

**.NET Web Developer's Smartphone Preference
and What it says about their Mobile Technology and Mobile Application Consumption Behavior**
Exploring Apple iPhone, RIM BlackBerry, Google Android, and Windows Mobile User Behavior

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Summary

With the increasing global adoption of smartphones and the rapidly growing popularity of the mobile tablet, it is becoming increasingly important to understand the user behavior of people who use different mobile operating systems and form factors. However, there is a general lack of research data regarding the differences in user behavior between different mobile operating system users within a defined group of people. In this research paper, based on the results of a September 2010 survey of DiscountASP.NET customers, we explore user behavior differences among .NET web developers based on the smartphone they use, in terms of their mobile technology and mobile application consumption behavior.

Introduction

Does the smartphone that you use say something about you? According to an article in the Wall Street Journal¹ your smartphone preference says something about your spending habits. A study of 275,000 mobile phone users from the financial aggregator data of Pageonce, Inc. showed that Apple iPhone users spent significantly more on their credit cards than RIM Blackberry users, Google Android users and Windows Mobile users. Windows Mobile users had the least average monthly credit card expenses.

While there may be some reports about the behavior of smartphone users in general and studies on user behavior of a particular mobile operating system (OS), there is little information on behavior comparisons between different smartphone users of a similar group of people measured at the same time. The prospects of this type of information is intriguing, as there could be implications for improved product development and design, insights for more targeted advertising, and enhanced strategic mobile application (app) development.

¹ <http://blogs.wsj.com/digits/2010/11/05/what-your-smartphone-says-about-your-spending/>

In addition, getting a better understanding of smartphone users is increasingly becoming important, as smartphones are now outselling personal computers.² Gartner reported that worldwide mobile device sales reached 1.6 billion units in 2010.³ Recently it was reported that the data usage among smartphone users increased 350% from a year ago.⁴ In fact in the future, for most of the world, the user's first interaction with the Internet or with a particular brand will most likely be through a mobile device.

Adding to this trend toward increased mobile technology adoption is the popularity of the tablet form factor. Forrester is predicting that tablet sales in the United States (USA) will more than double in 2011,⁵ will grow to 44 million units sold in 2015⁶ and will have a market share of 82.1 million units by 2015.⁷ These projections highlight the shift in how users are consuming the Internet, web, and applications and they are increasingly choosing to use mobile device form factors.

In an effort to contribute new research and data points to the community, DiscountASP.NET has been conducting surveys of our web hosting customer base and publishing research papers through the DiscountASP.NET blog.⁸ In our surveys, we collected information on smartphone usage by our customer base. In this research paper, we will explore differences in user behavior in terms of mobile technology and mobile application consumption behavior segmented by the smartphone they use.

Methodology

This report is based on a set of questionnaires that was sent out in September 2010 to 21,025 customers who host their web sites with DiscountASP.NET. We received complete responses from 852 clients and the response rate was 4.1%. In this report, we primarily focus on our USA-based customers as they represent the largest segment of our customer base.

It should be noted that the survey was conducted in September 2010, which was prior to the Professional Developers Conference (PDC) 2010,⁹ prior to the availability of Microsoft Windows Phone 7 (WP7) operating system, and prior to the Silverlight Firestarter conference.¹⁰

² http://news.yahoo.com/s/ap/20110208/ap_on_hi_te/us_tec_techbit_smart_phone_sales

³ <http://www.gartner.com/it/page.jsp?id=1543014>

⁴ <http://www.fiercewireless.com/story/data-tsunami-and-why-sprint-increased-its-data-charges/2011-01-18>

⁵ http://blogs.forrester.com/sarah_rotman_epps/11-01-04-us_tablet_sales_will_more_than_double_this_year

⁶ http://news.cnet.com/8301-13506_3-20027153-17.html

⁷ <http://bits.blogs.nytimes.com/2011/01/04/tablet-sales-to-spike-in-2011-forrester-says/>

⁸ <http://blog.discountasp.net/category/research/>

⁹ <http://player.microsoftpdc.com/schedule/sessions>

¹⁰ <http://channel9.msdn.com/Series/Silverlight-Firestarter/Silverlight-Firestarter-2010-Keynote-with-Scott-Guthrie>

General Customer Profile

Web Site Development Expertise

Among the respondents of our September 2010 survey 5% of survey takers described themselves as beginner level web developers and 9% were web site owners who outsourced their web site development. The remaining 86% of the customers described themselves as intermediate to advanced developers. A large majority of customers are skilled web developers.

ASP.NET Adoption

We asked customers about the technologies used to power their web sites and 95% of the respondents reported powering their web sites with ASP.NET. The DiscountASP.NET customer base represents a rich sample of .NET web developers.

Silverlight and Flash Adoption

In a previous article, we reported that we observe an increase in the use of Microsoft Silverlight in customer web sites and a decline in the use of Adobe Flash.¹¹ In a more recent article,¹² to confirm this general technology adoption trend among our customers, we compared our September 2010 survey results against our previous survey results from April 2010. In the article, we showed that even within a 5 month time period, we observe growth in the use of Silverlight among our customer base between April 2010 and September 2010 most likely fueled by the official release of Silverlight 4 in April 2010.¹³ During the same timeframe, we observe a continued decline in use of Flash in the wake of Apple's announcement to drop support for Flash on the iPhone.¹⁴

USA-Based Customer Profile

For the rest of the paper, we focus on our USA-based customers as they represent the largest customer segment. In addition, since we will be exploring data related to mobile devices which has strong regional and cultural differences around the world, by focusing on the USA-based customers, we reduce the effect of these regional and cultural factors in our results.

Smartphone Adoption

In our survey, we asked our customers which mobile phone they used, and if we examine our USA-based customers, their use of smartphone devices break down as depicted in Figure 1. The most popular mobile phone is the Apple iPhone (36.5%), followed by Google Android (30.2%), RIM BlackBerry (19%), and Windows Mobile (14.3%).

¹¹ <http://blog.discountasp.net/research-article-silverlight-surpasses-flash-use-among-recent-shared-asp-net-hosting-customer-web-sites/>

¹² <http://blog.discountasp.net/exploring-attitudes-of-net-developers-toward-new-technologies/>

¹³ <http://en.wikipedia.org/wiki/Silverlight>

¹⁴ <http://www.apple.com/hotnews/thoughts-on-flash/>

If we compare our findings with the general smartphone subscriber population in the USA, we observe that the behavior of .NET web developers is different than the general population. Examining the market at around the same September 2010 timeframe of our survey, comScore¹⁵ reports the smartphone subscriber breaks down as listed in Table 1. While the most popular smartphone device in the USA is the RIM BlackBerry, it is the third most popular mobile device among the DiscountASP.NET customer base. While Apple iPhone is the most popular mobile phone among our customer base, it falls as the second most popular smartphone in the USA. Windows Mobile occupies the fourth position for both the general USA population and our customer base.

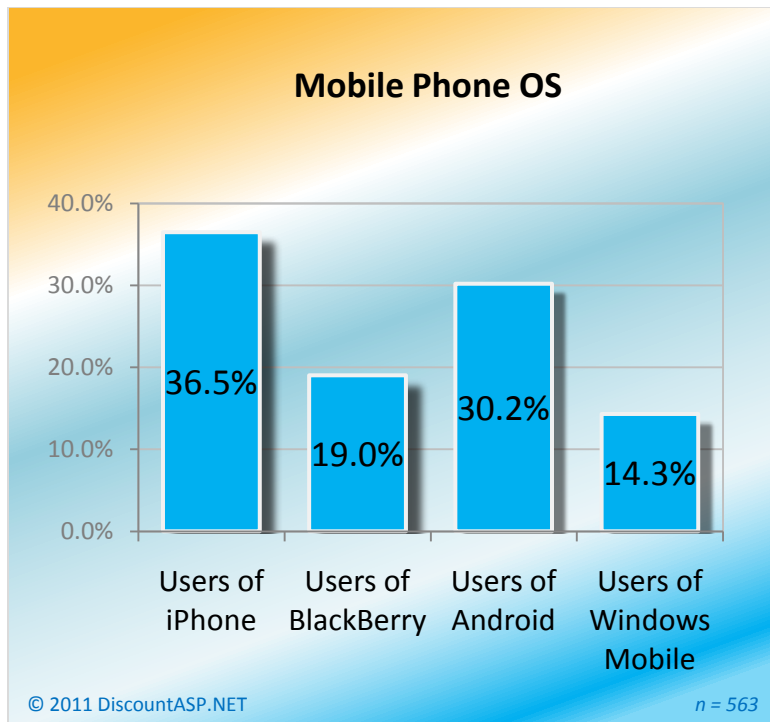


Figure 1 Smartphone use among DiscountASP.NET USA-based customers

Table 1 Top smartphone platforms for September 2010 and January 2011 (Source: comScore)

Smartphone Device	Share (%) of Smartphone USA Subscribers Sept 2010 (3 month average ending Sept 2010)	Share (%) of Smartphone USA Subscribers Jan 2011 (3 month average ending Jan 2011)
RIM BlackBerry	37.3%	30.4%
Apple iPhone	24.3%	24.7%
Google Android	21.4%	31.2%
Microsoft Windows Mobile	10.0%	8.0%

¹⁵http://www.comscore.com/Press_Events/Press_Releases/2010/11/comScore_Reports_September_2010_U.S._Mobile_Subscriber_Market_Share

In Table 1, we also list the most recent comScore smartphone subscriber data from January 2011.¹⁶ The volatility of the smartphone market in the USA is apparent as we see in a short 4 months, Google Android has overtaken both RIM BlackBerry and Apple iPhone for the top position and both RIM BlackBerry and Windows Mobile has decreased in subscriber levels. We will continue to monitor our customer's smartphone usage trends as the mobile market share evolves.

Mobile Application Development Experience

In a previously published research paper,¹⁷ based on our September 2010 survey, we segmented our USA-based customers into two groups – those that had experience building mobile applications and those that did not. Figure 2 shows the breakdown. We observe that 61% of the USA-based customers did not have experience building mobile applications and 39% had experience building mobile applications.

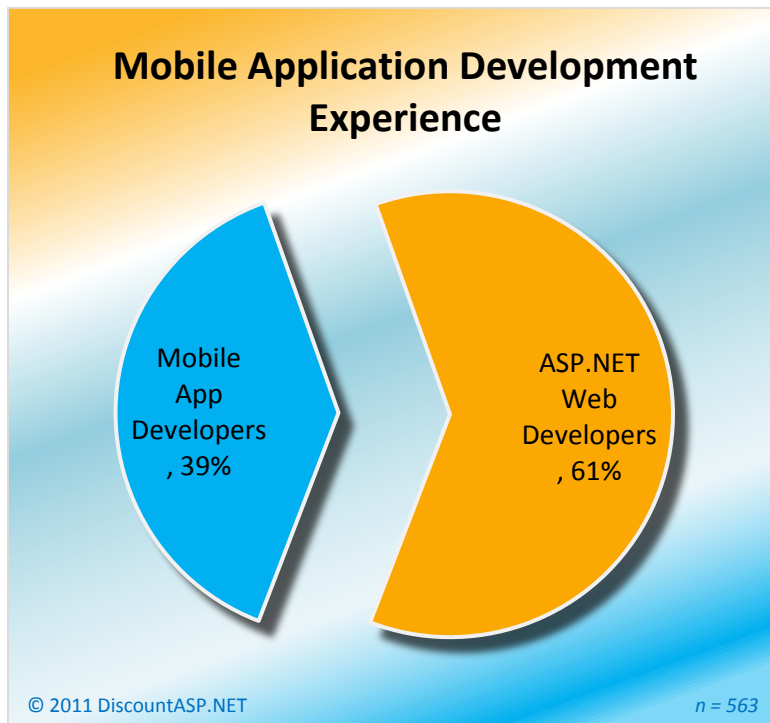


Figure 2 Percentage of USA-based customers who have and have not built mobile applications

¹⁶http://comscore.com/Press_Events/Press_Releases/2011/3/comScore_Reports_January_2011_U.S._Mobile_Subscriber_Market_Share

¹⁷ <http://blog.discountasp.net/profile-of-mobile-developers-and-aspnet-web-developers-implications-on-wp7-strategy/>

As labeled in Figure 2, for the rest of this paper, when stating “mobile application developers” we are referring to the 39% of the USA-based customers that have experience building mobile applications. We will refer to the 61% with no experience in building mobile apps as “ASP.NET web developers.” Finally, “.NET web developers” will refer to our entire USA-based customers, a combination of both groups. It should be noted that the mobile application developer group are also ASP.NET web developers and “ASP.NET” and “.NET” are interchangeable, but we adopt this naming convention for convenience.

Does the smartphone used by .NET web developers say something about their mobile development experience?

In this section, we explore the differences in mobile application development experience between different smartphone users. Figure 3 shows the ASP.NET web developer group – the group without any mobile app development experience - segmented by the type of smartphone they used. Among the ASP.NET web developers, we observe that they behave similar to the general USA population¹⁸ with the most popular smartphone being the RIM BlackBerry (57%) but just slightly higher than the Apple iPhone (56%), then followed by Google Android (48%) and Windows Mobile (33%).

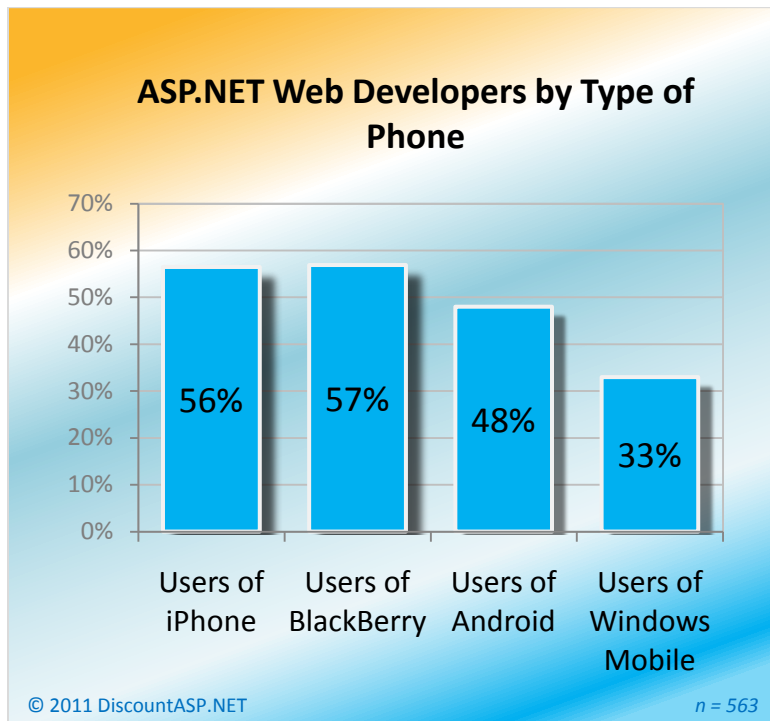


Figure 3 ASP.NET web developers segmented by type of smartphone

¹⁸http://www.comscore.com/Press_Events/Press_Releases/2010/11/comScore_Reports_September_2010_U.S._Mobile_Subscriber_Market_Share

Figure 4 shows the mobile application developer group segmented by the type of smartphone they use. The mobile app developer group behaved differently than the general USA population. The most popular smartphone among this group was Windows Mobile at 67%, followed by Google Android at 52%. The Apple iPhone and RIM BlackBerry were about the same percentage at 44% and 43%, respectively.

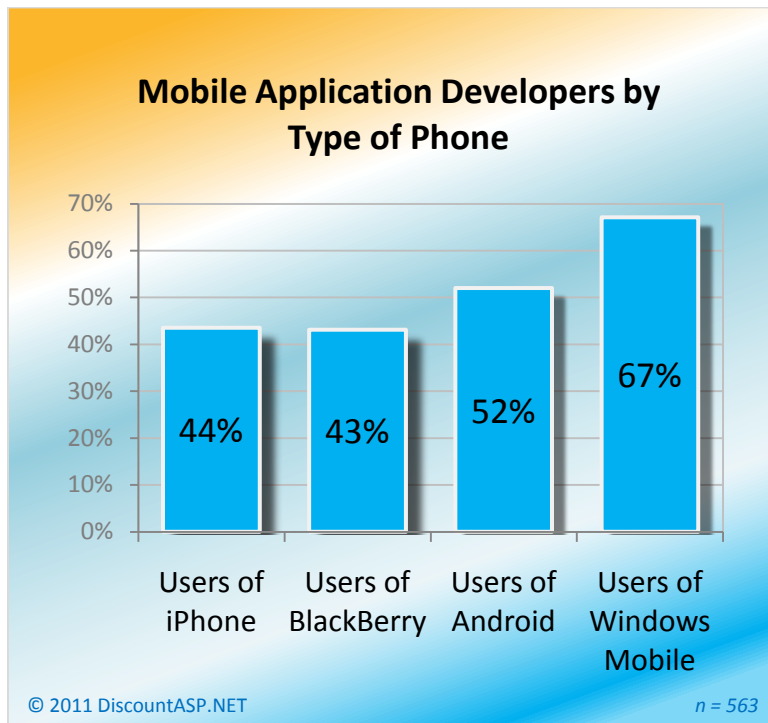


Figure 4 Mobile application developers segmented by type of smartphone

If we view this data in a different chart type, the difference in behavior among the different smartphone users is remarkable. Figure 5 shows the mobile app developer vs. the ASP.NET web developer groups for the Apple iPhone and Figure 6 shows the two groups for the RIM BlackBerry. We observe that the majority of iPhone and BlackBerry users belong to the ASP.NET web developer group. Both the iPhone and BlackBerry users have roughly the same percentage of mobile app developers (43-44%).

Figure 7 shows the mobile app developer vs. the ASP.NET web developer groups for the Google Android and Figure 8 shows the two groups for Windows Mobile. The majority of Google Android and Windows Mobile users are mobile application developers. While 52% of the Android users are mobile app developers, a much larger 67% of Windows Mobile users are mobile application developers. If a developer is hosting an ASP.NET web site and uses a Windows Mobile phone, there is more likelihood that they have experience in building mobile applications.

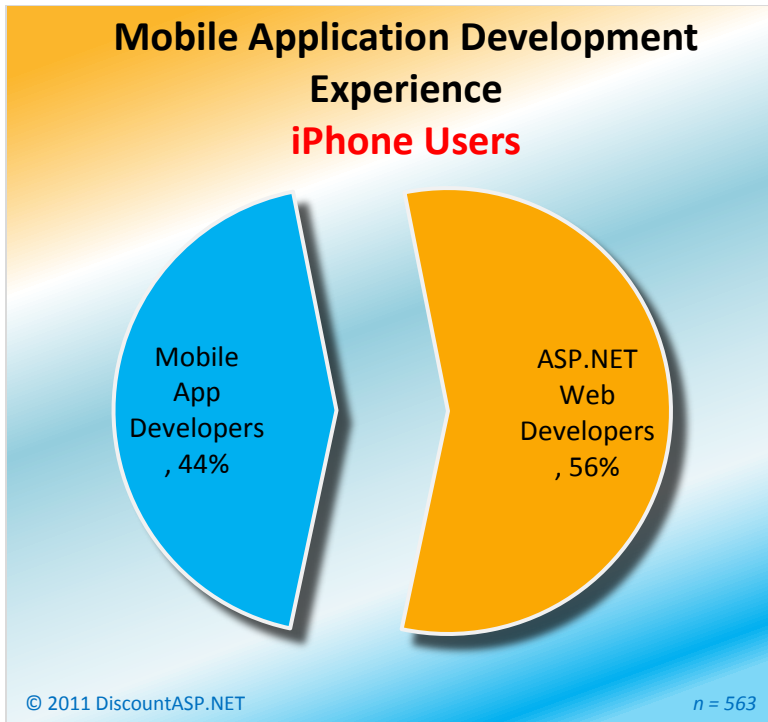


Figure 5 Mobile app developer vs. ASP.NET web developer - Apple iPhone

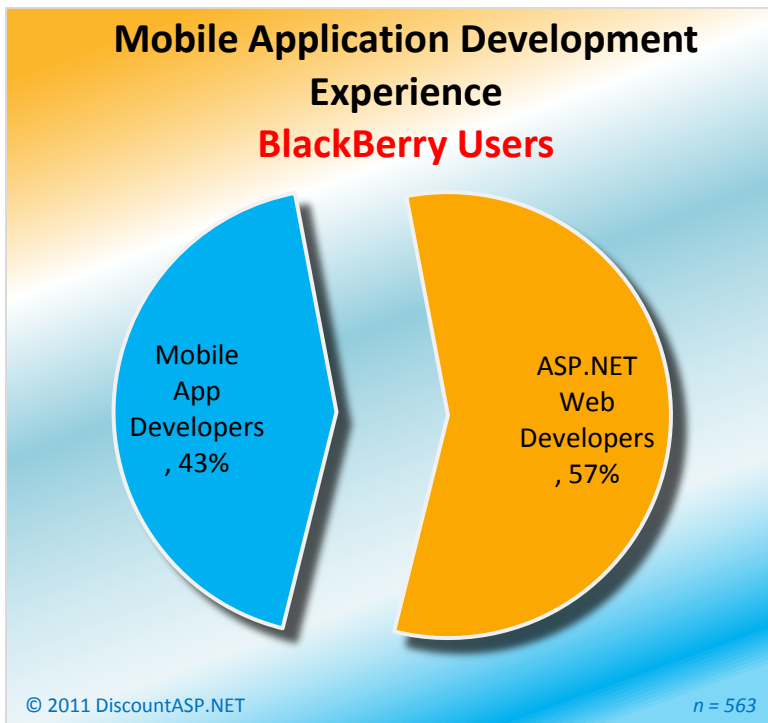


Figure 6 Mobile app developer vs. ASP.NET web developer - RIM BlackBerry

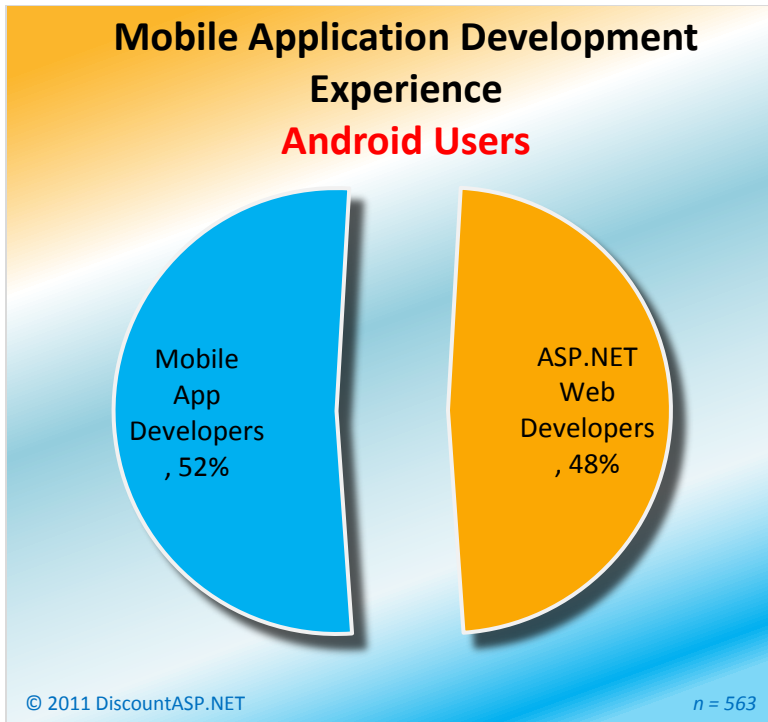


Figure 7 Mobile app developer vs. ASP.NET web developer - Google Android

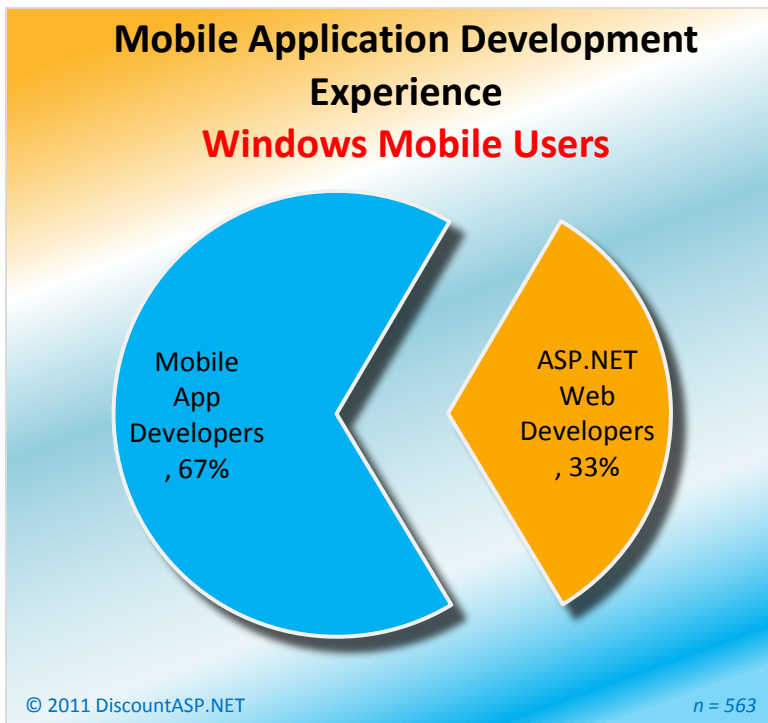


Figure 8 Mobile app developer vs. ASP.NET web developer - Windows Mobile

Does the smartphone used by .NET web developers say something about their use of Silverlight?

Next, we explore the differences in Silverlight adoption among users of different smartphones. We are generally interested in Silverlight because it is one of the main platforms for developing mobile applications for the new Microsoft Windows Phone 7 platform. Because Silverlight web application developers can port their skills to develop Windows Phone 7 mobile apps, we can think of our hosting customer’s level of Silverlight adoption within their web sites as a measure of the pool of potential WP7 developers.

In Figure 10 we show the Silverlight adoption levels among our USA-based customer web sites segmented by the smartphone that they use. The global average Silverlight adoption among our customers was 30%.¹⁹ We observe that users of RIM BlackBerry used Silverlight slightly less than the global average at 29% and that the iPhone user used Silverlight on their web site at the same global average of 30%. However, 35% of the Android group used Silverlight and the most Silverlight adoption was observed for the Windows Mobile users at 54%.

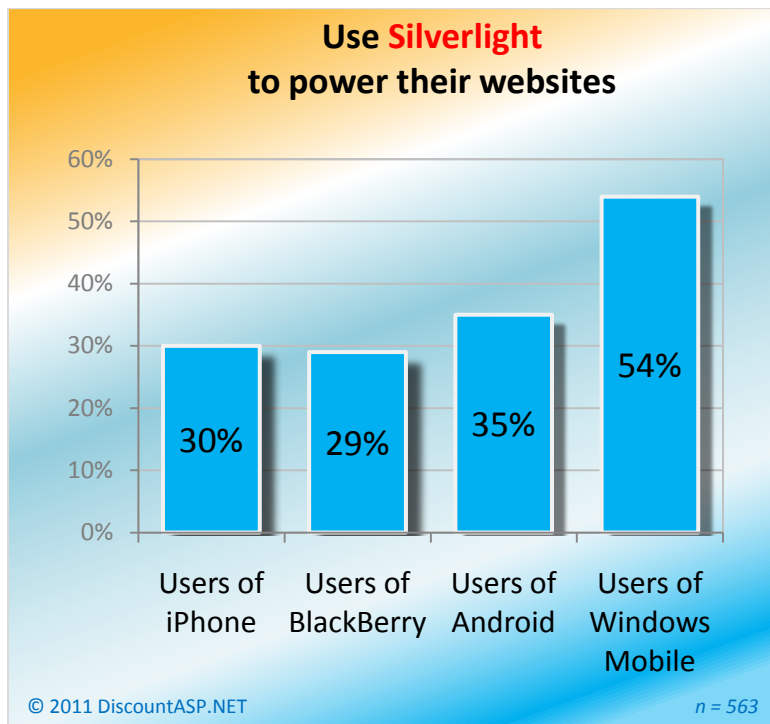


Figure 9 Silverlight adoption segmented by smartphone

¹⁹ <http://blog.discountasp.net/exploring-attitudes-of-net-developers-toward-new-technologies/>

In Figure 10 we show the Flash adoption among our USA-based customer web sites segmented by the smartphone that they use. The global average Flash adoption among our customers was 19%.²⁰ We observe that there is only about a 5% variation among the percentages, with RIM BlackBerry users showing Flash adoption (18%) slightly less than the global average. For Apple iPhone, Google Android and Windows Mobile users, we observe a slightly higher Flash adoption than the global average. Google Android users using Flash in their web sites was the highest percentage at 23%. It should also be noted that the Flash adoption was less than the Silverlight adoption for all smartphone groups.

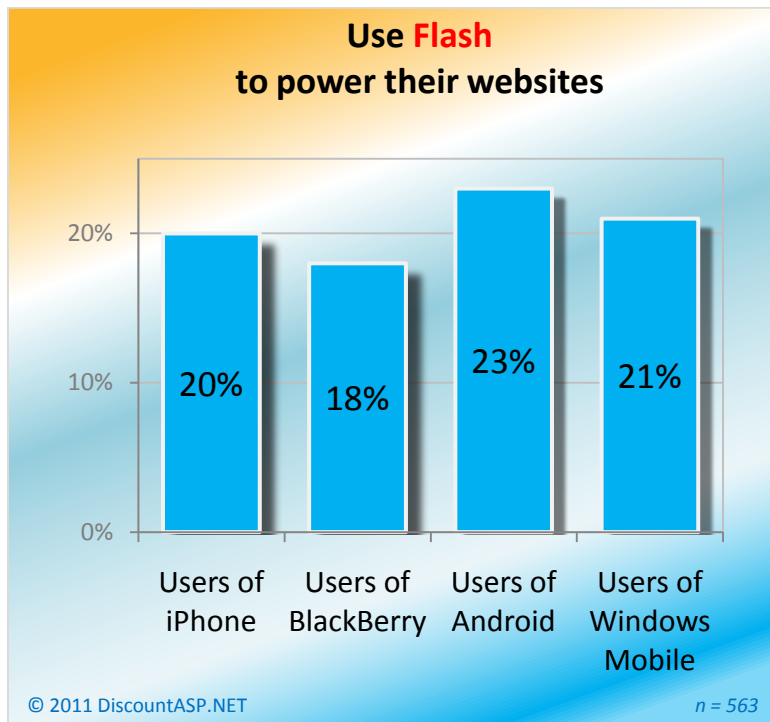


Figure 10 Flash adoption segmented by smartphone

While the smartphone device used by the .NET web developer did not show much variation in Flash adoption within their web sites, we observe more variation in Silverlight adoption between different smartphone users, with the majority of Windows Mobile users indicating using Silverlight in their web presence.

²⁰ <http://blog.discountasp.net/exploring-attitudes-of-net-developers-toward-new-technologies/>

Does the smartphone used by .NET web developers say something about the type of mobile applications they use?

There is existing research data about the quantity and types of mobile applications in different mobile app stores such as data reported by 148Apps.biz,²¹ Distimo,²² and BuzzingUp.²³ While it is possible to infer that the quantity of the mobile app type correlates with its popular use by consumers, this may or may not be the case. In our survey, we have an interesting cross-section of data on the mobile application category actually used by .NET web developers and the smartphone device they use. If we look at a few specific category types, we see some interesting trends when segmenting by smartphone type.

We asked our customers what type of mobile applications they use often. Here we examine a few category types and segment by the smartphone used. Figure 11 shows the popularity of books and reference mobile apps segmented by the smartphone used. We observe that both iPhone and Android users consume book and reference apps more than Windows Mobile and BlackBerry users. RIM BlackBerry owners used books and reference apps the least at 23%. According to 148apps.biz,²⁴ the most popular category type of available applications in the Apple AppStore is for books, which correlates with our observation for high level of use of book and reference apps on the iPhone.

Figure 12 shows the popularity of business mobile apps segmented by the smartphone used. Here we observe that both RIM BlackBerry and Windows Mobile users consume business apps more than iPhone and Android users. Google Android users used business apps the least at 41%. The BlackBerry is a known mobile platform that is popular among business users, but we also observe here that Windows Mobile platform is equally used for business applications among .NET web developers.

Figure 13 shows the popularity of entertainment mobile apps segmented by the smartphone used and Figure 14 shows the popularity of gaming apps segmented by the smartphone used. For both entertainment and gaming apps, we observe that the iPhone users are the highest in the range of 46%-47%. For entertainment and gaming apps, we also observe that Google Android is the second highest at 38% and 42%, respectively. The least use was observed in the RIM BlackBerry users at 16% for entertainment apps and 22% for gaming apps. It follows that the Apple iPhone and Google Android form factors are used by many for entertainment purposes, while the BlackBerry and Windows Mobile platform is used more for business purposes. With the launch of Windows Phone 7 and its integration with xBox, we will monitor how the trends of Microsoft Windows Phone OS users change over time in terms of entertainment and gaming applications.

²¹ <http://148apps.biz/app-store-metrics/>

²² <http://www.distimo.com/>

²³ <http://www.buzzingup.com/2010/12/apple-app-store-statistics-for-2010-infographic/>

²⁴ <http://148apps.biz/app-store-metrics/>

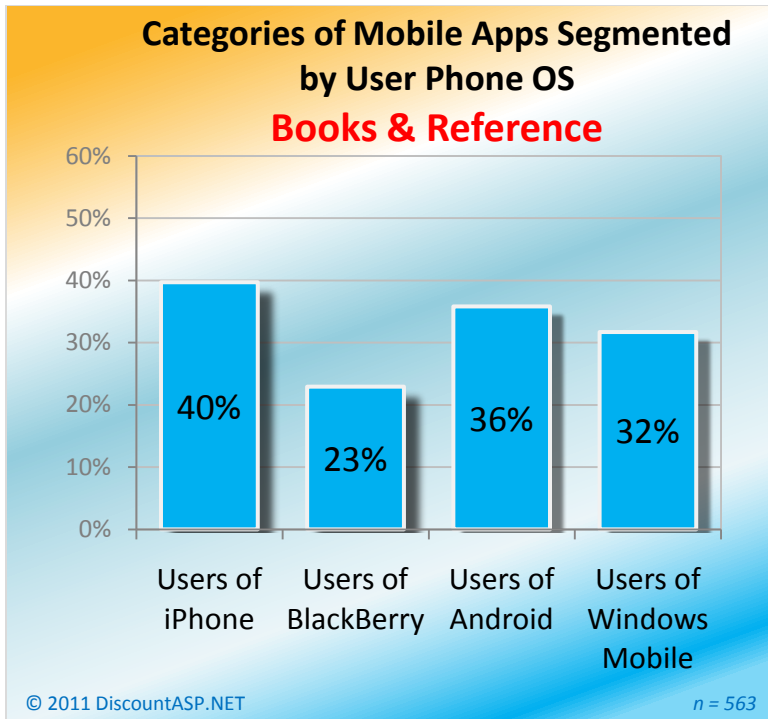


Figure 11 Books and reference application segmented by smartphone used

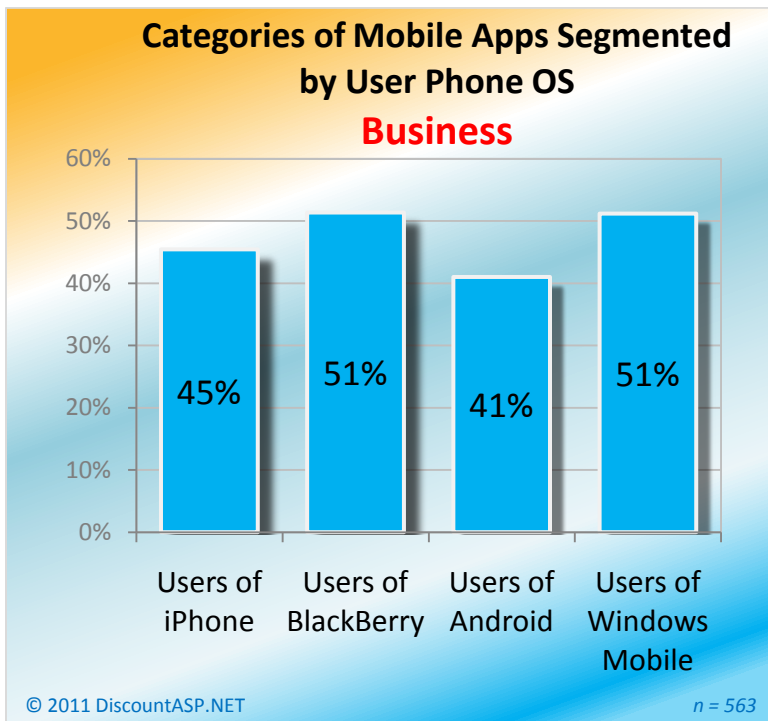


Figure 12 Business applications segmented by smartphone used

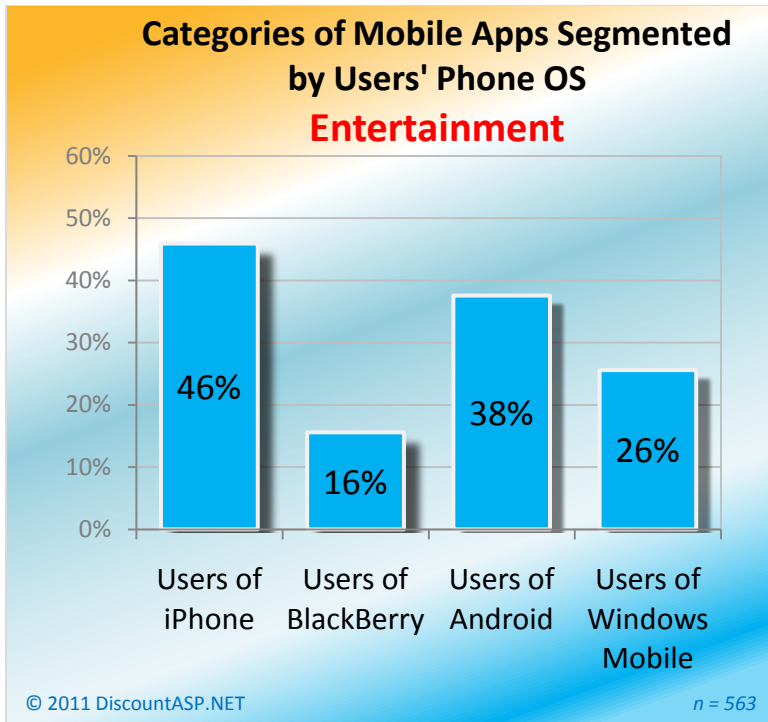


Figure 13 Entertainment applications segmented by smartphone used

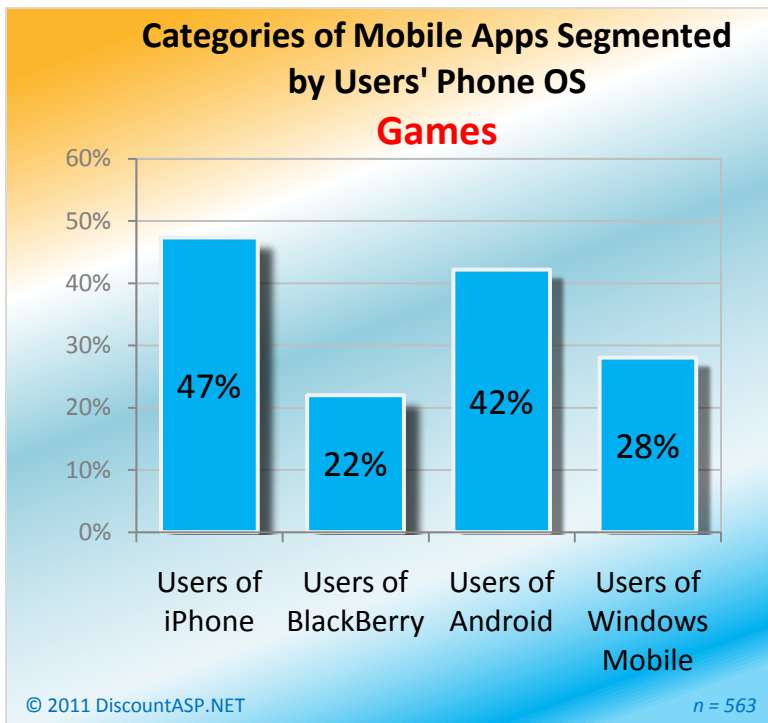


Figure 14 Game applications segmented by smartphone used

Figure 15 shows the popularity of social media mobile apps segmented by the smartphone used. Here we observe that the majority of Apple iPhone users regularly use social media apps, while the majority of other smartphone users did not. The lowest regular use of social media apps was observed for the Windows Mobile users. It would appear that the Windows Mobile users are the least “social” on their phones compared with the other mobile OS users. With the launch of Windows Phone 7 and its live tile UI featuring social media tiles, we will monitor how the trends of Microsoft Windows Phone OS users change over time.

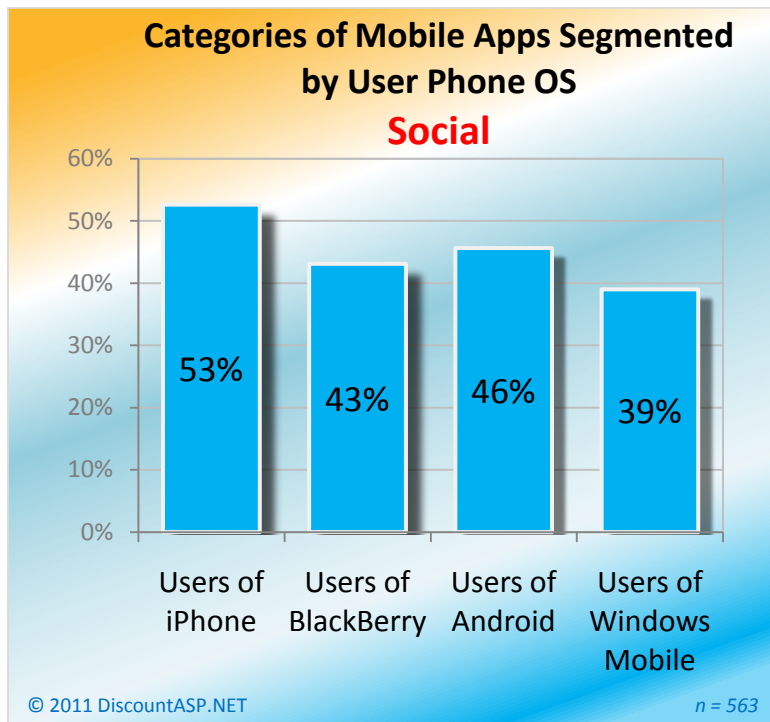


Figure 15 Social applications segmented by smartphone use

Does the smartphone used by .NET web developers say something about how much they spend on mobile applications?

We asked our customers how much they spent on downloading mobile applications. Here we will look at the extremes of the ranges we explored. Figure 16 shows the .NET web developers who do not download any mobile applications segmented by the smartphone they use. Both Windows Mobile (16%) and RIM BlackBerry (12%) users had the highest percentage of users who do not download any mobile applications. Both Google Android (3%) and Apple iPhone (2%) users showed the lowest percentage of users who did not download any mobile apps. The Apple AppStore and Google Android marketplace have hundreds of thousands of mobile applications and it does make sense that their users are

discovering and consuming more mobile applications than the other mobile OS platforms. We will continue to monitor the trends to observe if the percentage of Windows Mobile OS users who do not download mobile apps decreases as the number of applications increase in the recently launched WP7 marketplace.

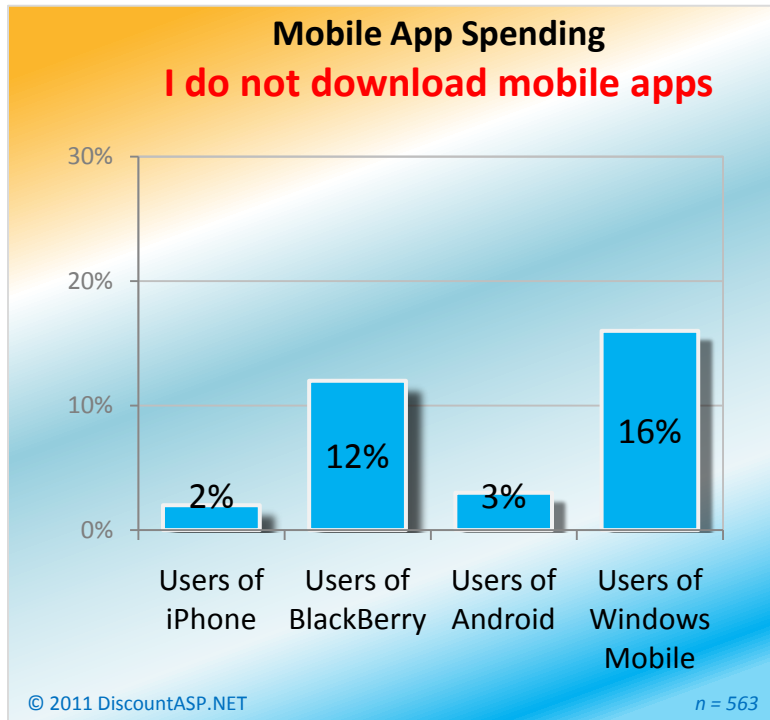


Figure 16 Users who do not download mobile applications

Figure 17 shows the .NET web developers who only downloaded free mobile applications segmented by the smartphone they use. Here we observe that RIM BlackBerry and Google Android users had the highest and same percentage of 23%. For Windows Mobile users, 17% only downloaded free apps and 11% of iPhone users only downloaded free mobile applications. In a recent paper,²⁵ it was reported that free applications outnumbered paid applications in the Google Android marketplace, while it was the opposite for the Apple AppStore and all other mobile app stores. For Google, we infer that a marketplace with more free mobile applications than paid apps and with users that are more willing to consume apps leads to a higher population of users that do not spend money on obtaining mobile applications.

²⁵ http://www.distimo.com/blog/2011_02_comparisons-and-contrasts-windows-phone-7-marketplace-and-google-android-market/

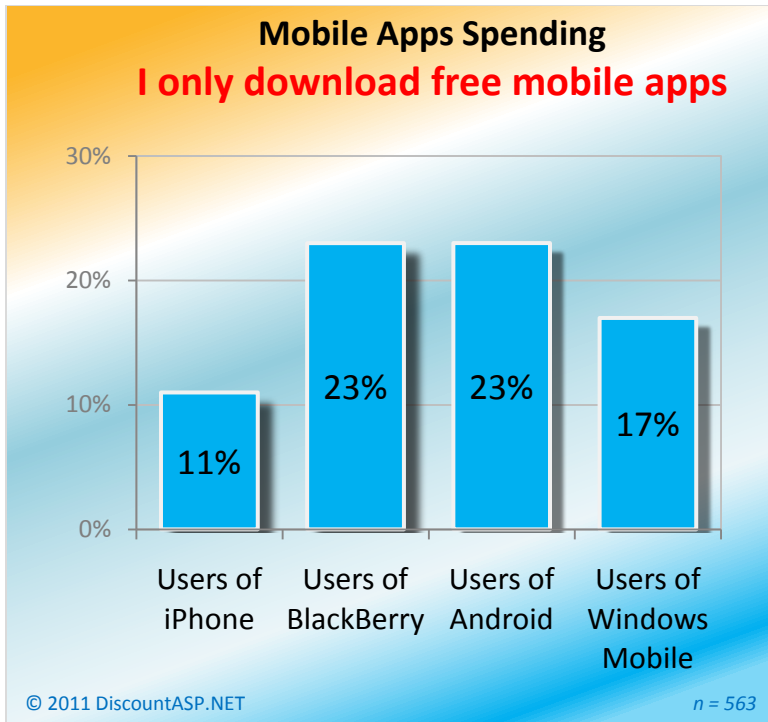


Figure 17 Users who only download free applications

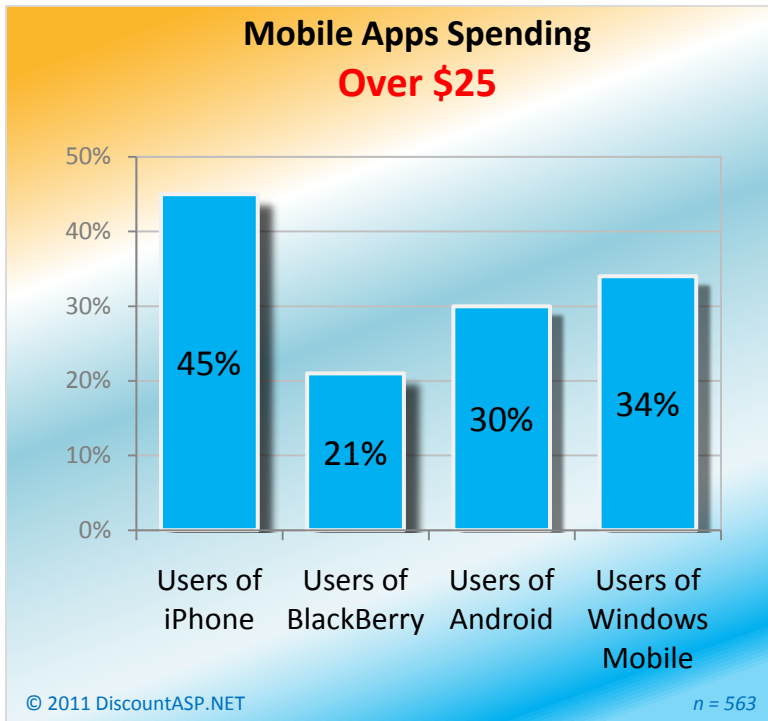


Figure 18 Users who spent over \$25 on mobile applications

Figure 18 shows the .NET web developers who spent over \$25 on mobile applications. In this range of spending, the iPhone users had the highest percentage at 45% and followed by Windows Mobile users at 34%. Google Android users were at 30% and the lowest in this range was the RIM BlackBerry users at 21%. While it was expected that iPhone users would have the highest mobile application spending level, we also observe that the Windows Mobile users do show more willingness to spend money on mobile applications. It will be interesting to continue to observe the spending trend as the marketplace grows for Windows Phone 7 mobile applications.

Conclusions

With the proliferation of mobile smart devices throughout the world, it will be increasingly important to understand the behavior of the mobile device users. As different mobile operating systems attempt to maintain and gain market share, it is also increasingly important to understand the user behavior differences among consumers who use different mobile devices and platforms. In this paper, we explore differences in our customer's behavior in terms of mobile technologies and mobile application consumption based on the smartphone device they used.

- With the observation that the majority of .NET web developers that use a Windows Mobile smartphone device were mobile application developers, Microsoft can use Windows hosting providers as a channel to reach mobile developers and increase development activities around Windows Phone 7 mobile applications.
- While the majority of .NET web developers who use Windows Mobile smartphones use Silverlight within their web sites, we observed that Google Android users also adopting Silverlight at a percentage higher than the global average. In combination with our observation that a majority of Windows Mobile and Google Android users are mobile application developers, this further reinforces the potential of using Windows hosting providers as a channel for reaching potential Windows Phone 7 developers.
- With ubiquitous technologies like Macromedia Flash, we observe little difference among its adoption within web sites by users of different smartphones.
- From our customer base, we observe that the iPhone users were the most active users of book and reference applications which correspond with the most popular app category in the Apple AppStore.
- The Google Android user behavior for mobile application consumption most closely followed the Apple iPhone user – with higher use of book and reference apps, lower use of business apps and higher use of entertainment and games applications.
- RIM BlackBerry is known to be a popular mobile platform for businesses and this correlates with its higher level of use for mobile business applications and its lower use for entertainment and gaming applications.

- While we observe that Windows Mobile users consumed mobile business applications at the same high level as BlackBerry users and we acknowledge that it is important for Microsoft to make sure to address the mobile business user, we also note the importance of the WP7 mobile platform as a social and entertainment platform. The Apple iPhone leads in high level of social and entertainment application use and also leads in users with more willingness to spend more for mobile applications. Microsoft's strategy of using Silverlight and XNA as platforms for WP7 mobile applications makes sense to address the business and entertainment application categories simultaneously.
- From our observations, a large number of Android users choose only to use free mobile applications, which corresponds with the majority of mobile apps in the Android marketplace being free. If maintaining a healthy commercial mobile app marketplace is important, then it appears that it is important to make sure that the free apps do not outnumber paid applications.

The results presented here should be considered as a baseline. We will continue to monitor our customer's smartphone usage and their mobile technology consumption trends and observe how their behavior evolves within the larger context of the volatile mobile technology market.

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About DiscountASP.NET

DiscountASP.NET is a Microsoft Gold Certified partner and an award-winning shared Windows hosting provider with over 30,000 customers worldwide. Delivering on their mission to offer innovative hosting solutions for the .NET developer, DiscountASP.NET launched Team Foundation Server hosting as a SaaS solution for source control and bug tracking. For more information, visit <http://www.DiscountASP.NET>.

We hope that this paper offers new research results that will be beneficial to the community. Please direct any questions or comments about this report to Takeshi Eto at takeshi@discountasp.net.