

Factors influencing people to later visit mobile app based on push notifications: A comparison between formats

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Abstract— As of 2015 India is the second largest smart phone market with a year on year growth of 23%. Currently there are 239 million smartphone users in India out of which 159 million use internet; with the urban population contributing to almost 71% of the number. With the growing number of smartphone users with internet there has been an increase in mobile applications (apps) and companies are trying to reach their potential customers through mobile apps. This study is concerned with identifying which format of push notification sent by the application will bring the app users back to the app and the factors that influence it. For this purpose, a questionnaire was created and a sample of 154 was considered from metro and non-metro cities. The data was analyzed using Binary Logistic Regression in Stata-13. The study revealed that factors like personalization, context, informativeness, entertainment value, credibility, trust and gender have different effect depending on the format used to convey the notification to the mobile app user.

Keywords— mobile notification; formats; personalization; trust; context; informativeness; entertainment; credibility; gender; India

I. INTRODUCTION

There has been study on how receiving push notification causes people to visit applications more often until it becomes a habit. However no similar study has looked into the importance of the format of the notification in the habit of visiting the application. This study looks in to various factors that prompts the app user to view the app after having received a notification and also compares it with three different formats of notification that individuals receive in their smart phones. The findings of the study show that personalization, context, informativeness, entertainment value, credibility and trust on the push notification received causes people to visit the app again but this however varies differently when information is given in different formats of push notification. The formats considered for this study are text, picture and notifications with call to action buttons, and the factors significant for individuals to visit the app later is different in different formats.

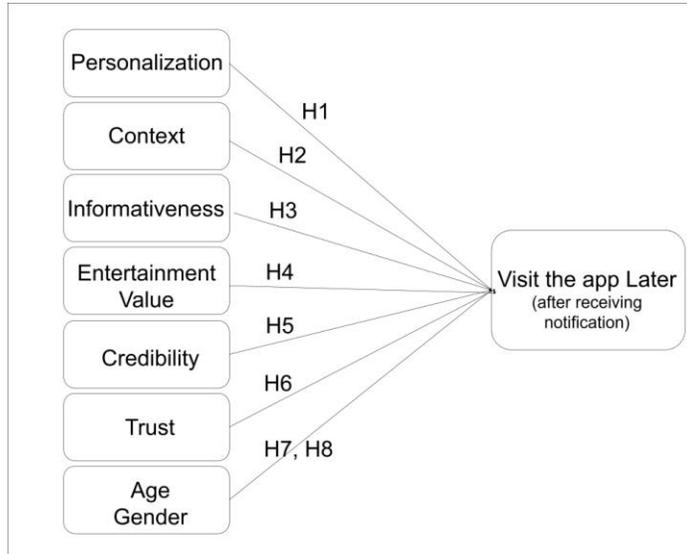
II. LITERATURE REVIEW

Mijung Kim in her study showed that push notification initiates application usage behavior, the usage of the app increases with the increase in the receipt of the notification.[1]. She also says that receiving notification develops a habit in people to visit the app often. Companies are also looking at push notification as a means to re-engage with their existing customers and bringing them to the app [2]. The concept of notification has been studied by authors before [3] [4], these studies along with studies on marketing and advertising bring out the factors such as personalization [5], context [3], informativeness [3], entertainment value, credibility, trust [6], age & gender and their interaction with behavior such as clicking on the notification or responding to a marketing message. There have been studies related to formats in areas of print advertisement, web advertisement. Their effectiveness and importance in dissemination of information has also been studied [7] [8]. However, there have not been sufficient study in the area of push notification and the effect of formats in the context of push notifications. Hence, we feel that the importance of format should also be looked at when it comes to a communication mode of push notification.

III. CONCEPTUAL MODEL AND HYPOTHESES DEVELOPMENT

After an extensive review of the literature in the concerned area, we developed the conceptual model to help understand which factors are considered important for individuals to later visit the app, having received a notification. We then compare it with different formats. The factors considered for this study include personalization of notification content, context of notification, informativeness of the notification, entertainment value, credibility of the notification, trust on the app sending the notification, age and gender differences.

FIGURE I: CONCEPTUAL MODEL



A. Personalization:

Barwise et al. (2002), in his paper points out the importance of personalization of the message content sent to recipients due to the personalized nature of the mobile phones [9]. In context of mobile marketing R. Rettie et al. points out that personalization of the message is an important factor for its effectiveness. [10]. Hence, we hypothesize that the greater the personalization of the message will prompt the individual to later visit the app sending the message.

H1: The greater the personalization of the push notification the more likely individuals will visit the app later

B. Context:

Notifications unlike a phone call or a personal encounter can be ignored, hence, context plays an important role for the content of the message being sent. The most commonly used contextual information used is time and location according to Huang [11]. Sahami also points out in their study that context in which the user received is important in deciding whether the notification is ignored [3].

H2: The better the context of the push notification the more likely individuals will visit the app later

C. Informativeness:

Mohammed in his paper points out that there is a relationship, though not direct, between informativeness and the behavior towards the content sent through SMS [12]. In the same paper, he points out the definition of informativeness given by Oh and Xu as “the ability to successfully give related information”

H3: The better the informativeness of the push notification the more likely individuals will visit the app later

D. Entertainment Value:

The paper by Hu (2006) points out that “a high degree of pleasure and involvement during interaction with computer-based media lead to positive affect and mood of the consumer” [13]. It is important that the message sent to people must be concise and funny. The same paper also points out that people generally have natural playfulness and its helps to incorporate element of entertainment in the message.

H4: The higher the entertainment value of the push notification the more likely individuals will visit the app later

E. Credibility:

With increased number of sources of information and being bombarded with digital information, it is possible the data that one receives online could be outdated, incomplete or even inaccurate [14]. The same paper also point out that credibility of the information in the website is important as in the digital medium the clear distinction between sponsored and unsponsored content is blurring. Credible source also reduces the time needed to take decision or action [15] In another study on smartphone application acceptance, credibility was considered to be an important factor for application usage.

H5: The higher the credibility of the app sending the push notification the more likely individuals will visit the app later

F. Trust:

A study by Zheng et al. says that trust plays an important role in application consumption and usage. They also point out that there is a close correlation between trust and use.

H6: The higher the trust on the app sending the push notification the more likely individuals will visit the app later

G. Age:

Studies have shown, time and again that the younger generation are more likely to adopt new technology. Even in a study by Rettie and his team showed that younger people showed greater acceptance towards mobile advertisements [10]. Another study also points out that when it comes to digital medium age is a key differentiating factor as younger consumers are more responsive [16]

H7: Younger people are more likely to visit the app later after receiving a push notification

H. Gender:

The role of gender and gender roles have been studied in other areas such as smart devices [17]. Another study points out that there have been links established between gender and mobile usage [18]. A study by Li shows us that gender does play a significant role in usage of technology such as computer.

H8: Men are more likely to visit the app later after receiving a push notification

IV. METHODOLOGY

A. Questionnaire Development and Measures

Data was collected from through a questionnaire with a sample representative from across India. The questionnaire was initially pre-tested with 10 respondents. Learning from the pre-test a modified version of the questionnaire was used to collect responses. The questionnaire tried to capture various factors that are used for analysis like personalization, context, informativeness, entertainment value, credibility, trust, age and gender from the respondents. These questions were taken from papers and modified to suit the topic of push notifications. All the items were measured using a 7 point Likert scale ranging from “Very Strongly Disagree” to “Very Strongly Agree”.

B. Data Description

A total Sample of 154 responses were collected for the purpose of this study. The data was collected from metro and non-metro cities and across age groups.

The below table describe the sample collected for this study.

TABLE I: DESCRIPTION OF SAMPLE

	Metro	Non-Metro	Total
Old (Above 24)	27	40	67
Young (24 and below)	37	50	87
Total	64	90	154

The data collection for the study was done between the months of January and March 2017.

C. Empirical Model

The below model was used to test the hypothesis

$$VAL = \beta_1 + \beta_2 PER + \beta_3 CON + \beta_4 INFO + \beta_5 CRED + \beta_6 ENT + \beta_7 TRU + \beta_8 AGE + \beta_9 GEN + U \quad (1)$$

Where,

VAL = Visit the App Later (after receiving a notification in a particular format)

PER = Personalization

CON = Context

INFO = Informativeness

ENT = Entertainment Value

CRED = Credibility

TRU = Trust

AGE = Age Group of Respondents

GEN = Gender

U = Error term

The model was estimated using **binary logistic regression**. This was preferred as the question on later visit to app had a binary response of “Yes” or “No” The binary logistic regression was performed using Stata Software. The results of binary logistic regression are given in the following Tables.

V. RESULTS AND DISCUSSION

The logistic regression for this study was carried out using Stata-13. The results we see tells us that the factors that are considered important to visit the app by the app user are different when the information is provided through different formats of notification.

TABLE II: RESULTS OF THE REGRESSION MODEL TEXT FORMAT

Independent Variable	OR	Coefficient	P-Value
Personalization	0.869	0.661	0.316
Context	1.168	0.891	0.259
Informativeness	1.330	0.949*	0.097
Entertainment Value	0.889	0.683	0.386
Credibility	1.445	1.051**	0.023
Trust	0.919	0.732	0.466
Age	1.332	0.620	0.462
Gender	1.340	0.630	0.447

Note: *, **, *** imply significance at the 10%, 5% and 1% level respectively

TABLE III: RESULTS OF THE REGRESSION MODEL PICTURE FORMAT

Independent Variable	OR	Coefficient	P-Value
Personalization	0.920	0.715	0.517
Context	1.248	0.965*	0.090
Informativeness	1.195	0.873	0.265
Entertainment Value	1.027	0.806	0.824
Credibility	1.035	0.768	0.818
Trust	0.943	0.761	0.592
Age	0.725	0.351	0.385
Gender	0.935	0.462	0.854

Note: *, **, *** imply significance at the 10%, 5% and 1% level respectively

TABLE IV: RESULTS OF THE REGRESSION MODEL ACTION BUTTON FORMAT

Independent Variable	OR	Coefficient	P-Value
Personalization	1.375	1.063**	0.015
Context	0.962	0.744	0.769
Informativeness	1.230	0.900	0.193
Entertainment Value	1.281	1.000**	0.049
Credibility	1.051	0.785	0.735
Trust	0.803	0.642*	0.055
Age	0.794	0.391	0.525
Gender	2.162	1.070*	0.032

Note: *, **, *** imply significance at the 10%, 5% and 1% level respectively

- a) In case of notifications send through text format the two significant factors are the informativeness of the notification sent and credibility of the app sending the notification. The results in the above table show us that the higher the informativeness of the notification presented in a text format the app user is 33% likelier to visit the app later. And with greater credibility of the app sending the notification in text format, the user is 44% likely to visit the app later
- b) With the next format shown in the table, i.e. the picture format of notification, only one factor out of eight showed as significant and that is the context. The results in the table show us that when the context of the notification is better there is 24% higher chances for the user to visit the app later.
- c) In the third format, i.e. the format with a call to action button there are four factors that are significant for an individual to visit the app later; namely the amount of personalization, the entertainment value, trust in the app sending the message and the gender of the user. The findings in the table shows us that when a push notification is personalized in the action button format the individual is 37% likely to visit the app later. Similarly, higher the level of entertainment value of a notification the 28 % likely to visit the app later. Trust in the app has surfaced as signification for users to take action of visiting the app later when the notification comes with a call to action button. Gender is significant only in the action button format in comparison with the other two formats with males 1.16 times likely to visit the app later having received a notification with a call to action.

VI. CONCLUSION

The aim of this study was to examine factors that may cause individuals to visit the app having received a notification from them. These factors are compared between three different

formats, i.e. text format, picture format, call to action (action button) format. On comparison, we discovered that when the notification is send through different formats the factors that prompt an individual to visit the app later are different. Informativeness and credibility being important for the text format; where as in picture format context being important; not to mention in a notification with a call to action button various factors such as personalization, entertainment value of the notification, the trust in the app sending the notification and the gender plays an important role.

VII. LIMITATIONS AND FUTURE RESEARCH

The study has a few limitations, as the act of visiting the app later were asked in the questionnaire and not by actually counting the number of instances they returned to the app after notifications of a particular format and message, there may be recollection error by the individuals who have filled up the questionnaire. Also, the study looks as applications in general and not any specific category of app, the results may vary when we look at category specific notifications and formats of notification. Also, the sample size in another limitation, as for this study we have considered only a sample of 154 respondents. Since it's a small sample size the results may not hold same for the population. The same study can be taken up for futures study, giving special attention to how individual would react to the notifications in different formats from a particular category.

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