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A Conceptual Assessment of the Uncertain Future of the Personal Computer

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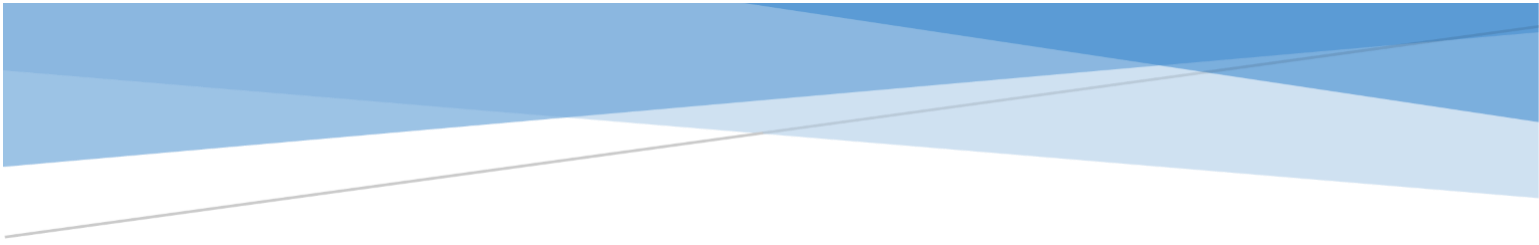
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A CONCEPTUAL ASSESSMENT OF THE UNCERTAIN FUTURE OF THE PERSONAL COMPUTER

Written for Partial Fulfillment for Graduation from
the Honors College, University at Albany.

Completed: May 2016

Research Mentor: Dr. Raymond Van Ness, Ph. D

McCann, Patrick J

Abstract

In this thesis, I investigate the chances that the personal computer (PC) becomes a thing of the past in the near future. PC sales have seen quite the downturn, while smartphones have thrived in the technology space. I also consider how affects not only firms in the technology sector, but in almost all fields. Since the world today revolves around technology, specifically computers, it goes without saying that a change in the way we depend on PCs would change how we do almost everything.

After diligently analyzing various sources on the matter, as well as consulting my own experiences, I identified a plethora of arguments for and against the topic. Many view the personal computer as an artifact on its way out of relevancy, making way for new technologies that can easily replace a PC. On the other hand, PCs are still everywhere, and are necessary to fulfill many tasks that users depend on the machine for.

I have discovered that one could analyze financial performance, trends in the tech industry and just about anything else without getting to the bottom of the issue. While it may be unreasonable to believe that in five years from now all desktops and laptops will be obsolete, we are no fortune tellers. The technology space is one of the most rapidly changing climates, but the personal computer paved the way for so many of the advances. When it's all said and done, PCs will be around in one form or another.

Acknowledgements

With college now behind me, I would like to acknowledge the fact that I had some amazing support along the way. I would like to send a big shout out to my parents and immediate family, because it is with your support that I continue to challenge myself and gain a sense of awareness that I am headed in the right direction. Thanks for raising me into the man I am today.

I have also been fortunate to have come in contact with some of the greatest mentors. Dr. Raymond Van Ness has been an excellent role model and professor, and I will never forget some of the gems I took away from you. Your approach to teaching is unlike any other I've ever seen, and I really appreciate your commitment to the high regards and expectations you place onto your students. You've motivated me to become the best possible version of myself, and to keep my priorities in order.

I also must thank all of my close friends who have accompanied me along this wild ride. I am extremely fortunate to have been blessed with such wonderful people in my life. Without you all, I do not know where I would be.

Lastly, shout out to everyone. All is love.

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Introduction

Growing up in the 21st century, almost everywhere I look I see a computer. Our phones are computers, our cars are computers and our watches are computers. Researchers are now implementing nanotechnology to develop contact lenses that are also tiny computers (Bourzac). I cannot bring myself to fathom life without today's technology, as my parents or grandparents were raised. Life without computers just seems impossible. Considering the way our society relies on desktop computers and laptops in this day and age, the idea that one day they will no longer be prevalent to the business world, and to the world in general is fascinating. This theoretical work is designed to assess the uncertain future of personal computers, and how it could affect the way businesses operate around the world.

When you step foot into the offices of most companies worldwide, there is a high chance you will find rooms filled with cubicles, and in these cubicles, employees with their personal computers. Thanks to these computers, they are able to complete the tasks given to them by their management efficiently and effectively. As I've noticed in my short time here on this Earth, times are changing, arguably faster than ever. In just twenty years the internet has become everything. Consumers and producers alike rely on computers to handle a majority of their daily tasks, whether it be work or personal related.

For the purpose of this study, personal computers can be defined as desktop computers and laptop computers, the big products pushed by companies in the PC (personal computer) industry such as Gateway and Dell. This definition of personal computers does not include devices such as tablets and smartphones, as they have expanded a new market of mobile computing. With personal computers getting smaller and sleeker, and mobile devices getting

bigger and more powerful, the fine line between personal and mobile computer has never been harder to delineate. Computers and the internet have been the cause of a detriment to many different fields, including the book and television industries. Many people turn to the internet for audiobooks and Kindle online reading, as well as substitute watching standard television for watching ones favorite shows on sites such as YouTube and Netflix. Considering how quickly the lifespan of the hottest tech item can come and go, in the grand scheme of things, it is sensible to consider the fact that today's personal computer is not the pinnacle of our computing experience.

The technology industry is one that is constantly being shaped by what's trendy and happening. Computer software and hardware has come a long way since its inception. I recall stories of computers that take up as much room as a whole computer lab today, and now we have access to virtually unlimited information with the click of a button of our smartphones. One of the biggest trends in the industry is convergence. For example, a phone is no longer just a phone. Now, it is also a computer, camera, music player, calculator, and much more. It is becoming increasingly important to consumers for their products to have multiple functions. This could possibly lead to the downfall of the personal computer, in that all devices will have a computer integrated into them.

For at least twenty years now, researchers have been speculating the life span of the personal computer, and what will come to take its place. In a 1998 Business Week article, American technology columnist Stephen H. Wildstrom discussed how personal computers will become obsolete soon, and be replaced with more specialized and simple devices (34). To me, it seems as though this was written before the personal computer reached its full potential. It likely still has not reached its full potential. However, it is worth noting how this debate is nothing new,

and has been happening for decades. The new technology of today, nevertheless, continues to intrigue researchers and others alike regarding whether or not we will be using personal computers, say twenty years from now.

Approaching this topic from a different perspective, it is imperative to analyze how the big wigs in the personal computing industry will adapt in this dubious climate. Two companies come to mind when thinking of the PC industry, Microsoft and Apple. These two technological giants have dominated the market for decades now, but will they continue to do so? A revolution in the technology of the personal computer can prove disastrous to these firms if not handled accordingly. Both Microsoft and Apple have their hands in personal computers, as well as other devices that may end up replacing PCs, like tablets and smart watches. Their CEOs, along with the rest of their top management team, must band together to decide how they will satisfy the constantly altering desires of their consumers.

Bill Gates will go down as one of the most novel thinkers and businessmen of our time. He had visions of the internet becoming as big as it is today, way before anyone else really conceived the idea. He has been quoted saying “The Internet is becoming the town square for the global village of tomorrow” (Bill Gates Quotes). This is proving especially true today, as more and more people are getting their information from the internet, and discussing the information with others on the internet. He has also been quoted saying “Your most unhappy customers are your greatest source of learning” (Bill Gates Quotes). I am sure this has contributed to the success of his company, Microsoft. It is not by accident that they have been a major player in the technology industry, they have remained innovative throughout their existence.

The current Chief Executive Officer of Microsoft is Satya Nadella. He has played a vital role within the company over the years, and is one of the biggest proponents behind the firm’s

initiative towards a technology that may aid in the downfall of the personal computer, cloud computing (Raj). Nadella is clearly aware that the PC market is not what it once was, and his emphasis on cloud technology might be what keeps Microsoft in the game. With Nadella's previous experience with cloud computation, and Microsoft's new Azure Cloud Computing platform, the death of the personal computer may prove beneficial to Microsoft, as cloud computing supports smartphones and other variations of computers that cannot utilize a large hard drive.

Apple is the other big player in the industry. Consumers are often pitted to choose between Microsoft's Windows operating software and Apple's OS X operating system. They also rival in cloud services and web browsers. Apple's iCloud is extremely successful, and Microsoft has recently been making more forward-thinking moves in regards to its cloud technology. Apple's Safari is their internet browser that competes with Internet Explorer. Apple has a strong grasp on the smartphone industry, but Microsoft has recently tried to penetrate that market with their Windows Phone. In addition to this, they are both rivals in the tablet market. Apple's iPad is a staple as far as tablets go, and Microsoft is trying to get in on that with their Surface tablet. Both companies are known for foreseeing the future of the technology industry, and attempting to capitalize on it. It shall be interesting to see how they rebound if PCs become obsolete.

Judging by how reliant we are on personal computers, a shift in the way we compute will certainly change the world, for better or for worse. This is a topic that columnists and bloggers are passionate and vocal about, since it affects almost everyone on the planet. There are strong arguments for both sides of the coin that is the fate of the personal computer. Declining sales suggest that the future of the PC looks bleak. Despite that, strong arguments in favor of the

elongated time ahead for the PC explain how these sales decreases do not necessarily equate to a declining market. All things considered it is tough to say if the personal computer is here to stay. People can guess and speculate all they want, but they cannot see the future. Regardless, the topic itself is still extremely interesting, as it affects everyone and everything to an extent.

The overall objective of my studies has been to decipher which side of this argument has the stronger claim. Through examining each side, I hope to bring forth a better understanding of where PCs currently stand, and if they will continue to remain standing in the future. If so, it is very likely that there will continue to be constant improvements to computer software and hardware. If not, what could this mean for both businesses and consumers? There is no doubt that change is inevitable, but to what extent?

Findings

There is no denying that as of late, PC sales have been on the downturn. Over the past ten years or so, there has been a notable decline in the sales of personal computers. Yet, it was around 2011 where we began to notice a strong decrease. Deloitte decided to make a couple of highly controversial predictions involving PC and mobile/tablet computer usage. According to a study done by the firm, they had successfully predicted that sales of tablets and smartphones will outsell personal computers in the year of 2011 (Tablets, Smartphones to Outsell PCs in 2011: Deloitte). This trend has continued through present day.

As time progressed, PC sales continued to struggle. Sales of 90.3 million units in the 4th quarter of 2012 represented a 4.9% decline from sales in the 4th quarter of 2011 (Petty, “Declining Worldwide PC Shipments in Fourth Quarter of 2012”). Smartphones and tablets

became consumers' go-to electronic devices, replacing the personal computer. This can be attributed to a variety of reasons, including the flawed launch of Microsoft's new operating system, Windows 8. "At this point, unfortunately, it seems clear that the Windows 8 launch not only failed to provide a positive boost to the PC market, but appears to have slowed the market," Bob O'Donnell, program vice president for clients and displays at IDC, said in a statement. He said that "radical changes" to elements like the user interface and higher costs had made PCs less attractive compared with tablets and other devices (Wingfield). Figure 1 shows that PC sales have yet to recover from the hit they took in 2012, and have lowered to levels we have not seen since 2007.

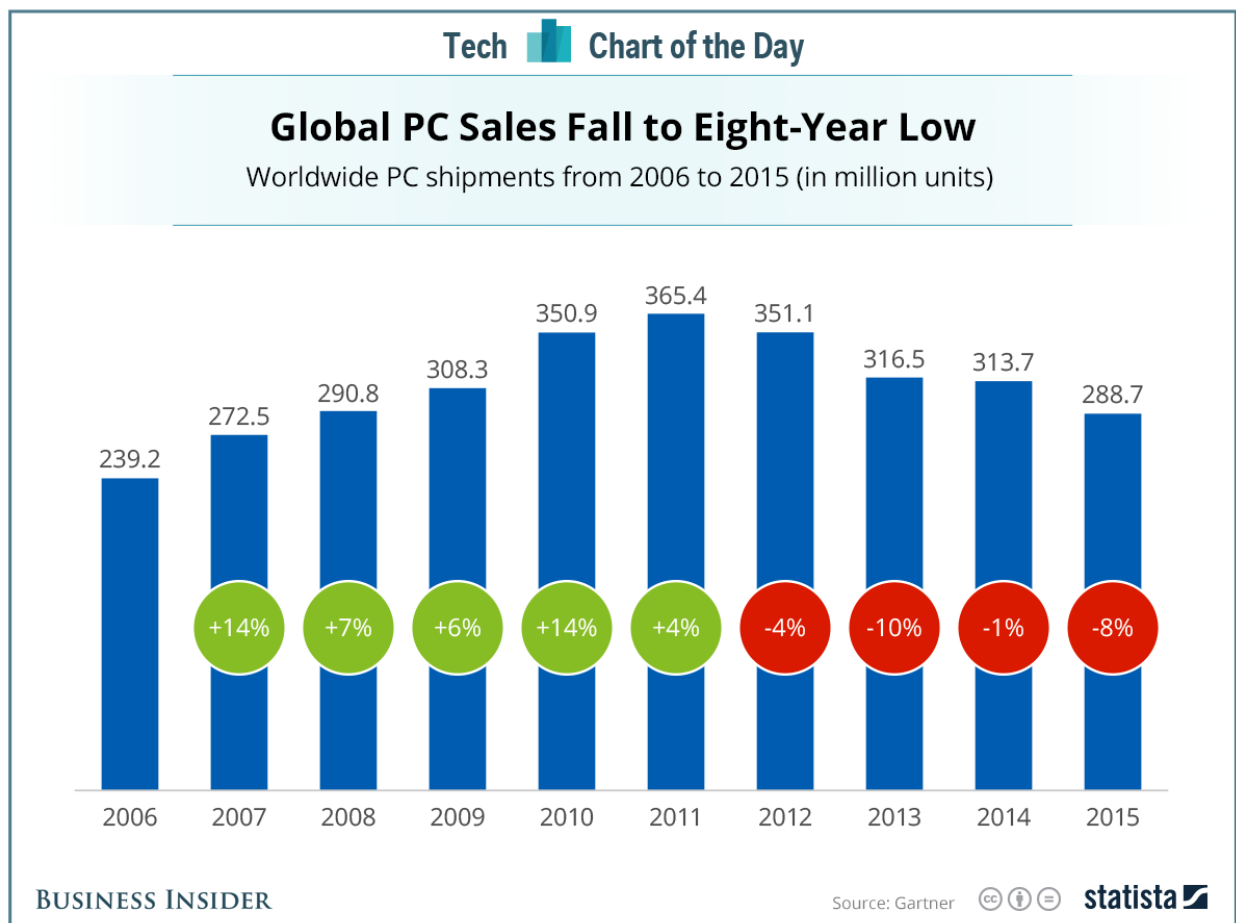


Figure 1. Global PC Sales Fall to Eight-Year Low; *Statista*; Gartner, 13 Jan. 2016; Web; 10 May 2016.

When we consider PC sales in the first quarter of 2016, the results hardly differ. Worldwide PC shipments totaled 64.8 million units in the first quarter of 2016, a 9.6 percent decline from the first quarter of 2015, according to preliminary results by Gartner, Inc. This was the sixth consecutive quarter of PC shipment declines, and the first time since 2007 that shipment volume fell below 65 million units (Petty, “Worldwide PC Shipments Declined 9.6 Percent in First Quarter of 2016”). It is clear that the sales of personal computers are hurting, and this issue has a high potential to snowball and damage other facets of the technology sector. The PC market as a whole is losing money. According to IDC, the PC market shrank 0.8 percent in 2014 to \$201 billion. While it did balloon somewhere in between 5 and 7 percent in 2015, by 2019, the firm expects the overall market to shrink to \$175 billion. This is several billion less than Apple’s 2014 revenue of \$183 billion (Davey). The current state of the PC market poses the question, why exactly is it in a decline?

Arguably the prime suspect in this case is the conquest of the smartphone, as well as the emergence of tablets and other various handheld devices. For the casual user as well as the occupational user, tasks that originally required the use of a personal computer can now be taken care of on the latest iPhone, or Android Nexus tablet. More and more have the words ‘Sent from my iPhone’ been appearing in the signatures of emails worldwide. The flexibility of a mobile devices is what appeals to this generation of consumers, especially in the workplace as many companies have begun to implement work-from-home and BYOD (Bring Your Own Device) policies into their organizational culture (Marley & Mooney 43-44). It can certainly be contended smartphone and tablet technology have enough stopping power to cause the PC

market to slip. Perhaps in the future we will look at the rise of the smartphone as the fall of the personal computer.

If the PC market is shrinking, what does this mean for the industry's pioneers like Microsoft and Apple? Their avant-guard nature has allowed them to thrive in other markets. Take Microsoft for example, as at last year's 'Build' developers conference, they unleashed a technology that may very well play a role in the demise of the personal computer. Windows executive Joe Belfiore described the new Continuum for Phones by saying, "You'll be able to carry a new phone device in your pocket and then at any time connect it to a mouse, keyboard, and larger screen, and unleash a PC experience almost just like the one you'd get from a full PC device." (Kline). This innovation mirrors the value of a personal computer while also providing the convenience of a smartphone. It also promotes a dual screen experience. Microsoft is virtually aiding and abetting the death of the PC here, as they attempt to take advantage of the influx of smartphone popularity.

In this same time frame that PC sales are taking a beating, smartphone sales have prospered. The smartphone industry witnessed a dramatic increase in market penetration, as over the last five years, the share of the population who owns a smartphone has doubled from roughly thirty to sixty percent. By 2017, it is predicted that two thirds of Americans will own a smartphone. This number is projected to increase further as time goes on, but at a bit more mild rate (Smartphone penetration rate as share of the population in the United States from 2010 to 2019). It is becoming increasingly rare to be able to walk down a busy street and not see a substantial amount of people with their eyes glued to their phone or tablet screens. The search engine giant Google is a strong supporter of the mobility driven shift, equally prioritizing mobile sites and desktop web sites in their search results (Schwartz). This promotes the idea that many

companies are targeting their websites solely to mobile users, since the traffic is higher. Figure 2 paints a picture on how mobile devices undertook the top spot, but may not sit there forever.

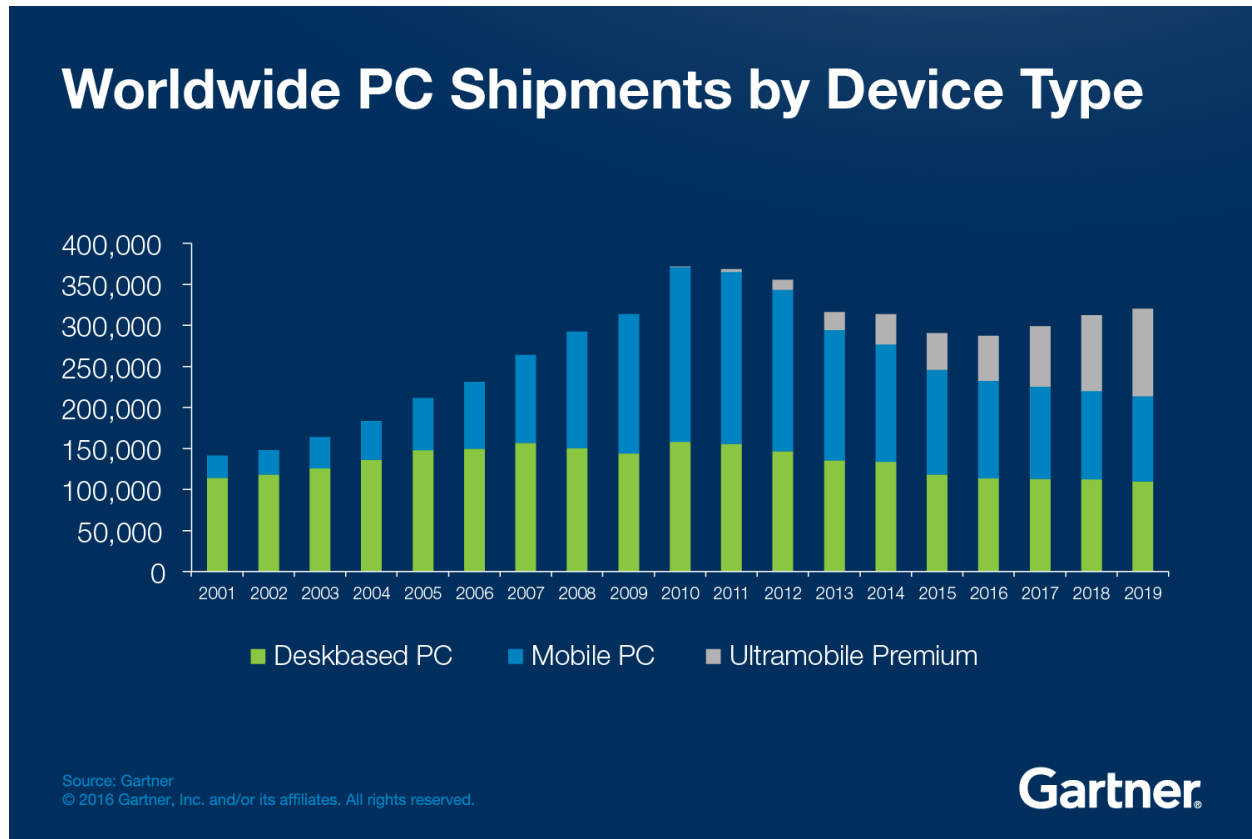


Figure 2. Worldwide PC Shipments by Device Type; *Gartner*, 1 Mar. 2016; Web; 10 May 2016.

A particular group of people who are sure to be extremely concerned with this issue would be venture capitalists. One in particular, the influential Keith Rabois, has made his voice heard in regards to the discussion of the future of the PC. He made a few bold claims on Twitter in 2013, stating that “Nobody is going to be using the web soon, it won’t take 5 years.” and that “Nobody will be using laptops either.” He also seemed to believe that apps will become the supreme technology, and trump the World Wide Web (Rogowsky). With the redesign of Windows’ operating system, and the rise of mobile phone technology, this idea seems plausible. Many obvious benefits of the personal computer are not as impressive as they once were, with

mobile phones seeing improvements in screen size, battery life and storage, they appear to have the edge.

Further reasoning behind the fall of the personal computer involves the strength of the U.S. dollar. As central banks around the world, especially the European Central Bank and the Bank of Japan, continue to try to weaken their currencies, the U.S. dollar strengthens by comparison. This makes it more expensive for foreigners to purchase U.S. products (Kuiper). Even Windows 10, debatably the most worthwhile operating system to come out, has not been able to boost PC sales. While it may be extremely user-friendly and reliable, it has failed to garner enough attention to drive PC sales, like its predecessors Windows 95 and Windows XP were able to do. The idea of a cutting edge operating system is just not as ground-breaking as it once was, and has drowned in the noise of all the rest of the hot computing technology of today. However, Windows 10 is predicted to pick up steam in the near-future, and become more commercially adopted.

Apple visionary, Steve Jobs, went on record at the D8 conference in 2010 saying, “PCs are going to be like trucks. They’re still going to be around, they’re still going to have a lot of value, but they’re going to be used by one out of X people” (Paczkowski). Here, Jobs presents a new argument that personal computers will not necessarily go extinct, but step out of the spotlight as the main platform for users to access the web. This opinion is a bit more realistic, as nothing stays on top forever. It could be regarded as a bit extreme to believe that PCs will become obsolete even quicker than they became relevant, as they are currently so universally relied on. It is actually predicted that 2016 will mark the end of this downward spiral of the PC market. Worldwide PC shipments are forecast to total 287 million units in 2016, a decline of 1 percent year-over-year, and shipments are projected to increase 4 percent in 2017 (Atwal).

While personal computer sales are not what the once were, the premium market of high-end consumers has not taken much heat. Macintosh laptops are regarded as one of the most pricy, yet widely loved devices. Due to the help of their hard-working marketing team, and creative design team, Apple has managed to not suffer, but instead increase their market share in the personal computer sector. According to both Gartner and IDC, Apple has managed to pass Lenovo as the third largest PC maker in the US (Singleton). This leaves a glimmer of hope that the PC will not become irrelevant in the near future.

Figure 3 gives a nice visual showing how Apple's operating efficiency, which compares the expenses of administering a company to the revenues the firm is able to generate, crushes that of Microsoft's. You always want to hear that your company is efficient. While Microsoft's operating efficiency increased from 2.54 to 2.71 from 2013 to 2014, this was not enough to constitute an above average performance. Compare this to Apple's operating efficiency, which stands at 10.14. While this is a decrease of 1.03 from the previous year, it is still way more than enough reason to suggest Microsoft has some room for improvement in this category. Their increasing trend must extend for years if they want to catch up to Apple's efficiency.

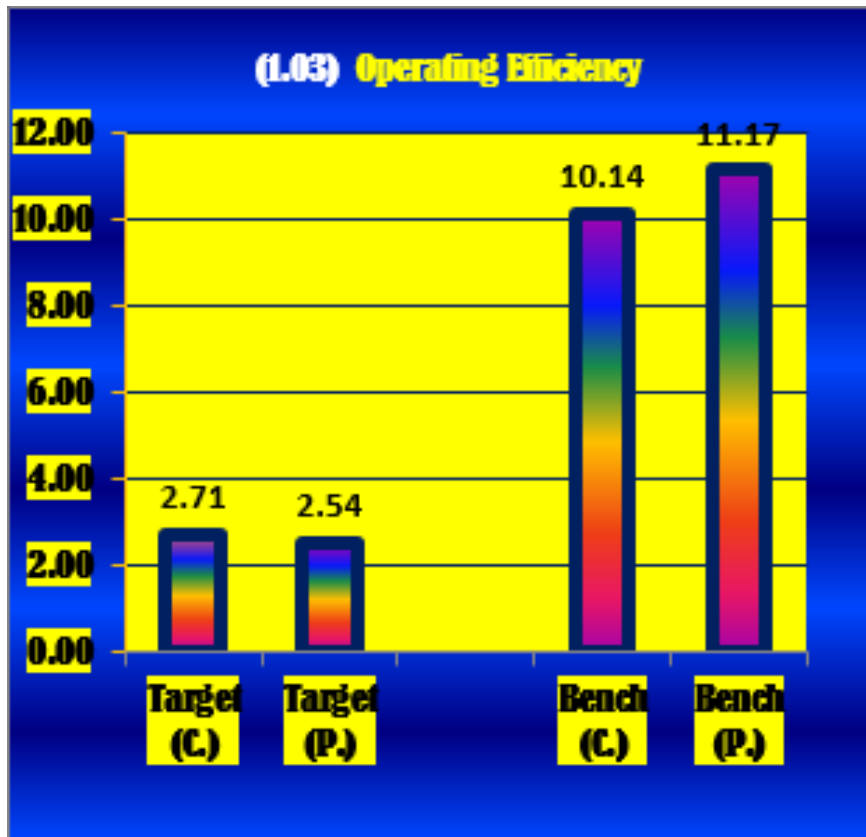


Figure 3. (1.03) Operating Efficiency

Could it be that the personal computer is not on its way out after all? There are a few qualities of the PC that render it a long-term player in the eyes of many techies. One of the most prominent being that the PC more often than not offers a stronger processor, more RAM, and better graphics, which leads to a faster and more effective machine. Trying to fit all of that processing power into a small handheld device is unrealistic. The portability of a smartphone or tablet is nice, but what you gain in convenience you lose in performance. One of the biggest reasons PC sales may not be up to par with mobile device sales is that they last longer, and do not need to be replaced as often. Additionally, tablets and smartphones are the new thing. Many consumers already own personal computers, and with the recent surge of the mobile device market, consumers are now getting the opportunity to get their hands on the new technology.

Yet, there is plenty that the smartphone or tablet is unable to do that, in comparison, would prove fairly trivial on a desktop or laptop computer. Many applications do not offer a mobile version, and those that do often do not include every feature into the mobile application. Take Spotify for example, their mobile app is much less user friendly than the desktop version, and denies some of the core capabilities that the application originally had to offer. The personal computer gives the user a better sense of practicality and accessibility.

For years, PC innovation consisted mostly of putting faster processors or a bigger hard-drive inside the same basic box. That didn't really matter when the personal computer was a mostly unchallenged commodity. With the rise of the smartphone, however, these days we are seeing the re-emergence of innovation in the PC space that is needed to keep it in the public eye. There are a number of developments on the horizon expected to change the way we look at personal computers. Depth-sensing cameras, for example, are popping up in high-end desktops and laptops. Intel vice president Navin Shenoy said his company's "RealSense" camera can recognize its owner's face and unlock a PC without requiring a typed password (Bailey). This is not the extent to which the personal computer plans to refine itself.

Taking a nod from the current leaders, laptop designs are becoming smaller and sleeker, often including touch screen interfaces, resembling tablets. Battery life is also on the rise. Another extremely important aspect of the PC compared to the tablet is the ability to customize and upgrade it when needed. Phones are not built to last forever, and there comes a time when just simply does not work well any longer. On the other hand, a PC can be easily and affordably upgraded to take on new tasks or to take advantage of the latest technology, without having to replace an entire system (Froehlich). To many, it just makes more sense to put your money towards a solid personal computer, instead of spending it on the latest smartphone or tablet.

A slightly different area in which the personal computer is thriving is in video games. While PC gaming has always been relevant, over the past few years, games have come out that have propelled PC gaming revenue over that of console gaming. High performing games such as League of Legends and Dota 2 have pushed PC gaming to a new level and, despite the release of new consoles, and a lack of big new releases, the PC market is still managing to outperform consoles (Serrels). Since many people already own personal computers, it is more accessible for some to play games on the PC, rather than buying a separate console.

Conclusion

There is without a doubt a great deal of support for the argument that the personal computer is on its way out. With smartphones more advanced and prevalent than ever, they are able to satisfy all the needs of a fair portion of the overall market. It may seem as though the personal computer's time is up, but it still might have some fight left in it. There are just some things that require a desktop or laptop, and there is no getting around that. Is it reasonable to assume that some of the biggest companies on the world could operate solely off of smartphone technology? People love options, and today, the options are endless. With so many different smartphones, tablets, and PCs, the consumer's purchase decision has never been so difficult.

In the end, tablets, smartphones and PCs all have their niches in our society. A tablet can be the perfect device for someone to watch their favorite show. Another user could prefer to watch on the bigger screen of their laptop, we are all different. Then convenience of a smartphone cannot be matched, while it will take a long time for smartphones to be on par with the specs of a PC. Since many new technologies these days are built with a computer integrated

within, it is tough to argue the fact that it is becoming increasingly easier to rely less on your personal computer and more on your other devices.

We cannot tell the future, so it is impossible to really say whether or not PCs will stick around indefinitely. The speculation, however, is inevitable. People love to speculate, and for good reason. All in all, only time will tell.

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