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企業管理碩士學位學程

碩士論文

探討微軟採用開源軟體策略的原因

Why Microsoft start to embrace open source

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Abstract

Microsoft used to be a leader in software industry and was famous for anti-open-source for a long time. However, more and more evidences show that Microsoft had changed their attitude and start to embrace open source. Why and how Microsoft make such a huge change? This is what this thesis want to discuss about. In this paper, I use building theory (Eisenhardt, 1989) and set three hypnosis - the direction of Microsoft's change, how they relocate the resource, and how they implement the change in their business model. Those information were collected from second hand or third hand reports from 1991 to 2015. My conclusion is that: embracing Open Source increase the chance for Microsoft to be a platform leader again.

Keywords: Open Innovation, Open Source, Dynamic Capacity, Microsoft, Platform Leader

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Introduction

Research Background and Motivation

Since 1960s, the idea of open innovation has been proposed. "Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology." (Chesbrough, 2003) It creates a buzz with more than 2,960,000 hits in Google scholar on open innovation. And Henry Chesbrough's 2006 book has more than 10,302 citation.

According to Henry Chesbrough, the shorter product life cycle in the market and rising development costs of innovation create more incentive for company such as IBM, Intel, and Procter& Gamble to open its business model in their business (Chesbrough, 2007).

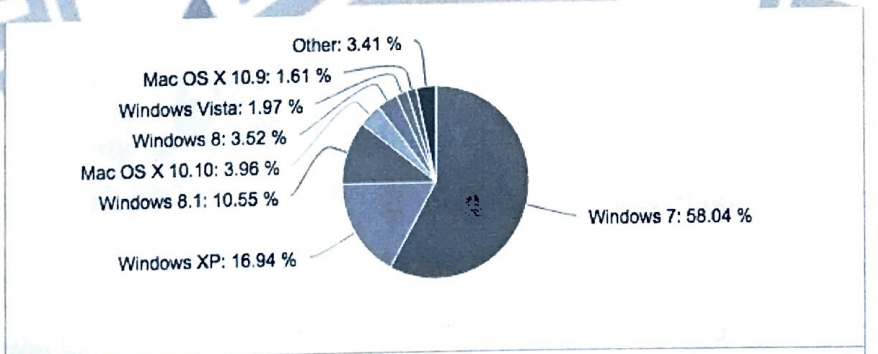
When we apply open innovation to both the process and outcome, open source is exactly this kind of example (Huizingh, 2011). However, in software industry, when it comes to open innovation, there still have some concern.

In 1991, Bill Gates, the founder of Microsoft, has opined that "If people had understood how patents would be granted when most of today's ideas were invented, and had taken out patents, the industry would be at a complete standstill today." (Cockburn & MacGarvie, 2009). In 1998, the "Halloween documents", which are believed as Microsoft confidential memo on potential strategies toward free software, open-source software, came to light. Microsoft has been considered to be the number one enemy of Linux and open source

community for more than ten years.

Microsoft also openly attacked open source citing problems related to version incompatibilities, intellectual property risks (especially in the context of copyleft licenses), lack of a credible business model, and an inability to fund innovation (The Economist, 2001) (Spinellis & Giannikas, 2012). The former CEO Ballmer had said about Linux in 2001:" Linux is a cancer that attaches itself in an intellectual property sense to everything it touches... The way the license is written, if you use any open-source software, you have to make the rest of your software open source." (Lendino, 2015)

Microsoft did achieve a huge success from the prospect of market share worldwide in computer operating systems. According to NetMarketShare for March 2015, multiple versions of Windows together command roughly 90 percent of the desktop-and-laptop OS market: (NETMARKETSHARE, 2015)



OPERATING SYSTEM	TOTAL MARKET SHARE
Windows 7	58.04%
Windows XP	16.94%
Windows 8.1	10.55%
Mac OS X 10.10	3.96%
Windows 8	3.52%
Windows Vista	1.97%
Mac OS X 10.9	1.61%
Linux	1.50%
Mac OS X 10.6	0.61%
Mac OS X 10.7	0.48%

Figure 1. Market Share of the desktop-and-laptop OS market
Source: NetMarketShare

However, the attitude of Microsoft toward open source changed dramatically. Corbet et al. (2012) shows Microsoft ranks 17 in the list of top contributors to Linux. In 2010, Jean Paoli, the general manager of Microsoft's interoperability strategy team, declared: "We love open source." (Casadesus-Masanell & Llanes, 2015) In November 2014, Microsoft even announced the open source release. NET core code on GitHub, the world's largest open source code escrow Web site. Nowadays, Microsoft Azure, Microsoft cloud platform, supports a large and growing number of open-source applications, frameworks, and languages, as a result of Microsoft's collaboration with the open source community (Micorsoft official website).

Why Microsoft, as the largest of the closed source software company, starts to embrace open source? Does Microsoft change their business model?

Research Objective

The object of this research is to analyze the trend of software industry- how a monopoly commercial company embrace open source gradually. Why Microsoft, as the largest of the closed source software company, starts to embrace open source? How Microsoft implement it to their strategy? In this thesis, I will use Microsoft as a case with open innovation and dynamic capacity theory to analyze why the software leading company embrace open source.

Literature Review

Open Innovation

In 2003, Chesbrough developed an innovation paradigm shift from a closed to an open model in his book Open Innovation. 'Open Innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation.' (Chesbrough, 2003) It is about how to manage the process of innovation. According to his model, as Figure1 shows below, projects can be process with both internal resource and external technology. And new technology can enter into the process at different stages, which will accelerate internal innovation, and expand the markets for external use of innovation.

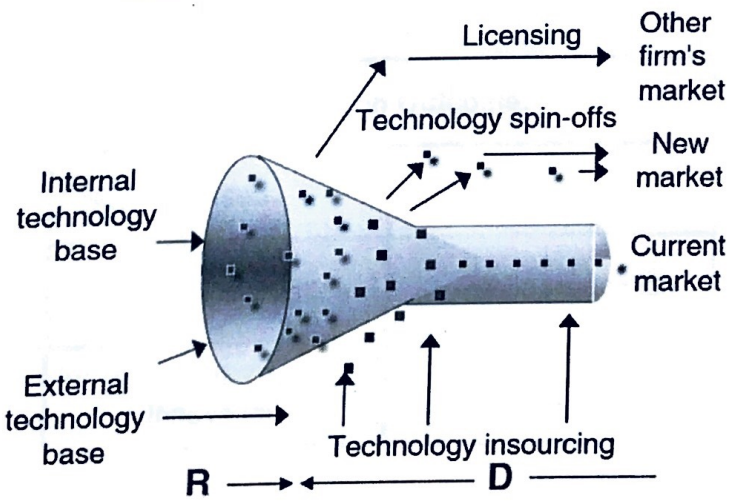


Figure 2. An Open Innovation paradigm
Source: Chesbrough, Henry(2003)

Since the rising costs of technology development and short product life cycles, it becomes difficult for firms to invest in innovation. (Chesbrough, 2007) With

the open innovation business model, firms can benefit from licensing fee, joint venture, spinoffs and the cost and time saving form external development. (Chesbrough, 2007) And there are many ways that firms can use external knowledge, such as utilizing strategic alliances, imitating a competitor, consulting with customers, funding university research, and etc. Among that, open source software has been an important phenomenon that utilizes external knowledge in a network structure. (Chesbrough, 2006)

In 2011, Eelko K.R.E. Huizingh proposed the questions of what the content of open innovation, when the context dependency, and how the process of innovation. One of the way to classify openness is based on the process and outcome. Both the process and outcome can be closed or open, and it leads to a 2X2 matrix as below. (Huizingh, 2011)

Innovation Process:	Innovation Outcome:	
	Closed	**Open**
Closed	1. Closed innovation	3. Public Innovation
Open	2. Private Open Innovation	4. Open Source Innovation

Figure 3. Various ways of innovation based on the openness of both the process and the outcome of innovation.
Source: Huizingh, Eelko R.E.(2011)

The closed innovation means that both the process and outcome are developed in-house. The second catalog adopts open process which uses internal and external resource to develop innovation and the outcome is closed. The famous

case is Procter& Gamble (Huston & Sakkab, 2006). The third one, devoting plenty of resource and give the outcome for free, sounds unreasonable. However, it makes sense from the point of view that it can set stander in the industry. The last one with both process and outcome innovation are open, is well known as open source innovation. (Huizingh, 2011)

Open Source

In 1999, Eric Raymond's paper, "the Cathedral and the Bazaar", he compared two approaches of engineering software. The first is the cathedral:

> "...needed to be built like cathedrals, carefully crafted by individual wizards or small bands of mages working in splendid isolation, with no beta to be released before its time."

The other is the bazaar:

> "...release early and often, delegate everything you can, be open to the point of promiscuity... a great babbling bazaar of different agendas and approaches...out of which a coherent and stable system could seemingly emerge only by a succession of miracles."

With more people using and developing the software, there is a greater chance that bugs will be spotted and someone will have the correct "toolkit" to deal with the problems simply. It also can increase the number of concept suggestions. (Wheeler, 1999)

According to Open Source Initiative, the definition of open source is as below (Open Source Initiative):

1. Free Redistribution

The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.

2. Source Code

The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a preprocessor or translator are not allowed.

3. Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

4. Integrity of The Author's Source Code

The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The

license may require derived works to carry a different name or version number from the original software.

5. No Discrimination Against Persons or Groups

The license must not discriminate against any person or group of persons.

6. No Discrimination Against Fields of Endeavor

The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

7. Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

8. License Must Not Be Specific to a Product

The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.

9. License Must Not Restrict Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

10. License Must Be Technology-Neutral

No provision of the license may be predicated on any individual technology or style of interface.

Well-known examples of open source software include the Linux operating system kernel, the Mozilla Firefox web browser, the OpenOffice.org office application suite, the Mysql relational database system, and Apache Internet Server, Google's Android iOS. Many OSS products offer plausible alternatives to The corresponding proprietary products, while some, like the Apache web server, the Sendmail mail server, and the bind domain name system server, are market leaders in their categories (Spinellis & Giannikas, 2012).

Open source movement literature mostly focus on the incentive of individual programmers join open source projects and contains evidence for the importance of both economic career-source and noneconomic intrinsic motivations. A smaller literature presents insights on competition between open-source and traditional software products. (Athey & Ellison, 2014)
Many literature cite plenty of open source benefits for operational software, which including high quality, in terms of reliability and stability (Forge, 2006; Varian and Shapiro, 2003); lower costs, as the software is often made available free or at a low purchase costs (Shaikh and Cornford, 2011; Morgan and Finnegan, 2007; Fanini, 2005); escape from vendor lock-in (Shaikh and Cornford, 2011; IDA, 2004; Johnson, 2003); user support from experts in the online community (Williams et al.. 2005; Krishnamurthy, 2003); and flexibility of use in that the software can be customized or modified to specific needs(Varian and Shapiro, 2003; Krishanmurthy,2003).

Dynamic Capacity

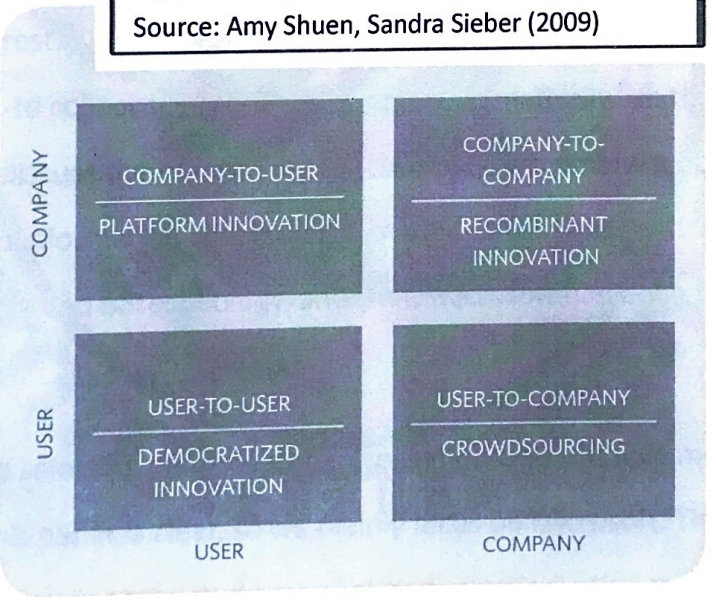
In 1989, the term Dynamic Capabilities was first introduced. Originally, dynamic capabilities was distinct from operational capabilities, which pertain to the current operations of an organization. (Wikipedia, 2015)Dynamic capabilities, by contrast, refer to "the capacity of an organization to purposefully create, extend, or modify its resource base." (Helfat et al., 2007)

Teece(1997) proposed the dynamic capacities approach how firms achieve and sustain competitive advantage. He defined dynamic capacity as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." (Teece, Pisano, & Shuen, 1997) In 2007, Teece's came up a framework, as below, of how to sustain a long-run success by disaggregating dynamic capabilities into : "the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets." (Teece, 2007) According to Teece, for enterprises, dynamic capabilities is the foundation of competitive advantage while facing rapid (technological) change. " the extent to which an enterprise develops and employs superior dynamic capabilities will determine the nature and amount of intangible assets it will create and/or assemble and the level of economic profits it can earn." (Teece, 2007) Even though the past will impact current and future performance, there still have much room that management can do to design processes and structures to support innovation and avoid the enterprise be affected by the

improper processes and structures designed for an earlier period.

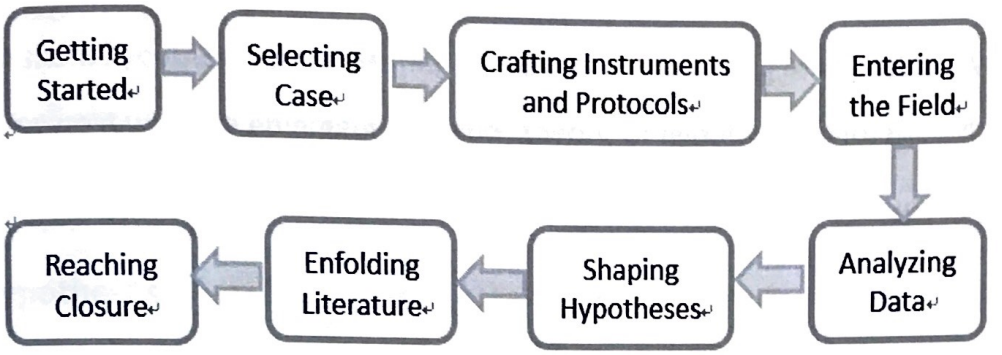
In 2009, Amy Shuen and Sandra Sieber came up with "the New Dynamic Capabilities". With the rise of Web2.0, new digital, information and network economics and the fall of the transaction costs of specialized multi-party orchestration change the business models and how firms collaborate with others. This framework focuses on "using a company's own dynamic capabilities to orchestrate and recombine the best of what the online world has to offer while multiplying the value of existing networks of users and partners." The below figure 4 shows different ways to combine users with company capability profitably and speedily with the help of digit. (Shuen & Sieber, 2009)

Figure 4. The New Collaborative Matrix
Source: Amy Shuen, Sandra Sieber (2009)



Research Methodology

In this paper, I adopt building theories from case studies (Eisenhardt, 1989). The process is as table below.



The first step is defining the research question. "An initial definition of the research question is important in building theory from case studies." (Eisenhardt, 1989) A research focus define the scope of how many and what kind of information we should collect, and also shape the initial design of theory. Mintzberg (1979, p.585) noted: "No matter how small our sample or what our interest, we have always tried to go into organizations with a well-defined focus-to collect specific kinds of data systematically." In this paper, we would like to discuss the reason why Microsoft start to embrace open source. Therefore, the information collected will related to the change of users' behaviors, the trend of technology, and what Microsoft had done to react the changes.

Second Step is selecting cases, and then collect data by multiple methods. Since the topic of this paper is clear, so we mainly focus on Microsoft. The source of research materials for case study are analyzed using inductive reasoning. The source of this study are mainly from secondary data and information, including company's annual report, official website, officially released videos. Statistical data from market research websites are also used to support the ideas in this study. The range of time of the data used in this research is from 1991 to 2015.

The next step is analyzing data in order to build theory from case study. Then, we sharp hypotheses by measuring constructs and verifying relationships. We compare it with the emergent concepts, theory, or hypotheses with the extant literature. Then, the next step, we reach closure.

Hypotheses

1. Open innovation create more value than close innovation in software industry
2. Enterprise use dynamic capacity to relocate its resource to cope with the environment change
3. Microsoft changes its business model to open innovation in order to create more value

The Interaction between Microsoft and Open source

Microsoft Corporation is an American multinational technology company headquartered in Redmond ,Washington. Paul Allen and Bill Gates officially established Microsoft on April 4, 1975, with Gates as the CEO.

In 1991, Bill Gates has opined that "If people had understood how patents would be granted when most of today's ideas were invented, and had taken out patents, the industry would be at a complete standstill today (Cockburn & MacGarvie, 2009)."

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enemy of Linux and open source community for more than ten years.

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In May 2001, Craig Mundie is Senior Vice President at Microsoft. He is critical of a pure open-source model: "A common trait of many of the companies that failed is that they gave away for free or at a loss the very thing they produced that was of greatest value in the hope that somehow they'd make money selling something else." (Software pluralism, 2015). Mundie argued that it was essential to retain the value of IP so that the investment in R&D can generate a return attractive to investors, as well as the broader community. (Software pluralism, 2015) (Turner, 2011)

According to Stephen Shankland's report on CNET on 2008: in an October 2002 interview, Ballmer touted Microsoft's shared-source program, which initially emulated some open-source attributes without giving programmers full freedoms. "We're learning...from the Linux world...If you take a look at the Linux world...There are many more communities in the Windows world than in the Linux world. I don't think we have mobilized that community as effectively as the Linux community has." (Shankland, 2008) And in June 2003, Pete

Houston, Microsoft's senior director server strategy, said Microsoft had moved beyond its philosophical attacks and had begun trying to show customers the "business value" of Microsoft products. "I don't see the Linux community development model building the integrated offerings we have today," he said. (Shankland, 2008)

In 2004, Microsoft initiated its Get the Facts campaign, which criticized Linux server usage. (Wikipedia, 2007) According to Microsoft website, it claimed that Windows is more reliable and secure than Linux, the total cost of ownership of Linux is higher (due to complexity, acquisition costs, and support costs), and Linux vendors provide little, if any indemnification coverage, and so on.

After few years, Microsoft softened its attacks and even began launching its own open-source projects.

In June 2006, Microsoft launched and solely owned a site called CodePlex as its free open source project hosting site. (CodePlex, 2015) One can create projects to share with the world, collaborate with others on their projects, and download open source software.

According to Fortune's Roger Parloff reports, in May 2007, "Microsoft claims that free software like Linux, which runs a big chunk of corporate America, violates 235 of its patents. It wants royalties from distributors and users." Ballmer and Brad Smith, Microsoft's top lawyer, said Linux and other opens-source projects collectively violate 235 Microsoft patents. "We live in a world where we honor, and support the honoring of, intellectual property," Ballmer said in an interview with Fortune. Microsoft's open-source competitors must "play by the same rules as the rest of the business." (Parloff, 2007)

In 2008, Sam Ramji, the Microsoft's director of platform technology strategy and the company's Open Source Software Lab, said "The Microsoft open-source strategy is focused on helping customers and partners be successful in today's heterogeneous technology world."

On July 1, 2008, Microsoft acquired Powerset, a semantic search startup that was among the first companies to run a web service atop Hadoop. Microsoft allowed the engineers of Powerset to continue contributing code to the open source project. (Metz, 2012) At same point, the project abandoned the technology and moved the service to Microsoft software, and at least one of the main open source contributors left the company. (Metz, 2012)

In 2011, Microsoft had become the fifth largest code contributor to the Linux kernel. Making sure Linux could work with Microsoft's Hyper-V virtualization. Hyper-V lies at the heart of Azure. (Vaughan-Nichols, 2014)

"The former CEO of Microsoft stepped down in February of 2014, and Satya Nadella took over. In September, Windows 10 was announced, with a new release plan, and a return to the design values of Windows XP and 7." (Bourque, 2015) Staya Nadella's background was at Sun Microsystems. During his time at Microsoft, Microsoft release the .NET framework as open source software in Github, and it runs both Linux and Mac OS X. As to Windows 10 Technical Preview, Microsoft has invited anyone and everyone to come try the newest OS. The development team has used A/B testing and an aggressive user feedback system to build a useful and responsive set of data about Windows 10 well before its release at Sep 2015. While the previous versions of Windows had very limited beta periods, open only to hardware managers and IT

professionals that applied for the program and signed a non-disclosure agreement. (Bourque, 2015) Nadella admitted that 20 percent of the operating systems on Azure are Linux.

In April 2015, at the Chefonf conference in Silicon Valley, Mark Russinovich, one of Microsoft's top engineers and Microsoft Azure CTO, admitted that most of the programmers run their machines by open source Linux operating system. "So many companies-so many Microsoft customers- are now relying on open source code. And that means that Microsoft must embrace it too." (Metz, Microsoft: An open source Windows is 'definitely possible' , 2015)

Discussion

1. How to be a Platform Leader in order to create value? Does open innovation create more value than close innovation?

Technology platforms are the hubs of the value chains in technology industries. (Economides & Katsamakas, 2006) The firm who becomes a platform leader and controls a platform can maintain a strong position in the industry but also faces the challenge of managing the evolution of the platform. (Gawer & Cusumano, 2002)

I. The Challenged Old Age Platform Leader：Microsoft in PCs and Laptops

Microsoft used to be the leader of operating system in PCs and laptops.

However, it is challenged from two aspects: First, most of the programmers run their machines by other OS, such as Linux or iOS. Second, more and more firms

adopt OSS. Take large US companies for example, those firms who run part or all of its operations on OSS is significant and is increasing over time through a low-churn transition, advancing from applications to platforms. (Spinellis & Giannikas, 2012) According to the 2015 Future of Open Source Survey, which annually conducted by Black Duck Software and North Bridge, also reflects the increasing adoption of open source. Up to 78% percent of respondents run part or all of its operations on OSS, which is nearly doubled since 2010 with 42% respondents run on OSS. More than half of respondents believe: 1) open source affords the greatest ability to scale, 2) it delivers superior security when lined up against proprietary solutions, 3) OOS is enabling enterprises to compete and win, and 4) OSS helps them find and recruit top talent. (Bourque, 2015)

II. The New Age Platform Leader：Google Android in Mobile Device

According to Mary Meeker, one of the Morgan Stanley analyst, we are in the era of the mobile Internet. It means that the importance of laptops and PCs will be gradually substituted by mobile devices. She predicted that by 2015 "more users will connect to the Internet over mobile devices than desktop PCs." As the figure Morgen Stanley Research shows below. (Ingram, 2010)

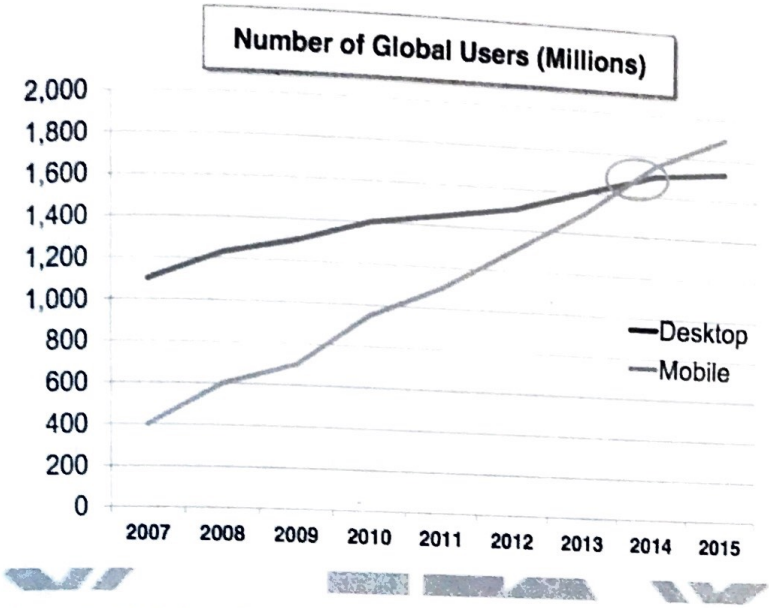

Figure 5. Global Mobile vs. Desktop Internet Users Projection, 2007-2015E
Resource: Ingram, Mathew (2010)

However, Microsoft is not a leader in mobile operating system. In the US, Android has more than half of share in smartphone platform with Microsoft has around 3.5%. (9to5google, 2015) As to the worldwide market share, Android has become dominant over 80%. (Pon, Seppälä, & Kenney, 2014)

Actually, at around 2007 to 2008, Symbian was the dominant OS. Microsoft had tried to capture the market share with the same strategy it had so successfully implemented in the PC industry, by licensing its Windows CE operating system to OEMs and Developers. Once Microsoft dominated the market, it could control access to the mobile web and therefore be positioned to displace Google's searching engine with its own Bing. Then, Google's core advertising revenue model will be disrupted. So, Google launched Android in 2008 was a defensive move. (Pon, Seppälä, & Kenney, 2014)

Google never intended to monetize the operating system directly, Android was meant to increase the total number of internet users. (Pon, Seppälä, & Kenney,

2014) So, what make Android so success in mobile operating system? Open source give Android unique advantages at the time of its release.

First, almost all The OEMs manufacturing mobile phones members of the Open Handset Alliance(OHA) released Android phones and still continue to do so. Second, since the Android source code is available for people to download and change, more and more variants of the operating system, adapted to different hardware platforms, are also popping up. It is also very easy for the developer to quickly develop an app. The number of apps available for a particular platform can help one gauge the popularity of the OS. Third, since it was the first open source mobile operating system, Android generated much interest. (Tiwari, 2014) Google Android operating system even open licenses and enables other firms to build proprietary platforms on top of the operating system (Pon, Seppälä, & Kenney, 2014).

III. How to be the Next-Generation Platform Leader?

From the above information, open innovation/ open source do create more value than close innovation in the new age platform war.

Now that Microsoft had lost in mobile operating system, how can Microsoft do to seize opportunities in the near future? As to the future trend, "cloud" and "Internet of Everything" are things that all those high-tech company eagerly joined. It is an obvious phenomena that more and more applications move from local data centers to "cloud" services. In the past, businesses paid companies like Microsoft for software and loaded it on their own servers. Now, businesses pay to use online services instead (Metz, 2012). It would be better

for Microsoft to pay more effort on how to be a leader in cloud platform. Then, probably Google Android business model with open source ecosystem can be a good model for Microsoft's reference.

2. How to relocate the resource to cope with the environment change?

Nowadays, Microsoft supports a variety of open-source programs such as the big data Hadoop, Docker containers (Microsoft acquired it on June 2015), and Facebook's open compute datacenter project.

At the same time, Microsoft is giving to open source as well as taking. Orleans, the .NET distributed cloud-programming model behind the Halo game, is going open-source. Microsoft is also open-sourcing the full server-side .NET core stack and porting it to Linux and Mac OS X. Microsoft has already open-sourced a tool for moving virtual machines from one Azure data center to another, plus other .NET code and tools, and many developer tools. (Vaughan-Nichols, 2015)

Besides, Microsoft Staya Nadella also admitted that 20 percent of the operating systems on Azure are Linux.

Microsoft also releases a free, cross-platform development application, "Visual Studio Code", and which runs on both Mac OS X and Linux, and handles an immense number of programming languages. It even includes the Intellisense intelligent code completion tool that's built into the full version of Visual Basic Studio. This isn't a token attempt to bring Windows to other hardware, but a fully released tool meant to make Windows 10 development easy on any

platform. (Bourque, 2015)

As to Windows 10, Microsoft has invited anyone and everyone to come try the newest OS, and did so quickly, putting out the first technical preview just days after the announcement in September of 2014. The development team has used A/B testing and an aggressive user feedback system to build a useful and responsive set of data about Windows 10 well before its release. (Bourque, 2015)

3. How can Microsoft change its business model?

I. Generating money via Microsoft Azure

Nowadays, more and more businesses pay to use online services. (Metz, 2012) That's the reason why Microsoft continues to transform itself from a software sales company to a software service rental business with Windows as a Service. (Vaughan-Nichols, 2015)

According to Bill Hilf, working for Microsoft to oversee Azure, "With Azure, we make money from compute and storage and bandwidth...., we want to offer as many types of applications and as many types of systems as we can, so they can help that flywheel spin.... We don't see [Node.js] on Azure as altruistic. We see it as a way to drive business." (Metz, 2012) Microsoft can make money by offering open source software atop Azure, such as Office 365, Cosmos big-data service, and so on. (Metz, 2012) Microsoft's fortunes now lie not with the desktop or desktop programs, but with its Azure cloud and cloud-based programs. (Vaughan-Nichols, 2014)

II. Getting more Chance to be a Leader in Cloud Platform

All Microsoft Azure's competitors - Amazon Web Services, Google Compute, OpenStack, etc.,-all run in Linux and offer Linux server services. From the experience of the war of being a leader of Mobile operating system, if Microsoft still insist on using close ecosystem, it is highly possible that Microsoft couldn't be a leader in could.

Open sourcing .Net also creates an alternative to Java and boost Microsoft's Windows Azure cloud. As long as Microsoft keeps retaining larger numbers of dedicated developers, this will continues to fan the flames of the platform be providing .Net developers with a cross-platform runtime strategy based on open source. This move will help popularize the .Net applications, which will help Azure. (Bourque, 2015)

III. Making Money from Open Source

"How and why software and IT firms engage in OS development where, paradoxically, increased 'public' investment can lead to greater 'private' benefits." (Grand, Krogh, Leonard, & Swap, 2004) There are different business model that Microsoft can reference. Take Rat Hat for example. Rat Hat generate revenue not from selling proprietary software but from distributing and adding services to software protected by OS license. To firms who adopt this kind of business model, the cost of developing new software, exploring new technologies and customer needs are lower compared with the one who don't adopt open source. Besides, those firms

can keep interacting with user community. (Grand, Krogh, Leonard, & Swap, 2004)

Microsoft is also able to generate money by selling other stuff. Embracing open source can generate more users to Microsoft's new service. If Microsoft did open source Windows, Microsoft could expand the use of its OS. Open Code is easier to test, easier to shape, easier to build into something else. And if the OS is more widely used, that means a bigger audience for the Microsoft applications that run on Windows. (Metz, 2015). Some firms profit from selling products and services that are complementary to OSS products (Athey & Ellison, 2014). Microsoft also makes money directly from Linux. It can sell enterprise service and management packages the way Red Hat does (Lendino, 2015). Just like Linux and Android package, distribute, and update the OS to as a vendor. (Krill, 2014)

According to Lorraine Morgan and Patrick Finnegan, while decision makers looks to open innovation initiatives like Open Operating System for value creation and capture, there is still a desire to remain self-reliant. (Morgan & Finnegan, 2014) For Microsoft, Windows is still a big part of Microsoft revenue stream (Metz, 2015), it is hard for Microsoft to open source the Windows' code in a few day, even though Microsoft has given away Windows 10 for free.

Conclusion

My conclusion for the main reason why Microsoft to embrace Open Source is about to how to be a leader again!

Even though Microsoft is still the leader in laptops/PCs platform, it is still a crisis that most of programmers run their applications on open source such as Linux, and more and more firms adopt open source.

As to the mobile device OS platform, Microsoft loss the war to Google Android. The old way which made Microsoft successful in laptops/PCs OS are not working anymore. Instead, the why how Google Android dominate the market with open source is a good example for Microsoft's reference.

In the following technology trend, it would be important for Microsoft to win and to be a leader in cloud platform. To win is to change. It is wise for Microsoft to change its business model and embrace open source.

Microsoft is able to generate money by offering open source atop Microsoft Azure, such as Office 365. Since all Azure's competitor all run in Linux and offer Linux server services, Microsoft must have to adopt open source in order to generate more users, and which will enhance the chance for Microsoft to be a leader in this area. Besides, embracing open source can generate more users to Microsoft's new service, which is beneficial for Microsoft to sell other stuff, too. So, in the platform leader war, I conclude that embracing open source is a wise decision for Microsoft.

Research Limitation

The limitation for this thesis is lacking of face-to-face interview with Microsoft managers, and the information is insufficient and is limited to surface news or information. Therefore, we can't know some exactly reasons and motivation of Microsoft, such as why Microsoft change their attitude toward open source at that time, and why Microsoft have this ideas..., etc..

Besides, those hypothesis may will lead the whole research and make the information collection become subjective.

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