INTERNATIONAL COMPARISONS: THE HANDSET REPLACEMENT CYCLE

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The United States still suffers from a wireless inferiority complex. Seemingly every other country is better. In fact, the further away the country the better it seems. Is this inferiority complex based on facts? Or are American wireless consumers victims of a complex delusion?

This is the first in a series of reports from Recon Analytics in conjunction with Mobile Future that will examine, compare and contrast the performance of 14 countries: Brazil, Canada, Finland, France, Germany, India, Israel, Japan, Korea, Mexico, South Africa, the United Kingdom, and the United States. The countries were selected to provide a good comparison in terms of geographic and economic diversity as well as the different stages of wireless development, in terms of wireless penetration and wireless data usage.

Mobile device sales figures are among the most obscure and difficult to obtain statistics around the wireless world. Recon Analytics has worked with handset manufacturers to ascertain the number of devices sold in each country. We use these figures to then calculate the handset replacement cycle (i.e., how often a consumer replaces their device). Mobile handsets are becoming more capable every year, while price points for these devices have held steady. Shorter handset replacement cycles translate into newer, more technically advanced devices in the hands of consumers and business users. The more technically advanced the device, the more likely a consumer or business user is to take advantage of advanced wireless services and mobile applications. This is a critical prerequisite for innovation that every country needs to succeed and prosper the 21st century. The innovation in mobile devices and its associated services has been impressive and unprecedented. New smartphones in conjunction with high-speed wireless data networks have truly put the power of the Internet in the palm of people's hands. The things people do and the utility and satisfaction they receive were inconceivable only five years ago. Access to private and business email anywhere, anytime is no longer viewed as a miracle. Watching the same on-demand television programs that consumers have at home is now taken for granted. And on the spot, real-time information about business processes has transformed into a necessity rather than the mere academic vision statement and wishful thinking it once was.

Through this explosion in capabilities, these new devices engage owners much more than any device they might have had in the past. Unsurprisingly, every survey confirms that consumers with a new, more powerful device have higher satisfaction scores than consumers with older, less capable devices.

Table 1

Handset Replacement Cycle in Months

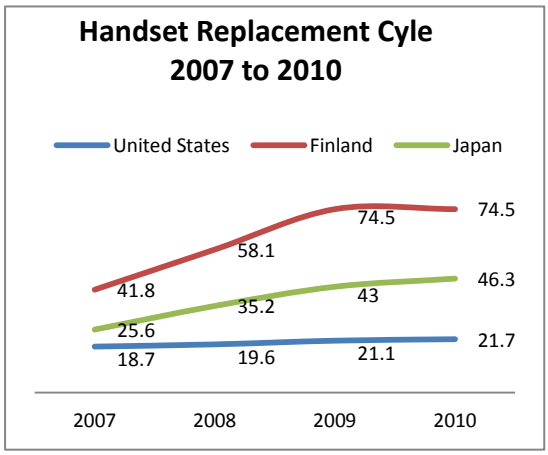
	2007	2008	2009	2010	Prepaid Subscriber	Income in PPP$
Brazil	51.5	74.2	70.4	80.8	80%	$11,239
Canada	29.5	30.8	31.8	33.0	20%	$39,057
Finland	41.8	58.1	74.5	74.5	14%	$34,585
France	28.5	28.8	29.9	30.8	30%	$34,077
Germany	43.7	55.8	49.5	45.7	55%	$36,033
India	322.1	144.0	185.6	93.6	96%	$3,339
Israel	67.1	56.1	67.0	76.5	53%	$29,531
Italy	53.3	43.1	42.9	51.5	87%	$29,392
Japan	25.6	35.2	43.0	46.3	1%	$33,805
Korea	27.3	25.1	24.2	26.9	0%	$29,836
Mexico	48.6	41.7	42.9	39.6	86%	$14,430
South Africa	52.3	118.6	46.3	38.2	80%	$10,498
United Kingdom	24.5	24.4	26.4	22.4	54%	$34,920
United States	18.7	19.6	21.1	21.7	22%	$47,284

Source: Recon Analytics, 2011, IMF 2010

The data set in Table 1 shows that the United States has consistently had the shortest handset replacement cycle, while India and Brazil have the longest. In 2010, Americans replaced their mobile device after one year and nine months, whereas Indians replaced their device after seven years and nine months and Brazilians after six years and eight months. The considerably slower pace of technological change in the most vibrant technology sector is truly amazing. Many countries in Europe, which American folklore considers leaders in wireless, are actually laggards. Average Germans and Italians keep their devices in excess of four years, more than twice as long as Americans. This proves conclusively that Americans use the newest handsets in the world. As we all know, new affordable handsets are a key decision factor for consumer when chosing their mobile carrier. Hence the level of handset subsidization is an indicator of how competitive a market is. In no other country are consumers upgrading faster than in the U.S., so no one else has comparable access to the latest handsets, technology and services than the American consumer. The rapid handset replacement cycle has put new smartphones in more people's hands faster than anywhere else in the world. As a direct result the mobile applications market is sky rocketing. Apple's App Store alone had 1 billion application downloads within nine months of its launch and hit the 10 billion download mark in just two and a half years from more than 350,000 applications.

There are a number of other points the table underscores.

The replacement cycle for the United States has edged up slightly since 2007. But, in comparison to Japan, which is often pointed to as an advanced wireless country, Americans upgrade far faster. In 2007, Japanese consumers replaced their handsets after slightly more than two and a half years, compared to the U.S. figure of 18 months. As noted, the U.S. figure has edged up, but the Japanese figure has nearly doubled to just under four years in 2010. A slow handset replacement cycle means that consumers and business cannot take advantage of new technologies as rapidly and adoption of those new technologies is correspondingly slow. This hinders new innovation and slows down the virtuous cycle in which the adoption of new technology creates new services, enhances efficiency and builds new revenue streams that help the overall economy of the country and its inhabitants. Even Finland, which is thought of as a wireless technology vanguard, has seen its handset replacement figures skyrocket from an already-sluggish 41.8 months in 2007 to 74.5 months. There's a good chance a consumer will replace their car faster than that.



What are the factors that get people to replace their handsets faster or slower? Let's look at some of the factors that could play a role.

- **Percentage of prepaid subscribers:** At first glance there seems to be a connection between the handset replacement cycle and the percentage of prepaid subscribers in a country. Many countries that have a slow handset replacement cycle have a high percentage of prepaid customers. Could it be that just being on prepaid means that you keep your handset longer? However, as a notable exception, it is obviously not stopping the people in the United Kingdom from changing their handsets almost as quickly as the people in the United States, even though they are more than twice as likely to be on prepaid plans.
- **Per capita income at purchase power parity:** Another factor could be simply how affluent the people are in a country undisturbed by exchange rates. The logic is that the more people earn the quicker people will replace their handset. The data in Table 1 generally agrees with that premise, but again there are important exceptions. Israelis, Italians, and Koreans earn almost the same, but the handset replacement cycle in Israel is 76.5 months, in Italy 51.9 months and in Korea 26.9 months. Although they have the same income level, Israelis keep their phone three times as long as Koreans, and Italians twice as long as Koreans. Is it because of prepaid subscriber levels? The data doesn't support that because Israel has 53% prepaid subscribers and Italy has 87% prepaid subscribers, while Korea has none.
- **Level of handset subsidization:** One common practice, especially among operators that provide their services via contract, is to subsidize the device in exchange for the commitment of the customer to stay a certain period with the operator. Similar to higher income, more affordable devices allow customers to purchase a device sooner rather than later. Instead of focusing on the absolute handset price, the handset subsidy is a better metric to consider because handset price overemphasizes low cost handsets regardless of

capabilities, whereas handset subsidy focuses on the shift in the value perception of the consumer. It is one thing to have a higher income and it's another to be tempted by a low price. Because data is sparse when it comes to average handset prices and even more so for how much an operator paid for a handset, we have to find a suitable proxy, ideally in the most vibrant part of the market – smart phones.

Fortunately, the Apple iPhone 4G with 16MB is such a proxy. Apple sold 18.65 million iPhones in Q1 2011 and achieved revenues of $12.3 billion from it, which results in an ASP of $660. The iPhone 4's ASP is higher than that of the iPhone 3GS, but the volumes for the iPhone 4 are vastly greater than for the iPhone 3GS. So for the sake of simplicity and conservativeness, let's make them even.

Table 2
Handset Subsidization: The iPhone 4G Case Study

	Operator	Unsubsidized iPhone Price in PPP$	Subsidized iPhone Price in PPP$	Handset subsidy in PPP$ off $660 ASP	Income in PPP$	2010 Handset Replacement Cycle
Brazil	Claro	n/a	$739	$67 profit	$11,239	80.8
Canada	Bell	$540	$131	$529	$39,057	33.0
Finland	Sonera	$871	$576	$84	$34,585	74.5
France	Orange	$710	$263	$379	$34,077	30.8
Germany	T-Mobile	$662	$187	$473	$36,033	45.7
India	n/a	n/a	n/a	n/a	$3,339	93.6
Israel	n/a	n/a	n/a	n/a	$29,531	76.5
Italy	TIM	$879	$309	$351	$29,392	51.5
Japan	Softbank	n/a	$104	$556	$33,805	46.3
Korea	SK	$724	$161	$499	$29,836	26.9
Mexico	Telcel	$1,233	$963	$303 profit	$14,430	39.6
South Africa	Vodacom	$n/a	$1,999	$1,309 profit	$10,498	38.2
United Kingdom	Orange	$797	$0	$660	$34,920	22.4
United States	AT&T	$599	$200	$460	$47,284	21.7

Source: Recon Analytics, Company information, 2011

Note: The iPhone is not offered in India and Israel and is only offered through an operator in Brazil, Japan, and South Africa. The iPhone in Canada is only offered with 3 year contracts.

One of the most interesting observations in the table above is that in the lowest income countries – Brazil, Mexico, and South Africa – the iPhone is sold at a profit. The iPhone in these countries is even more of a status symbol than it is in the United States and is simply unaffordable for the average consumer in that country. Therefore, the operators in these countries are following the rational path of charging for the iPhone as a luxury item to a largely price-insensitive clientele. This means that the market for the iPhone is vastly different compared to the other countries where it is a mass consumer item and does not make them suitable for our exercise.

Another interesting note is that Canada is the only country in the world that has three-year contracts for the purchase of a new device for the lowest price. For most devices the price difference between a 3 year contract and a 2 year contract is more than $300, sometimes even $400, whereas the difference between a 2 year, 1 year or no contract is only an additional $30 per step. This provides Canadians with a significant incentive to commit to 3 year contracts. Nevertheless, Canadians replace their devices every 2 ½ to 2 ¾ years. If a customer would like to upgrade their phone before the contract expired, they have to pay an additional Canadian-$20 per month until the original committed period expires to upgrade to the new device. Even with this additional cost, the average Canadian upgrades 6 to 9 months early. Even with the unique 3 year contracts, Canadians have the fourth shortest handset replacement cycle in the world. Clearly the contract length is not having a major impact compared to many other countries that have a longer handset replacement cycle (but shorter contract duration) than Canada.

What is really going on?

Regression Analysis: When several factors, such as prepaid subscriber percentage, income, and handset subsidization, affect a variable such as the handset replacement cycle, regression analysis can determine the impact of the different factors. More detailed analysis further revealed that, not surprisingly, handset subsidization was the dominant factor, far ahead of how people paid and their income levels.

Here is what the analysis determined:

$$Handset\ Replacement\ Cycle = 74.9\ Months + 0.000117 * Income - 0.0348\ Prepaid\ Percentage - 0.08696\ Handset\ Subsidy$$

$r^2 = 0.64$

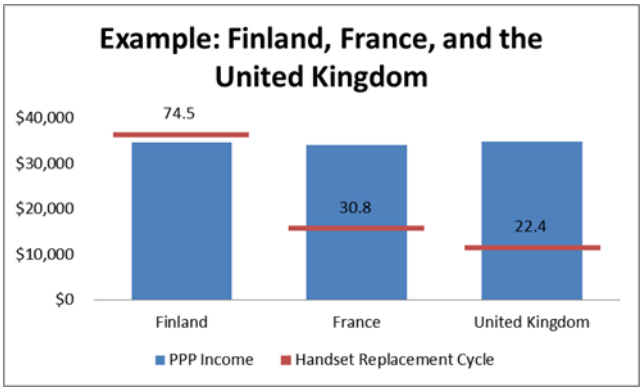
We first look at how well the formula explains the empirical data: An r^2 of 0.64 indicates that the formula used has good explanatory value, but not perfect.

Let's look at it by the various components.

We will begin in purchase-power parity income. According to our analysis, for every dollar someone earns, the handset replacement cycle goes up by 0.000117. For every $10,000 in income the handset replacement cycle goes up

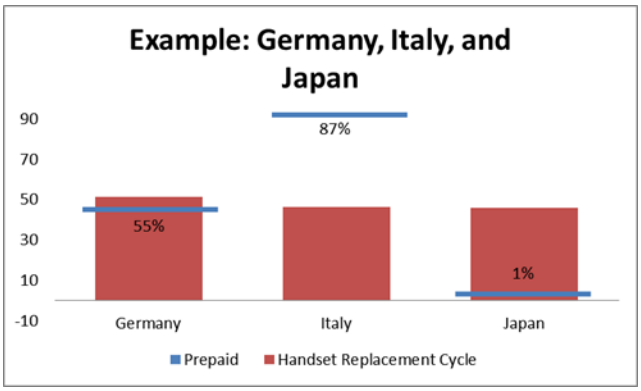
by 1.1 months. The impact of income is modest, which is clear in a comparison between United States and Italy. The income differential between the two countries is roughly $18,000, which affects the handset replacement cycle by two months when the overall difference in the handset replacement cycle is about 30 months. Again, the direction is surprising, but the magnitude of the impact is small.

A good example to illustrate the lack of impact that income has is a comparison of Finland, France, and the United Kingdom. The average income in all three countries is almost identical: Finland with $34,585, France with $34,077 and the United Kingdom with $34,920. At the same time, the handset replacement cycle is remarkably different. As mentioned before, in Finland the handset replacement cycle is 74.6 months, while in France the average consumer replaces his or her handset every 30.8 months. In the United Kingdom, the average consumer changes their handset every 22.8 months, which is almost as quickly as consumers in the United States. The same income yet significantly different handset replacement times supports the findings of the analysis that income is a negligible factor in how quickly the handset gets replaced.



The next variable is the percentage of postpaid subscribers. For every 10% of postpaid subscribers the handset replacement cycle goes down by 0.3 months. While the direction is somewhat surprising, the relatively small magnitude of the increase is a lot more important. It shows that the handset replacement cycle is relatively unaffected by the way people pay their bills in a given country. The maximum difference in handset replacement cycle between a country with 100% prepaid and a country with 100% postpaid is about three and a half months compared to a baseline of 74.9 months or almost seven years.

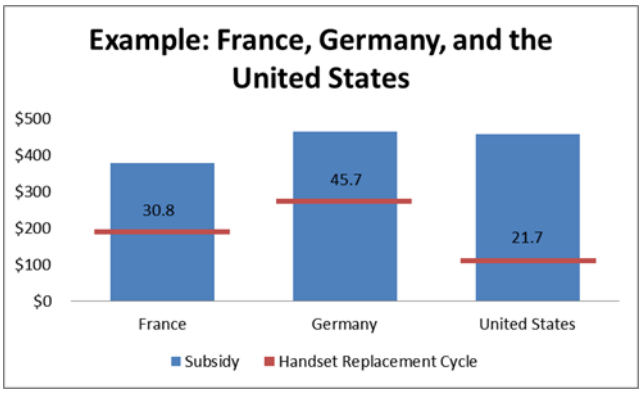
The most interesting examples of a significant direct connection between the significance of prepaid and the handset replacement cycle are Germany, Japan, and Italy. The handset replacement cycle in all three countries is almost the same (between 45.7 and 51.1 months), whereas the percentage of customers using prepaid could not be more diverse: Japan is almost exclusively postpaid with only 1% of customers using prepaid; in Italy 87% of customers are on prepaid plans; in Germany the two payment options are almost equal, with 55% of customers choosing prepaid plans. The average income in all three countries is also close ranging from $29,392 in Italy versus $33,805 in Japan and $36,303 in Germany.



The final factor is the handset subsidy provided by the operator. For every $100 handset subsidy, the handset replacement cycle shortens by roughly 8.6 months. By directly lowering the price of the handset through a subsidy, the

handset replacement cycle is most dramatically impacted. The price/value perception of the consumer is altered and the new device becomes even more attractive through its affordability.

The general trend is clear, as shown through the comparison of the United States and France, a greater handset subsidy generally leads to a faster replacement cycle. Nevertheless, the comparison of the United States and Germany shows that the relationship is far from perfect. While in both countries the devices are subsidized by about the same amount, the handset replacement cycle in the United States is far shorter. As we indicated at the beginning, an r^2 of 0.64 is a good fit, but not a perfect fit. There are other contributing factors which we will examine as this series continues. One of the contributing factors could be the lower cost of of wireless telecommunications and the higher consumer surplus that Americans are enjoying.



Conclusion and additional thoughts

Based on the data and analysis outlined in the report, it is conclusive that over the last four years, handset subsidization is the dominant factor influencing the handset replacement cycle. The percentage of subscribers on postpaid and prepaid plans, as well as the relative income level in the countries, had a negligible impact on the handset replacement cycle.

There is considerable empirical evidence to support the analysis. When the original iPhone was released, it was priced at $499 to consumers. Sticker shock ensued and sales were relatively modest—falling short of some overly exuberant forecasts. The iPhone became a mass market phenomenon when AT&T and Apple reworked their arrangement and AT&T increased its handset subsidy from the typical $150 to $200 level to the previously unprecedented $450, which allowed the handset price for consumers to come down to a more palatable $199. Another example is the situation in Finland, which for a long period of time outlawed handset subsidies. Since it lifted the ban it has only modestly adopted handset subsidization, and has one of the longest handset replacement cycles in the world—about six years. Therefore, Finns have some of the oldest devices in their hands and seem poised to miss out on the mobile Internet revolution.

Another myth can be laid to rest is that early termination fees are a barrier to consumers getting new handsets faster. For both the United States and Canada, where two-year and three-year contracts are the rule, consumers chose to upgrade their phones on average three months before the end of the contract. Contracts including handset subsidies and early termination fees that are used to protect the operator's investment are accelerating the handset replacement cycle rather than inhibiting it.

Americans are benefitting greatly from handset subsidies that allow them to have newer, more powerful devices than anyone else on the planet. Especially at times of rapid technological innovation, such as what we are observing right

now with the smartphone revolution, the countries that make the most advanced technology quickly available to businesses and consumers will reap significant benefits from it. Not only do the devices become more powerful, but the software on the devices are innovating in a six to twelve months cycle compared to desktop operating system innovation cycles of several years. Entire new business sectors are created, such as mobile application development, which help existing companies reap the economic benefits of enhanced productivity. In addition, consumers are enjoying entire new ways of communication and doing some of their daily activities in unprecedented ways.

What has the rapid handset cycle brought us? Only four years ago, flip phones were the pinnacle of consumer trends. These devices had one inch screens, the size of a postage stamp, that had barely enough room to display the phone number and processing capabilities that were barely beyond that of a pocket calculator. When sending or receiving a text message with 140 characters, the user had to scroll down the screen twice. Data speeds were slow to the point where a tiny mobile website took half a minute to load. It would have been inconceivable for consumers to watch videos on four inch screens whose resolution is on par with that of a high-definition TV set. Social networking, something that today's wireless users take for granted, has been made possible through these new devices. Cameras and video capabilities that rival that of stand-alone devices have become the standard and people today are taking more pictures and videos than ever before in history. Low cost, high quality, and part of what people carry with them all the time. Due to the rapid handset replacement cycle, more than 37% of Americans own smartphones today. With smartphones, the power and capabilities of the Internet that only a few years ago were limited to a computer in the home or at work are now in the palm of your hand virtually anywhere you go. Ten years ago, the things we take for granted now were the very things we saw in a science fiction series – now we live with them every day.

Addendum

Handset replacement cycle: The handset replacement cycle describes the length of time in months that a device owner keeps his handset before purchasing a new one. It is calculated by first subtracting the number of new subscribers from the subscribers at the end of a year to get the number of long-term device owners. Then we subtract from the total number of device sales the number of net subscriber additions to determine the replacement device sales. Then the number of long-term device owners is divided by the number of replacement device sales and multiplied by 12. This results in the handset replacement cycle in months.

((subscribers – net subscriber additions) / (device sales – net subscriber additions)) * 12 = handset replacement cycle in months

Purchase power parity: The exchange rate at which the domestic purchasing power of both currency is equivalent.

ASP: Average Selling Price, the amount that the wireless operator pays for the device to the device manufacturer.