

A CASE STUDY IN THE APPLICATION MARKET: BEHAVIOR OF PLAY STORE CUSTOMERS

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Abstract

Google is one of the key players in the mobile market. With its mobile operating system, which is called as android, many of the cell phone manufacturers have been sold billions of products to the mobile device market customers. One of the key embedded applications in the Google's Android operating system is the Play Store. Play Store is a program for the users of the mobile devices that gives opportunities to the customers download application from its rich application content. With a customer's Google account, millions of applications have been ready to be downloaded to these mobile devices. In the Play Store, these applications are categorized under twenty-eight different categorizes based on a simple tagging mechanism. In each category, applications are listed in three top lists, Top Paid list for the applications with the price tags; Top Free applications without price tags, however users could charge with the application's run time buying mechanism; and Top Grossing, the applications listed based on revenues. Based on the county of origin of the customer's Google Accounts, the market application content is changing. In this study, the main purpose is to see the connection between the environmental changes, such as starting of education semester in the schools and universities, migrant's actions, exams that are coordinated by higher education authorizes etc... in a specific county application market. In this study by using an Android based cell phone the monthly changes in these top lists have been investigated by looking at only the top 10 of the applications. The changes in these top 10 applications discussed with looking the possible environmental factor changes. This study is focused on the Turkish market in the period of July 2015 and November 2015. This four-month period also reflects the Turkish Google's Play Store market behaviour after the June 7th and October 31st 2015 Turkish parliamentary elections.

Keywords: Application Market, Google Play Store, Top 10 Applications

1. INTRODUCTION

Mobile devices such as smart phones and tablets are important tools with the capability of being online 7/24 in the Internet. These devices can run hundreds of millions of different applications. Downloading most popular applications has become an important fashion for the owners of these device users. The applications become indicator of customers' behaviours to reflect changes in the environment effects such as two Turkish parliament elections in June and October, Syrian refugee crises... Also there are different application markets for the users of the mobile devices. However, to be able to show this indicator, first of all, the application market needs to be decided by looking at the related statistical data. The reason for selecting Google Application Market will be given in this part. From this perspective, in this study the current digital

application market will be discussed after this introduction part. Even deciding the application market is an important step, the method and scope of this study also need to be defined. For this reason after Digital Market part, this requirement will be answered. The results of the study will be presented before the final section. At the end of this study, the conclusion and future of the study will be discussed.

2. DIGITAL APPLICATION MARKETS

June 27 2007 is an important date for the smart mobile devices. On that day, first generations of the Apple iPhone was presented with the iOS operating system. Google was one the first company to answer this new market competition by introducing Android beta version of operating systems for the rest of phones did not built by the Apple on November 2007. Not only these firms Operating Systems but also the application market software embedded within these Operating Systems are the harbingers of a new generation of the change. Today, Google Play Store by Google and App Store by Apple are best known application markets on the mobile devices.

There are other alternatives for the smart mobile device operating systems. Microsoft, Blackberry, Nokia and other firms have their own Operating Systems and related application market software. Based on the statistics published by Statista (2015, July), Android based systems are leader on the current market with 64.8% share. The other devices could be visualized as in Figure 1.

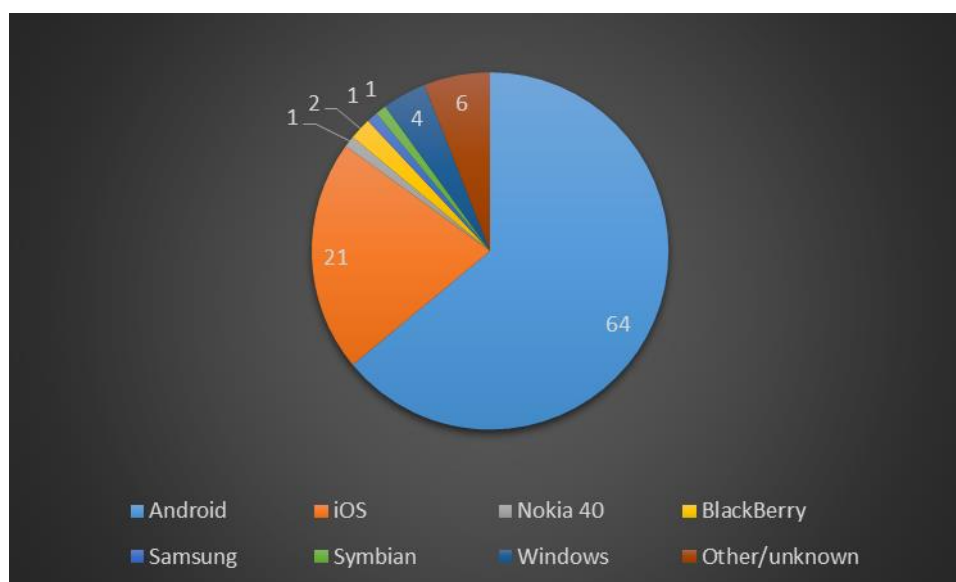


Fig. 1. Global distribution of mobile operating systems, July 2015.

With its more than 1 600 000 (Statista 2, July 2015) application numbers, Google Play store represents more than 60% of the global population. Based on the data collected from the Google Play store, in the next section, the method followed in this study and scope will be presented.

3. METHOD AND SCOPE

In this study, the period between June 2015 and November 2015 had been taken. Under Google Play store, there is not any known API for sharing application statistics. For this reason, the study is only focused on the changes in the Top 10 application lists of the categories. In this period, 28 categories of applications' data shared by the Google Play Store mobile phone interface. Under each 28 categories, except family, applications were grouped under three sub-categories, Top Price, Top Free and Top Grossing. The Top Price sub-category was named as Google Top Price (GTP), the Top Free sub-category was named as Google Top Free (GTF) and the Top Grossing sub-category was named as Google Top Grossing (GTG) for collecting data from the given interface. The GTP is related with the top application downloads from the applications with price tags, the GTF is related with the top application downloads from the applications without price tags, and GTG is related with the application that brings revenue from the GTP and GTF applications. Under the 28 main categories, there were other sub-categories available, however they did not included under the scope of this study. Under Family category, the GTG sub-category have not been activated in the period of data collection for this reason GTG of family category was not included under the scope of the study.

In Google Play Store, to be able to purchase and download an application, google account is a prerequisite for the users. The content and the statistics reflected on specific to the region of the account and the connected IP is belonged to. For this reason the data was collected with a Turkish Google Account by connecting directly a smart phone registered in Turkey. However, if the applications are open for the specific region in the world that is possible to download by the Turkish account. The data was collected in each month's last ten days.

Two ratios were identified to compare previous months, Keeping Positions Ratio (KPR) and New Applications Ratio (NAR). KPR was calculated by dividing the number of application keep their rank in top 10 with compare to the previous month list by 10. The results are in between 0 to 1. If KPR is close the 1, this will show the stability of the category and sub-category that show the applications ability keep their position in Top 10 list. However if KPR is close to the 0, this will show the categories dynamism in updating the applications in the top 10 list. To show changes in each category and subcategory, the average of the months KPR was taken. NAR value calculation is also similar to the calculation of KPR. In NAR, calculation is made by dividing the number of application new in in top 10 with compare to the previous month list by 10. The results are in between 0 to 1. If KPR is close the 1, this will show the dynamism of the category and sub-category that show the applications changes in Top 10 list. This shows the domination of the new applications in the given categories' sub category. However if KPR is close to the 0, this will show the categories stability in updating the applications in the top 10 list. The results are given in the next section.

4. RESULTS

The results are investigated based on KPR and NAR values average calculation.

4.1. KPR Values

The high average KPR values show the stability in the given category and the low values show dynamic structure on the given category. To be able see changes and estimate reasons on changes in these categories, the low values are important. The KPR values are given under GTP, GTF and GTG subcategories. For 28 categories and the results summarized in Figure 2.

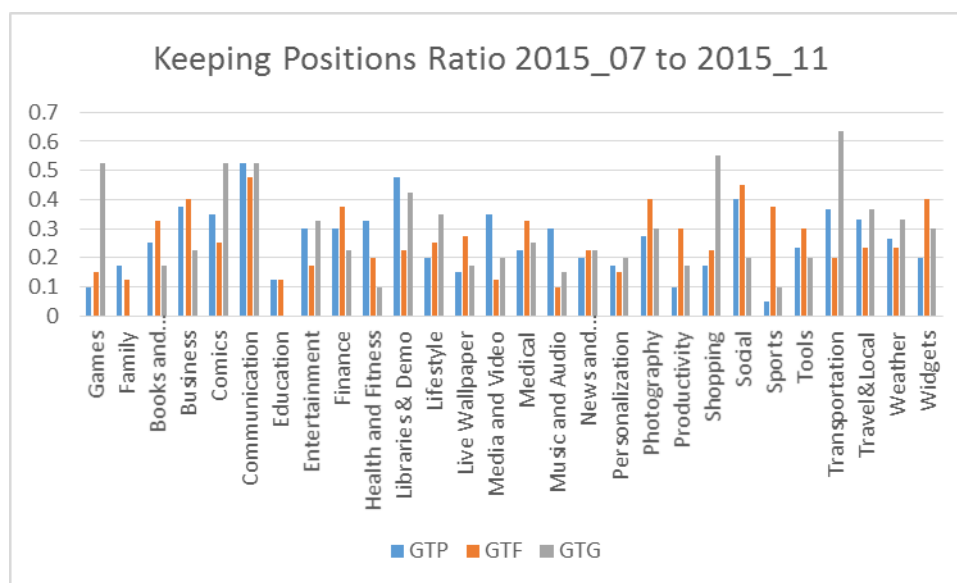


Fig. 2. Average KPR between July 2015 and November 2015.

Under each category, the results are collected as follows;

4.1.1 GTP

Based on GTP values, with the 0.525 KPR value, the communication category has the highest value. This shows that, in Top 10 applications, the positions of the applications remain most stable under communication category. When the category detailed examined, from July to August 2015, ranked 1st, 4th, 5th, 6th and 7th applications kept their positions. From August to September, the ranked 1st, 2nd, 3rd, 4th and 6th applications were kept their positions. From September to October, 1st, 2nd, 3rd, 7th and 8th and from October to November, 1st, 2nd, 3rd, 4th and 5th kept their current positions.

The lowest KPR value is spotted under Sports category with the value of 0.05. This shows that, under the GTP category, Sport is the highest changes between all the remaining 27 categories. The category results shows that, only from July to August 2015, 1 ranked and from August to September 2015 2nd ranked applications remained in the same place. For the other months, KPR value is 0.

4.1.2 GTF

Based on GTF values, with the 0.475 KPR value, similar to GTP, Communication category has the highest value. This shows that, in Top 10 applications, the positions of the applications remain most stable under communication category. The detailed category examination shows that, from July to August 2015 1st, 2nd, 3rd and 4th ranked applications; from August to September 2015 same ranks; from September to October 2015; 5th ranked edition to the first four and from October to November 2015, ranked 8th added as to sixth application into the previous five application list.

Under Top 10 Free applications, with the 0.01 KPR value, Music and Audio is the most dynamic category. From July to August 2015 1st and 2nd, from August to September 2015 none; from September to October 2015 only 7th; and from October to November 2015 6th applications kept their places.

4.1.3 GTG

Based on GTG values, with the 0.63 KPR value, Transportation category has the highest values. This shows that, in Top 10 applications, the positions of the applications remain most stable under Transportation category. The detailed category examination shows that, from July to August 2015 1st, 2nd, 3rd, 4th, 9th and 10th, from August to September 2015 3rd, 4th, 6th and 9th; from September 2015 to October 2015 1st, 2nd, 3rd, 6th, 7th, 8th and 10th; and from October to November 2015, 1st, 2nd, 3rd, 4th, 5th, 8th, 9th and 10th applications remained same rank.

Under GTG applications education KPR value is zero, which means there is not any applications kept its previous positions.

4.1.4 KPR result evaluation

KPR values shows the position change in the top 10 list. Under this part, especially GTG education category shows that changes in Education. Starting with new 2015-2016 educating semester, education and OSYM exam related application started to appear. However it does not give new applications on the top 10 lists comparing with the previous month. To be able to see that, NAR values evaluation is required.

Table 1. Average highest and lowest KPR values in GTP, GTF and GTG with categories.

Average KPR Values	Highest Value, Category	Lowest Value, Category
GTP	0.525, Communication	0.05, Sports
GTF	0.475, Communication	0.01, Music and Audio
GTG	0.63, Transportation	0, Education

4.2. NAR Values

The high NAR values show the new comers to the Top 10 applications in the given category and the high values show dynamic structure on the given category. To be able see changes and estimate reasons on changes in these categories, the high values are important. The KPR values are given under GTP, GTF and GTG subcategories. For 28 categories, the results summarized in Figure 3.

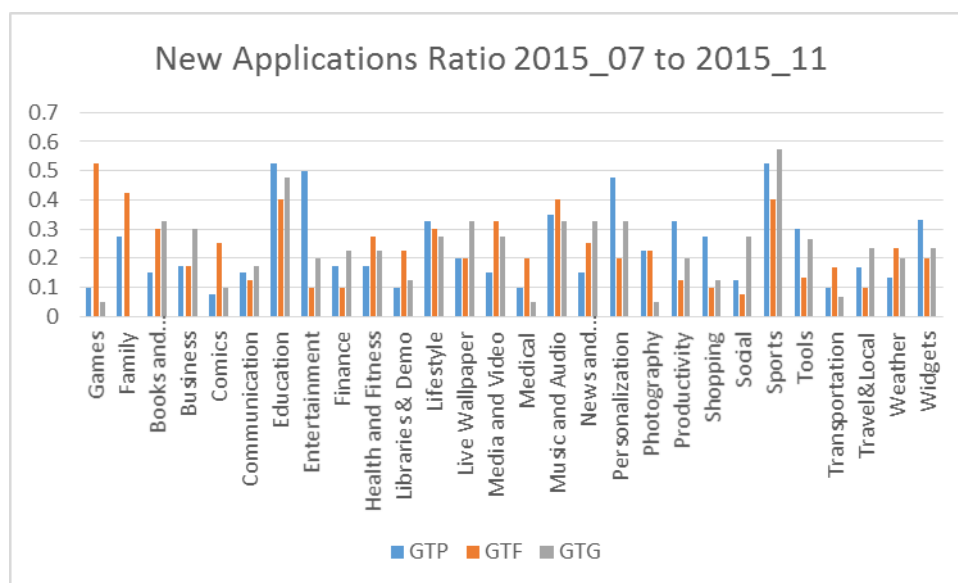


Fig. 3. Average NAR between July 2015 and November 2015

4.2.1 GTP

Based on GTP values, with the 0.525 NAR value, the education and the sport categories have the highest value. This shows that, in Top 10 applications, the positions of the applications remain most dynamic under education and sport categories. When the Education category detailed examined from July to August 2015, 1st, 6th, 7th, 8th, 9th and 10th applications are new comers to the Education. From August to September, 1st, 3rd, and 7th applications; from September to October 2015, 1st, 2nd, 3rd, 4th, 5th, 7th, 8th from October to November, 1,2,3,4 and 5 kept their current positions. The sport category results are; from July to August 2015 2nd, 3rd, 4th, 8th, 9th and 10th ranked; from August to September 2015 1st, 3rd, 4th, 5th, 6th, 9th and 10th; from September to October 2015 2nd, 3rd, 6th, 8th and 10th and from October to November 2015 6th, 8th and 9th applications ranked in the top 10 list. In here the sport results is parallel with the KPR ratio.

The lowest value was identified for the Comics category with the 0.075 NAR value. Only changed detected from July to August 2015 with two applications (8th and 9th) and September to October 2015 with two applications (4th and 9th).

4.2.2 GTF

Based on GTF values, with 0.525 the games category has the highest value. From July to August 2015, 4th, 5th, 7th and 10th applications; from August to September 2015 2nd, 4th, 6th, 7th and 8th applications, from September to October 2015 1st, 2nd, 4th, 5th, 6th, 7th and 10th applications, from October to November 2015 1st, 2nd, 5th, 7th and 10th applications were ranked in the top 10 list.

With 0.075 value, the social category has the lowest value in the GTF category. Only 3 of the 4 periods the 10th application's rank changed.

4.2.3 GTG

Parallel with the result of GTP, with the value 0.525 Sport has the highest value in the top 10 list. From July to August 2015, 1st, 5th and 9th applications; from August to September 2015 ranks of the all applications changed; from September to October 2015, 4th, 5th, 6th, 8th, 9th and 10th; from October to November 2015 5th, 7th, 9th and 10th applications ranked had been changed.

Games, Medical and Photography categories showed same KAR value, 0.05. Under the games, the 8th positions changed twice; for the medical category, the 10th positions changed twice and for photography, 7th position changed from July to August and 10th position changed from October to November period.

4.2.3 NAR result evaluation

When the education category is taken into the account, after announcement of OSYM's exam schedule especially KPSS and Police exams took the top 10 place on the GTP application which is reflected on the results in between September to October period. Sport in GTP applications also shows relation between the

starting of football and soccer season in the world. In GTP sport application, on September and October one Turkish Soccer league related application was determined. However, in Turkish application store, GTP sport mostly effected by abroad applications.

Table 2. Average highest and lowest KAR values in GTP, GTF and GTG with categories.

Average KAR Values	Highest Value, Category	Lowest Value, Category
GTP	0.525, Education and Sport	0.075, Comics
GTF	0.525, Games	0.075, Social
GTG	0.525, Sport	0.05, Games, Medical and Photography

Under GTG, for the sport applications, especially with start of the Turkish soccer league, the betting related and football game watching related application started to palaces on the top 10 list. The September is the month which the season started. Probably because of that, all the applications have been changed in the top 10 list.

4.3. Other Categories

Even the result does not appear directly on the highest and lowest values of the KPR and NAR values, there are also some applications need to mention in here. Before October election, voter related applications rise between September and October 2015 rank listed. Also on the summer season (August to September), Arabic-Turkish dictionaries were on the top 10 lists. There could be relation between Syrian refugees and/or Arabic Tourists. However with the end of summer season, this application has been dropped down from the top 10 application list.

5. CONCLUSION AND FUTURE STUDY

Even just looking at first five months started to give some idea about relation between the physical world and application market. As a future work, with also including Apple App Store top 10 list, this study will be expanded and try to completed at least a one year study. Also the effect of prices and customer ratings will be included.

6. ACKNOWLEDGEMENT

The studies presented in INTCESS 2016, the financial support application has been made to the Ankara Yildirim Beyazit University BAP department's BEKP program.

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