Store	Mean	Standard Deviation
There is a significant impact on society	3.545455	1.726802
There is not any impact on society	2.726293	1.762793
Developers are responsible for the social impact	3.185828	1.695887
Some users are responsible for the consequence of the social impact	4.320636	0.642824
Inappropriate apps are a minor issue for social impact	2.545292	1.724879

Table I represents how inappropriate apps influence the social values and ethics. The 11 participants ranked in terms of the social impact of inappropriate apps between 1 to 5 and most of the developers profoundly acknowledged the fact that “Some users are responsible for the consequence of social impact”, “There is a significant impact on the society”. Maximum of them strongly agreed to the fact that to some extent users are responsible for developing inappropriate apps. There is a high demand for those apps which they cannot either ignore or denied. Also, a notable amount of developers thinks there is a significant impact on society and there are responsible for the consequence.

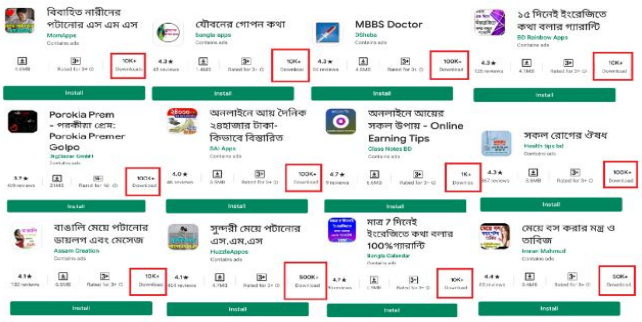


Fig. 2. High rate of downloads of inappropriate Bangla pps in Google Play Store

Fig. 2 shows the number of downloads of some inappropriate Bangla Apps in Google Play Stores. There are 500000+,100000+ downloads of these apps. The numbers are huge. The users are responsible to some extent for the increasing rate of the inappropriate apps in Google Play Store.

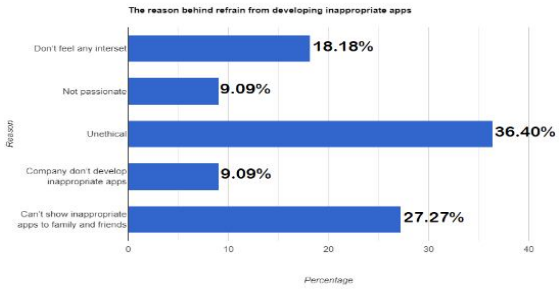


Fig. 3. Representation of the reason behind refrain from developing inappropriate apps

Fig. 3. represents the reasons why the developers who do not develop inappropriate apps are refraining themselves from developing inappropriate apps. 36.40% of them think it is unethical, 27.27% are ashamed of developing these apps 18.18% do not feel any interest in developing them and both 9.09% developers are not passionate and their company where they work don't develop these kinds of apps.

Table II Representation of correlation analysis of determinants with inappropriate app developers

	Correlation coefficient
Large users' group of inappropriate apps	0.034813
Anonymity of the developers	-0.58944
Out of curiosity of the developers	-0.48126
Ignorance of users of inappropriate apps	0.16132
Easy money from ads	0.88425
Less effort in developing inappropriate apps	0.645666

Table II represents the correlation analysis of determinants with inappropriate app developers. The determinants are the anonymity of the developers, large users' group of inappropriate apps, out of curiosity of the developers, ignorance of users of inappropriate apps, easy money from ads, less effort in developing inappropriate apps. From these determinants both anonymity of the developers and out of curiosity of the developers are negatively correlated.

Table III Representation of correlation analysis between the determinants

Correlation analysis between determinants	Correlation coefficient
The anonymity of the developers with making easy money from ads	-0.31355
Out of curiosity of the developers with less effort in developing inappropriate apps	0.079536
Less effort in developing inappropriate apps with easy money from ads	0.405733
Large users' group of inappropriate apps with ignorance	0.13202
The anonymity of the developers with less effort in developing inappropriate apps	-0.62222
Large users' group of inappropriate apps with easy money from ads	0.018519
The anonymity of the developers without curiosity	0.194745
Ignorance of users of inappropriate apps with easy money from ads	0.049507

In table III, shows that the correlation analysis between the determinants. If the value of the correlation coefficient is less than zero then they are negatively correlated to each other, if the value of the correlation coefficient is greater than zero then they are positively correlated and if the value is equal to zero then there is no relation to each other. The anonymity of the developers with less effort in developing inappropriate apps and anonymity of the developers with making easy money from ads is negatively correlated to each other. The rest of them are positively correlated.

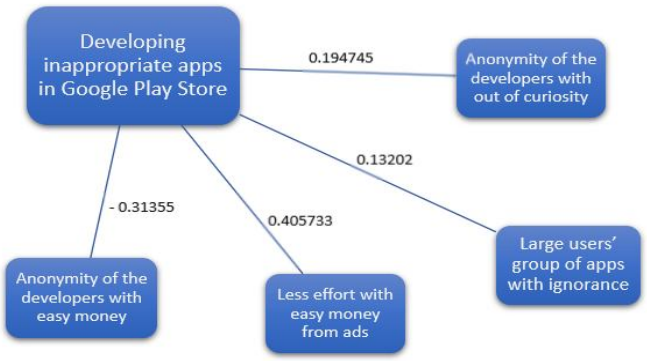


Fig. 4. Representation of the behavioral pattern of inappropriate apps in Google Play Store

Fig. 4 represents the behavioral pattern that explains the correlation between the determinants and the relation of these determinants with the main factor.

IV. DISCUSSION

The results from the research study show that most of the developers develop this kind of inappropriate apps in the play store as they get a significant response from the users for those apps. This is the most effective reason behind developing those apps which make easy money in quick succession. Though earning money was not only the point regarding this issue that the research study says. There were a few more reasons behind this to develop such kind of Apps in the play store. Some developers were passionate about this, some have no such knowledge about ethical issues regarding this apps, few of them do this out of curiosity, some of the developers eager to try something new, some have no care about this kind of things, there also a big amount of developer do this for not getting enough response from their relative work, etc. But among all of them earning money was the main focus to develop such kind of apps as they get a huge response from the users.

The research was not taken part in a bigger margin of people. Only a few App developers took part in the interview in our study some of them were inappropriate App developers and some of them were refrain themselves from developing inappropriate App. Tough it is not the right way to classify the developers as bad or good.

The inappropriate App developers give more priority on how the output comes rather than whether it is ethical or not to develop those apps from an engineering point of view. They do not care about the impact of those Apps on the society they are mostly concern about how they earn the outcomes building those apps.

On the other hand, the developers who are refrain from developing inappropriate Apps have mixed opinions. Most of the developers who are refrain from developing inappropriate Apps development take this as an unethical work to do that is why they do not develop this kind of Apps. Many of them have no interest in building such kind of Apps thinking about society, family, and friends, etc. Our study shows that few amounts of people either have no passion for building those Apps or they work under a company and their company does not develop those apps that are why they cannot develop these Apps out of their work.

From our research study along with the discussion with the developers through the interview, we have come to know that there is a huge social impact of these apps. Most of the App developers have agreed to the point of having the impact of those Apps on society. Though who is responsible for the impact of these apps either developers or the users are a long discussion for debate.

In a paper, they have explored that the increasing rate of smartphones and users have attracted a huge number of developers to develop various kind of apps for different platforms through the respective Apps market[10]. with the increasing rate of users, the Apps markets are also becoming populated with inappropriate Apps. Their study shows that about 35% of the Apps were removed which was very likely to be spam Apps. Although it could not resist the developers to develop such kind of Apps as there are no such law enforcement rules against building those Apps.

A. Future Work

The researchers need more data from the App developers for proceeding into future work. They worked with a limited number of developers in this study, but in the future, this study can be expended. They have the opportunity and proper field to work with not only Bangla inappropriate apps in Google Play Store but also English and other languages where researchers are fluent. Users experiences of inappropriate apps can be added in future study. How Google terms and policy conflict with inappropriate apps can also be added in the future study. The researchers can explore the increasing rate of inappropriate apps.

B. Conclusion

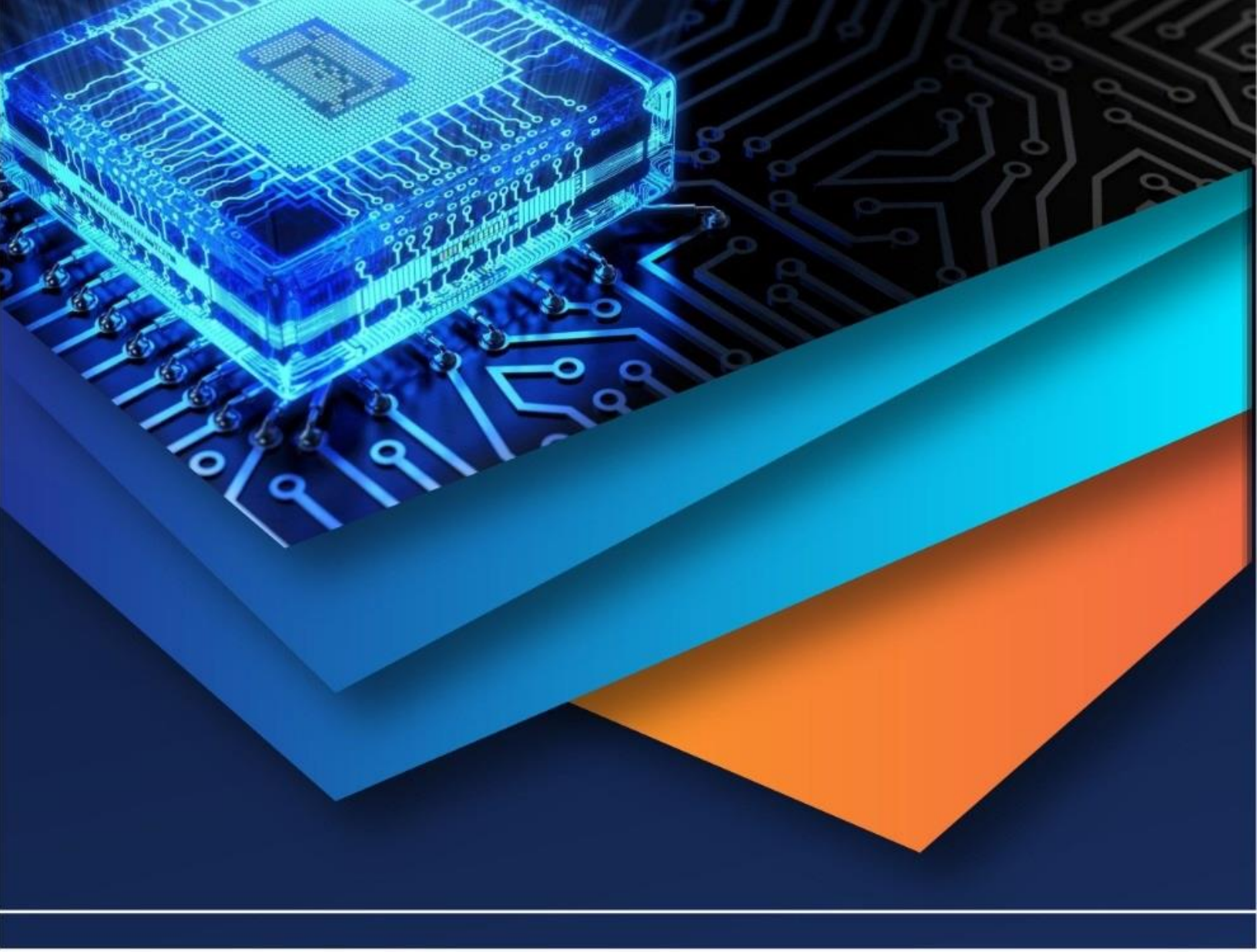
The research study shows that though there are some factors that are related to making the developers build inappropriate apps, the increasing number of mobile app users has influenced the developers to build inappropriate apps in the play store. Besides they are making more money by doing so. Both the users and the developers should realize that those inappropriate apps create a huge impact on society and it is unethical to build those apps or use it. Social awareness should be increased against this. But the measurement of the resulting model shows that it is quite tough to decrease the rate of building those apps as there is a high demand for those apps in the app market.

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