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FREE TO PAID: PURCHASE AND DROPOUT BEHAVIOR OF MOBILE APPLICATION USERS

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Abstract

Since mobile application market was open, developers have been seeking for strategies to maximize their profit. However, there is little research on user behavior of mobile applications for its short history. In this study, we conducted an exploratory study on mobile application users with actual usage data of Weather On. The result indicates positive relation between the premium conversion rate and the logarithm of the market wealth. It is observed that most of the users take only a short time to make a purchase or dropout decisions. Also, we suggest that push message can induce user responses in a positive or negative way.

Keywords: Mobile application, User behaviour, Purchase behaviour, Actual usage data

1 INTRODUCTION

In July 2008, Apple introduced an open market for mobile applications, or App Store. Shortly after Apple's successful introduction of the mobile application market, Google announced another platform to distribute mobile applications, which now is called Google Play. Since these new players opened the mobile application market, the mobile industry has experienced significant structural changes. Previously, development and distribution of mobile applications was mostly controlled by the mobile network operators. However, the mobile application markets such as App Store and Google Play have transferred the controlling power to mobile operating system (OS) providers. Currently, Google and Apple collectively account for 86.3% of the mobile OS market (Gartner, 2012b).

Mobile application market has made a remarkable growth in recent years. The open innovation strategy of the leading OS providers attracted many developers to the mobile application market. Both Google and Apple share 70% of the application sales revenue with developers (Apple, 2013b; Google, 2013), and the revenue sharing policy motivated many developers to dive into the market. There are 800,000 applications in App Store (Apple, 2013a) and 700,000 applications in Google Play (Womack, 2012). As mobile devices sales are predicted to increase, the mobile application market is also expected to continue to grow.

Since mobile application market was open, developers have been seeking for strategies to maximize their profit. The simplest strategy to monetize applications is to sell them to users. However, there are only a portion of applications which succeeded to make profit through sales. According to Gartner (Gartner, 2012a), in 2012, only 11% of all applications were paid for, and the other 89% of applications were downloaded for free. Freemium strategy, in which applications are offered for free and complementary goods or services are sold at a price, can help developers monetize free applications. For a free application, the mental barrier of users to download and use the application is reduced drastically, for time investment usually is not accounted as cost (Soman, 2001). Once, users install and use the free application, they know for sure whether or not the application is worth buying.

In order to get the most profit out of the mobile market, it is essential for developers to understand purchase behaviour of mobile application users. For a general perspective, studies on information systems and consumer behaviour on the Internet can be referred to. However, the usage context of mobile devices is different from traditional digital devices, so user behaviour is also expected to change. Currently, there are only a few studies on mobile application usage, and empirical research is hardly found.

In this study, we aimed to examine mobile application user behaviour by analysing actual usage data of an iPhone application. We start by reviewing prior studies to clarify characteristics of mobile applications. Analysis of the actual usage data may complement other empirical studies with survey method. We make a few suggestions for mobile application developers.

2 THEORETICAL BACKGROUND

Apple's iPhone and App Store has lead innovative changes in creating, distributing and selling mobile applications (Ahmet & Holmquist, 2010). Apple has developed an innovative device, platform, and marketplace. These technologies and the market have been not only providing new business opportunities for software developers, but also encouraging ordinary citizens to feel interest in application development (Voas, Michael, & van Genuchten, 2012). In order to satisfy consumer's demand, application developers provide various contents from hedonic to functional and from free to premium applications on the mobile application market. However, the mobile application market is different from the traditional market in device characteristics and user behaviour. In order to achieve

success in a new market, developers should be armed with a deep understanding of the market and ready for a customer-focused action (Roberts, 2000).

The mobile application markets such as App Store, Google Play and Ovi Store are a typical two-sided market. At one side, developers provide applications, and at the other side, users consume the applications. In the two-sided market, there exists cross-side network effect that positive or negative change of one side induces a similar effect on the other side (Holzer & Ondrus, 2011). Thus, one side largely depends on the other side, and the market value grows with matching both provider and consumer's demand (Eisenmann, Parker, & Van Alstyne, 2006). In terms of App Store, quality and quantity of mobile applications attracts consumers, and an increase in the number of consumers gives more opportunities to developers. This positive feedback loop leads the growth of the market and delivers various values (e.g. increasing returns and application quality and variety) to stakeholders.

Mobile applications are information goods. Information goods are something that can be digitized (e.g. a book, a movie, and music). In general, they are also experience goods - a product that cannot be evaluated before purchasing (Varian & Ginkō, 1999). Computer software is one type of information goods (Liebeskind & Rumelt, 1989). In case of mobile applications, however, they are different from general information goods in that there are many reviews about mobile applications on the Internet, and thus users can make indirect evaluations without using them. For example, App Store provides much information about the products (e.g. screen shots, user evaluations, and feedbacks) before purchasing. Mobile applications are also considered to accompany a low purchase involvement as most of the premium applications cost less than 3 dollars each (Gartner, 2012a). However, there are also consumers who spend their time searching and comparing the products in-store and out-store. In addition, consumers can easily find free applications with limited features, and it often takes a long time for some of them to decide to make a purchase. Accordingly, it is still early to conclude that mobile applications accompany low purchase involvement.

Application providers have always had the challenges of attracting consumer and maximizing their profits. As consumers tend to expect the free or the cheap price for applications, they utilizes various pricing approaches: (1) free, (2) freemium, (3) pay-per-app download (4) pay-per-app issue/edition download, (5) in-application subscription, (6) out-of-application activation, (7) out-of-app payment (Ford, 2012). Among the various monetizing options, the most straightforward way is to charge the price of application. Advertising is also one way for free applications. On the other hand, in case of freemium applications, providers should choose more detailed options. They can employ between time-limited freemium (TLF) and feature-limited freemium (FLF) with in-app billing mechanisms (Cortimiglia, Ghezzi, & Renga, 2011). Apart from pricing strategy, providers should consider various marketing activities to be exposed to as many users as possible.

In summary, App Store plays an important mediating role in the ecosystem, and applications have various interesting features. There are also various strategic options for providers. Many theoretical and practical resources help researcher to investigate these issues, and discussions are becoming active. However, studies on user behaviour in the mobile application market are rare while understanding about the users and the market is becoming increasingly important. In addition, there are few empirical studies about the topic. Thus, we aimed to examine user behaviour in the mobile application market as an exploratory study.

3 MATERIALS AND METHOD

To investigate user behaviour of mobile applications, usage data collected in a mobile application, Weather On, was analysed.

Weather-related applications form a distinct category in App Store and Google Play. Weather On is one of the weather-forecasting applications run on iPhone. The application is differentiated from other weather applications in that it seeks to provide as much information as possible with a sleek interface.

Figure 1 shows the screenshots of the application. It has been distributed on App Store since September, 2012, and has been downloaded over 180,000 times as of February, 2013.

Weather On utilizes mixed freemium strategy, in which some premium features are provided fully for a limited time (TLF) and the other premium features are restricted for free users (FLF). In the free version of the application, an advertisement is placed, a background image cannot be altered, and only one location can be registered for weather forecast. In addition, push notification service, which sends a message reporting weather forecast at a specified time, is offered only for fifteen days. In the premium version, the advertisement is removed, the background image changes automatically in accordance with the weather condition, up to three locations can be registered for the weather report, and push notification service is offered without limitation.

3.1 Weather On



Figure 1. *Weather On. An advertisement is placed in the free version of the application. Advertisement is removed in the premium version. Weather On displays a lot of data in the screen.*

In order to persuade users to purchase Weather On, the application sends a message to free users on each of their twenty first and fifty first day from the first installation. Weather On offers a 50% discount for those who receive the message. The content of the messages on the twenty first day is “Weather On Premium is 50% off until tomorrow. For discount, you should open the app through tapping or sliding this message.” On the fifty first day, the content of the message is “Premium 50% off until tomorrow. (Your last chance) For discount, you should open the app through tapping or sliding this message.”

3.2 Data collection

In order to operate a weather forecasting service, Weather On collects data from users. For example, when a user requests a weather report, configures settings, or makes a purchase, the events are recorded on the Weather On server. The collected data were provided for academic analysis. In order to avoid invasion of privacy, the data were delivered anonymized. The data were collected from November fourth, 2012 to January eighteenth, 2013. During the period, more than two million activities were recorded for 116,098 users.

The data were organized for analysis through a series of cleansing processes. First, the records which missed a device identifier were removed. Second, the users who cannot be attributed to a specific country were also removed. Finally, the users who installed the application before the period were excluded from the data, because it was impossible to know when they downloaded and purchased the

application. Throughout the process, 18,700 users were excluded from the data, and finally 93,459 users were left to be analysed.

3.3 Analysis

The application usage records with the same device identifier were aggregated to represent the behavioural characteristics of the device owner. With the aggregated data, the application usage frequency, the point of purchase and the point of dropout, the effect of push message, and the premium conversion rate by country were analysed. The statistical analysis was conducted using the R program.

Premium conversion rate by country: Even though border lines are becoming faint in the online economy, geographic market segmentation is still effective as socio-economic environments vary across regional boundaries. For many developers, it is worth pondering the choice between domestic market and foreign market. Especially for developers in under-developed and developing countries, the foreign market such as North America and Western Europe may seem more profitable than their domestic market. In this study, the relation between the premium conversion rate and the economic wealth of the market was tested using log linear model.

Point of purchase and point of dropout: It is critical for developers to know when users purchase or stop using the application. Before the point of purchase, they should identify potential premium users and persuade them to purchase. Also, in order to retain users, developers should know when they drop out of the application.

Effect of push message: As stated above, Weather On sends a message to free users to persuade them to purchase the application on the twenty first day and the fifty first day from the first use. From the time users receive the message, they can purchase the premium features at a discounted price till the next day. The message will remind the users of the application, and users will respond to the message in a positive or negative way. To the users who felt the application was useful, it may be a good time to purchase, but the message may bother those who do not use the application frequently.

4 RESULTS

4.1 Premium conversion rate by country

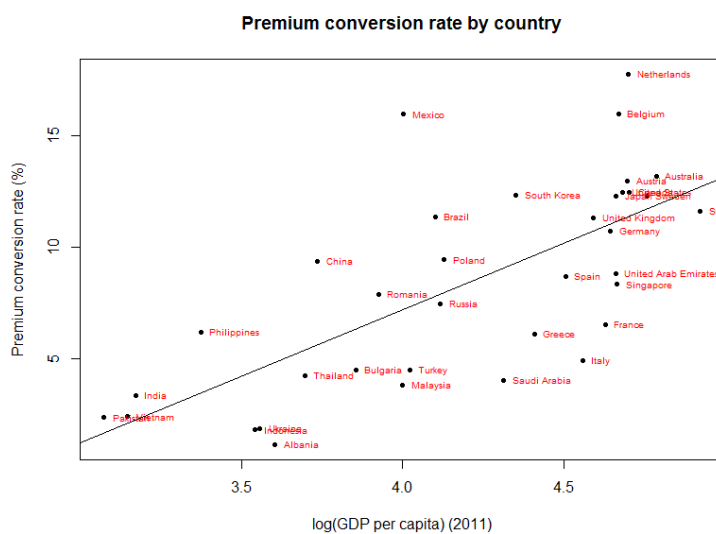


Figure 2. Premium conversion rate by country. 36 countries with more than 100 users were analysed. ($y = -16.648 + 5.962 \cdot \log(x)$; $R^2 = 0.4997$; $p < 0.0001$)

Figure 2 shows the relation between the economic wealth and the premium conversion rate of the market. The economic wealth of the market was measured as the 2011 GDP per capita. The plot illustrates a positive log linear relation. The regression analysis indicates that 10 times increase in GDP per capita was associated with an increase of 5.962% conversion rate. The range in GDP per capita between countries was about 2.

4.2 Purchase and dropout

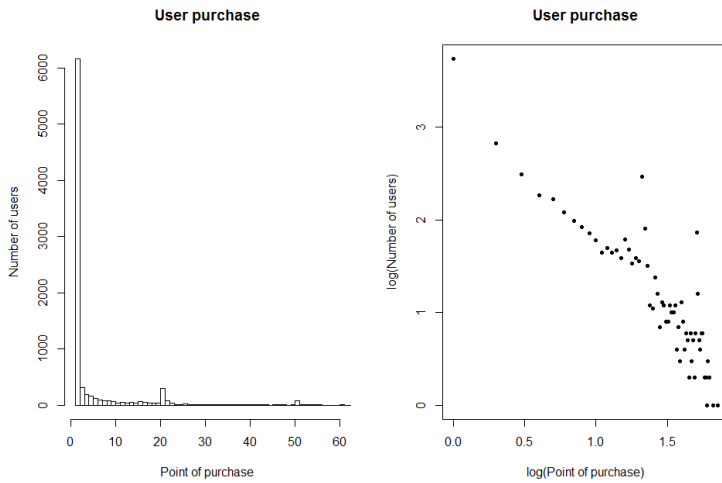


Figure 3. Point of purchase. Most purchase decisions are made on the first day of using the application. 64.8% of the premium users paid for the application on the first day.

Figure 3 illustrates the days taken to purchase the premium features from the first day of installation. It took more than sixty days for some users to pay for the application, but most purchase decisions were made in early days of using it. During the analyzed period, 8,456 users purchased the premium features, and 5,481 users (64.8% of the premium users) made the purchase on the first day of using the application. Those who made a purchase on the first day used the application up to three times, but most premium users (4,010 users, or 47.4% of the premium users) decide to purchase the application after using it only once.

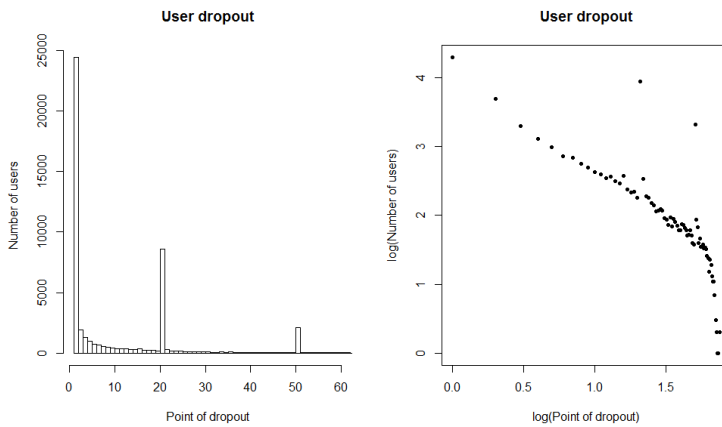


Figure 4. Point of dropout. Most dropout decisions are made on the first day of using the application. 40.3% of the users stopped using the application on the first day.

Figure 4 shows the days taken to stop using the application from the first day of installation. Similar to the purchase pattern, most dropout decisions were made in early days of using the application. During the analyzed period, 48,527 users decided not to use the application, and 19,556 users (40.3% of the dropout users) removed the application on the first day. All of the users who stopped using the application on the first day made the decision after using it only once.

4.3 Effect of a push message

The push message is sent to free users on the twenty first day and the fifty first day from the first use in order to persuade them to pay for the application. Those who receive the message can purchase the premium features at a 50% discounted price till the next day.

The push message seems to affect the purchase behaviour because premium users increased suddenly on the day users receive the message. On the twenty first day, purchases increased to 296, and it is roughly 800% incline from the previous day. In addition, on the fifty first day, purchases increased to 73, and it is about 1200% incline from the previous day. However, it also appears that the push message drove far more users out of the application. On the twenty first day, dropouts increased to 8,599, and it is 4,700% incline from the previous day. It is also 17.7% of all dropouts during the period. On the fifty first day, 2,095 users dropped out, and it is about 5,500% incline. More than 20% of all dropout decisions were made on the day users received the push message.

5 DISCUSSION

5.1 Implications

Our study analysed actual usage data of Weather On, a mobile weather-forecasting application, to clarify purchase behaviour of mobile application users. We have found that the premium conversion rate in the market was positively associated with the logarithm of economic wealth of the market. In addition, mobile application users make purchase or dropout decisions very quickly. Also, many users appeared to respond to push message in a positive or negative way.

One of the most remarkable observations in our study was that users had spent only a short time before they made a purchase decision. For most of the premium users, it took less than a day to purchase the application. Even though the free version of the application offered most of the essential features and the users could take more time to evaluate the free version, they made a purchase after using it only a few times. Similarly, the users were also quick to drop out. It seems that users make a decision of purchase or dropout at a glance. According to the analysis, when a user first uses the application, the mobile application has 9% chance of acquiring the premium user. However, the chance drops to 3.2% if it fails to persuade the user to pay on the first day.

In our study, the effect of the push message was also illustrated. It appeared that the push message motivated users to purchase on one hand. On the other hand, it made inactive users to leave. Developers should be careful to send messages to users if they do not want to lose users even though the users are inactive. The content of the message is likely to have different effect on user responses, so it should be chosen considering the cultural characteristics of the market. For example, people in a culture which values conformity and group membership over achievement and individualism are likely to be affected more by emotional than rational messages (Albers-Miller & Stafford, 1999).

We have shown that the association between the premium conversion rate and the economic wealth. It is reasonable that the economic wealth of a market is associated with the purchase behaviour. For researchers who want to analyse mobile application market, our research result may help the economics analysis of the market.

5.2 Limitations and further issues

There are some limitations in our study. The data analysed in this study were collected by a weather-forecasting application, but there are many other categories of mobile applications such as books, games, business applications and educational applications. Accordingly, the results of the study can represent the behaviour of only those who are using weather-related applications, and cannot be generalized for all mobile application users. By analysing mobile applications from other categories, deeper understanding of the mobile application users can be established.

There are several issues that should be addressed in the further study. In our study, the effect of the push message was illustrated, but more detailed study should be conducted to help developers build strategies exploiting push messages. In our study, it was not identified whether the effect was brought by discounted price or the message itself. In the further study, the effect of price incentive and the effect of the message contents should be studied separately. In addition, the premium features of the application included advertisement removal, alternative background images, extra locations and push notification service. If we can identify the marginal benefits from each of the additional features, developers will be able to assign limited time and efforts more efficiently by focusing on the features which confer more benefits to users.

Our research is one of the early studies on purchase behaviour of mobile application users. There are few empirical studies on user behaviour of mobile applications, for the history of the mobile applications is short. We hope that our study can stimulate further study on the mobile application market and user behaviour.

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