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Abstract

This paper is based on a literature review, and aimed to draw up some aspects, which are useful to discuss differences and effects of the proprietary and open market approach. Furthermore, the main goal of this work is to investigate this area through observing business practices of three giant tech companies in order to decide if they are participants of an open market or leaders of proprietary markets.

Proprietary vs Open Markets in IT

Apple, Microsoft, Google

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# Introduction

The IT market is a segment of the global economy, which since its born shows exceptional growth and there isn’t any reason to think that this trend will stop soon. Market analysts forecast that growth in every segment of IT is continuing also in 2019. Moreover, analysts say that the IT market growth is currently also fuelled by technologies like cloud computing, which could contribute to a historical market growth. (Gartner, 2018)

Table 1  
Worldwide IT Spending Forecast (Billions of U.S. Dollars)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2017  Spending | 2017  Growth (%) | 2018  Spending | 2018  Growth (%) | | 2019  Spending | | 2019  Growth (%) |
| Data Center Systems | 181 | 6.4 | 192 | | 6.0 | | 195 | 1.6 |
| Enterprise Software | 369 | 10.4 | 405 | | 9.9 | | 439 | 8.3 |
| Devices | 665 | 5.7 | 689 | | 3.6 | | 706 | 2.4 |
| IT Services | 931 | 4.1 | 987 | | 5.9 | | 1,034 | 4.7 |
| Communications Services | 1,392 | 1.0 | 1,425 | | 2.4 | | 1,442 | 1.2 |
| Overall IT | 3,539 | 3.9 | 3,699 | | 4.5 | | 3,816 | 3.2 |

Source: Gartner, 2018

This means that since IT is present in almost every market segment, companies, which are providing IT-based products or services are the new stars of economy. Silicon Valley, which is now not just a place in the USA, but also the symbol of IT sector, gave birth to giant tech companies, which now playing extremely important role on the IT market. Apple, Microsoft and Google started they business in different segments, but nowadays all of them are represented in various segments of the IT market like hardware components, software, services or complex enterprise solutions. During the years of the market growth, among many others, these IT companies gained so much power in some segments, that it regularly raises questions whether they are abusing their power to maintain their monopoly in the market and how they are influencing market operations with their business strategies and product designs. (European Commission, 2009) (European Commission, 2018) (Spotify, 2019) The dominant position is barely questionable, since these three firms are in the first three internet companies if we look at their market capitalization in 2019. (Statista, 2019)

In the light of the above, it can also be questioned that these companies are competitors on an open market, as in some segments they are so dominant that they can easily hinder competitors to enter onto the market. Moreover, sometimes they integrate whole market segments into their own platforms, which create proprietary instead of open markets, where they dictate the rules for other participants. In order to understand why this business concept is functioning on the IT market, the legal background of software and the specialties of the IT market segments have to be clarified, which provide a good environment for monopolies. We also have to understand, which instrumentals are used for creating proprietary markets on the IT market, and how they can be avoided if there is any possibility for that. In the end, the conclusion about the current openness of the IT market and the role of the proprietary markets can only be drawn, if a proper analysis of the different segments of the IT market shows evidences, which proving the presumptions, that market openness is hindered by the practices of these companies, which tend to push customers towards precisely regulated, limited marketplaces.

# Conceptual background

### Intellectual Property

Desired instruments to protect the intellectual property is a constantly discussed topic since digitalization of the immaterial goods made harder to control the usage of them. It is less common to discuss the purpose and the role of the intellectual property rights (IPR) though. The above-mentioned expression is a general one, so typical usage areas and the idea behind them is various.

The intellectual property rights can be divided into two different branches according to significant organizations like World Trade Organization (WTO) and Intellectual Property Organization (IPO). The first category is the copyright and other rights related to copyright. This legal construct is also often referred to as author’s rights, which means that the creator of an intellectual work has some specific rights in relation with own works. However, the widely used expression “copyright” refers the reproduction of the original product, which is only allowed to the author or with the permission of him/her. Copyright can be related to literary and artistic creation or a work based on technology such as a computer software as well. A commonly accepted ideology behind this legal form is that “the main social purpose of protection of copyright and related rights is to encourage and reward creative work.” (TRIPS: What are IPRS, 2019)

The second category of IPR is the industrial property itself, which may appear in many forms but have two areas and two main goals behind them. The protection of distinctive signs (trademarks), intends to guarantee and encourage the fair competition, while the role of other types of industrial properties like patents is to stimulate innovation and creativity in technology. The financial aspect of this stimulation is also often mentioned because the protection of industrial property gives „the incentive and means to finance research and development activities.” (TRIPS: What are IPRS, 2019)

If we look at IT and specifically the software industry, we will see that there is a significant difference between the above-mentioned concepts and how they are used in that industry.

### Ownership and Licensing

The traditional proprietary software model is built up on upfront license fees, which means that specified amount of money must be paid in order to grant the right to use the software. The business model of the more and more popular hosted applications grants even less rights to the users. In this case the provider only grants an access for the user in exchange for the fee. In both cases the actual ownership doesn’t belong to the user who “bought the software”, but to the company, which provides a license for usage.

However, software licenses are not just the privilege of proprietary software, this legal instrument specifies the rights of the user and the licensee even in case of a free and open source software. The software licenses can also be categorized based on their granted rights or even from other aspects. In terms of copyright for example, there are five different categories of software license. These categories are mainly different in the granted rights for the licensee or the user of the software. (Troan, 2006):

* Public Domain
* Non-Protective Free and Open Source Software (FOSS)
* Protective FOSS
* Proprietary License
* Trade Secret

Interpretation of granted rights in proprietary software license agreements led to many legal disputes on the court. An often-debuted area is the question of reselling used software licenses, which led to a ruling by the European Court of Justice. This was a consequence of a lawsuit against a European company called UsedSoft, which sells used software licenses and therefore Microsoft and Oracle sued them.

The court ruled that the principle of exhaustion in the copyright law is applicable for used software, therefore business model of UsedSoft is legal. According to the directive of the European Parliament “The first sale in the Community of a copy of a program by the rightholder or with his consent shall exhaust the distribution right within the Community of that copy, with the exception of the right to control further rental of the program or a copy thereof.” (UsedSoft GmbH v Oracle International Corp., 2012)

### Proprietary Software Model considering the Market Attributes

It is obvious that profit-oriented tech companies like Microsoft, Google or Apple are trying to reach the highest possible market share and profit margin. This means of course, that their software model is designed legally and technically in a way, which uses the special attributes of the software market to reach the highest possible market power. According to Carl Shapiro, the following attributes are typical for the software market, which play the highest role in companies’ business model and possibly create software monopolies (L. Katz & Shapiro, 1999):

### Network effect

The software by itself is worth nothing if it doesn’t fit into a system, which has a significant user base to be valuable enough for potential customers. This means that if the user number of the software is higher, the value for the customer is also greater. It could be due to the compatibility between computer programs (e.g. file format) or between computer programs and a platform. (e.g. operating system) Conscious exploitation and strengthening of this effect are important part of the strategy of software producer companies with relevant market share. This is often executed via application of own proprietary technical solutions instead of open ones or industry standards, in order to make the rival platforms or computer programs unattractive for the user.

### Low marginal costs relative to average costs

Research and development costs are usually the highest by those products, which are heavily built on intellectual property base. Computer software is also a member of this category, distribution and replication have always meant a relatively insignificant cost compared to the engineering and development. Nowadays this phenomenon is even more observable, because distribution of software products is mainly done through online channels.

This special cost structure implies some attributes, which are also important for the market participants. Firstly, price setting of software licenses is impossible to relate to the marginal cost because it almost doesn’t exist. Secondly, due to that, it worth in many cases for the companies to grant additional functionalities in the software for every customer even if a demand from their side doesn’t exist. It makes possible to bundle new products and an existing popular product in order to gain popularity, which is the case with preinstalled browsers or other not essential software in operating systems. These kind of, by the user often unwanted software are regularly called bloatware.

Lastly, the above-mentioned cost structure means that entry to the market is really difficult due to high development costs, which very likely leads to market concentration.

### Software as a durable good

Software is not like a common material good, which loses its value during normal usage due to reduction of quality. Software products only wear out for technological reasons or due to planned obsolescence.

This kind of durability means that it is sometimes hard to make new products attractive for customers, who already own an older version of that. It may encourage firms to lower their prices until they can get to those customers, who haven’t purchased their product yet, which would mean that even a monopoly market could act as a competitive market. Software giants of course want to utilize their position though, so there are some solutions, which help to avoid this trap for them. Firstly, software renting instead of selling is a possible business model, which provides a stable income and makes price cutting not a desirable strategy because it affects also the fees for existing customers. Secondly, continual product improvement is also really important even in a monopoly situation, which makes the product attractive for the existing customers as well.

The above-mentioned planned obsolescence is also a regular instrument of creating demand on the market though. This means that the producer applies conscious practices to limit the lifespan of its product up to a targeted value. There are various tools in the software industry for that, lack of intergenerational compatibility is one of those instruments for example. This problem has different forms, compatibility issue could arise if the user upgrades a component which makes the other older components useless. It is the case for example, when an operating system is upgraded for the newest version and the older computer programs are not supported on this system, which makes the older software obsolete. The second case is even more problematic, as the user doesn’t have any influence on that, because it is the case when other users upgrade their software, which version is no longer compatible with the user’s software. For example, if the older version of a text editor software doesn’t support the new file format of the same program, as more and more user adopt the newest software, the older one will become less and less valuable for the user, which will incite users to upgrade to the newest version available.

### Rapid technological change

It is true for the whole IT industry, so also for the software market that rapid technological change has a big impact not only on market conditions but also on behaviour of participants of the market. This theoretically means that the current position on the market is not that relevant as in other industries and intervening government policies in order to create a fair competition are not that efficient due to slow bureaucracy. However, these theories in case of the software market are not always seem to be applicable. In reality, we have experienced that positions on the software market can be stable despite technological changes. The case of Microsoft on the desktop operating system market shows that lock-in effect (which will be later explained in detail, but it is also a result of the above-mentioned practices) can be even a bigger market shaping force than technological change.

# Software distribution process

The process of software distribution is influenced by many factors, which should form a distribution strategy together in order to fulfil the business goals of a company. In case computer programs or mobile apps, software license is the framework, which determines – among other permissions – the entitlement of distribution.

The process and channels of software distribution have an incredible impact on the software market itself, so big player’s intention is to centralize the software distribution with their highest possible influence. The consideration behind this strategy is that if a market participant can gain control in the process of the distribution in a specific area, it will be much easier to control the whole software market in that part of the industry. In the next section software market is divided into different areas, which have unique distribution methods and market specialities to examine.

### Mobile Devices

Nowadays, if we talk about software on mobile devices, we almost always think about apps, and centralized mobile application portals as the place of distribution. Apple, as the producer of iPhone and Google, as the developer of Android, also use this model, which means this practice is highly dominant on the market, but it hasn’t always been the case. Smartphones existed earlier but this kind of business model has been ignored until AppStore on the iPhone was introduced. (Adrian Holzer, 2011) Moreover, this was also an evolvement in Apple’s business model, because initially they didn’t intend to support third party native applications on the iPhone, they wanted to encourage developers to develop for the browser instead. After a while, in 2008 they finally introduced the (Safari: iPhone Development Platform, 2007) Before the new era of application stores, the software distribution process was in the hands of mobile network operators and phone manufacturer, which limited the potential mobile software market really much. Moreover, big players of that time as Microsoft, Nokia or RIM (BackBerry) rather used decentralized portals, which means that application were distributed via third-party portals without any centralized policy. (Adrian Holzer, 2011) However, as soon as Apple proved that mobile application distribution has a great potential to generate revenue, their competitors also started to move towards centralization. It is another topic though, that application portals like BlackBerry App World, Nokia Ovi or Windows Phone Marketplace were all discontinued due to lack of success of the platform, which they were serving with applications.

If we investigate this model from an economic point of view, centralized application stores like AppStore on the iPhone or Google Play on Android phones are perfect examples of two-sided markets. There is always a platform in this model, which connects vendors with customers and tries to attract the highest number of them on both sides. The biggest advantage of a platform like this, that it can use network effects, which regularly attract more and more developers, which attract more customers and vice versa. The platform is regulated in this case by one of the tech giants and generate incredible revenues for them. In case of Android, even the loss leader strategy is applied, which means that a sale is made with a minimal revenue in order to get profitable sales later, which are necessary to generate value for the customer. It is the same business strategy as in the case of game consoles or capsule coffee machines.

The tight control of these centralized platforms is obviously the biggest advantage for companies, but this also gives so much power them, that it can harm the competition between software producers, as some cases shows. The platform between the suppliers and the consumers is the application store itself, which in all of the described cases has a specific policy. These rules regulate who can publish applications, and which standards those have to comply with. Of course, these standards can be both technical and content based, and in practice, the giant companies in many cases use those to push they own products or to extinguish their rivals. These marketplaces can’t be a fair field of trading, because firms like Apple, Google and Microsoft are both on the supplier side and they also own the platform and form the regulations. Furthermore, they are also in the position to decide whether a specific developer adheres to the rules or not.

In the light of the above, it is not surprising, that some developers of third-party applications are complaining about this kind of unfair practice. The long argument between Apple and Spotify shows how this affects developers and limits the open market for software. The most popular music streaming company, Spotify claims that Apple doesn’t play fair game, and tries to push with every possible resource its own music streaming application, Apple Music. They claim that “Apple makes it harder and harder for companies like Spotify to bring the best we have to offer to our fans — all for the sake of tilting the field to favour its own services and disadvantaging those it is playing against.” (Spotify, 2019) They summed up in five points, why they think that Apple’s App Store policy is not helping the fair competition between third party apps and their own services:

1. Apple’s in-app purchase system (IAP) is required by many applications in order to handle subscriptions for example, but Apple’s own services has the advantage is that they don’t have to pay 30% fee for this service.
2. If an app developer doesn’t want to use IAP, there are certain sanctions, which are applied by Apple towards their application. They don’t allow them to communicate directly with their customers in the app itself or via e-mail.
3. The upgrade options are not allowed to be within the application if it doesn’t use IAP, which means inconvenience for the user, who is forced to do this on a desktop computer in a browser.
4. Apple also rejects bug fixes and some other enhancements in some cases, which leads to weaker consumer satisfaction.
5. Apple also has the right to decide on which of its devices allows other services like Spotify. The streaming company claims that Apple won’t allow them to implement Spotify on the HomePod smart speaker, and Siri deliberately not able to play any song from their platform.

Apple didn’t leave those statements without reaction, and they have a couple of explanations for the controversial practices, which were mentioned in the points above. In a statement they wrote that “After using the App Store for years to dramatically grow their business, Spotify seeks to keep all the benefits of the App Store ecosystem — including the substantial revenue that they draw from the App Store’s customers — without making any contributions to that marketplace.” (Apple Inc., 2019) Furthermore, they also rebutted the insinuations of Spotify:

1. Spotify is not discriminated, the 30% and after a year 15% fee applies for every developer, who offer digital goods or services and uses the secure in-app purchase system.
2. The Spotify updates were only rejected, when they were not compliant with those rules, which should be followed by any application in the App Store.
3. Apple provided every resource to Spotify in order to support Siri and other Apple services, the application is available on CarPlay and currently No. 1 app in Apple Watch music category.

The outcome of this case is not yet decided by the European jurisdiction, but those debates show how controversial is the freedom of the centralized application marketplaces.

In fact, these marketplaces are even more important as they seem at first sight. The recent case between Google and Huawei in 2019 showed how these software distribution ecosystems hold even different original equipment manufacturers (OEM) of devices in their control. Even though Android is an open source operating system, Google’s ecosystem is the heartbeat of the software. The company’s popular applications like Gmail or Google maps are only executable on the system if the Google Play Services is installed, which is a tightly controlled proprietary software. The situation is also the same with the Google Play Store, which is outside of China is an almost exclusive marketplace for applications on the platform. Furthermore, Google can also refuse to update their smartphones, which will result in further security issues. This means that OEMs like Huawei are really dependant on the services of the company, which puts them into an even more dominant position as they would be due to their market share. In this particular case, Google’s refusal to use their services on Huawei’s devices makes the Android operating system barely usable for users outside of China. In this situation, Huawei has no other option than to move towards another ecosystem, but there is no other relevant competitor on the mobile software market anymore, so Huawei confirmed that they will build they own system. (Kharpal, 2019)

### Personal Computers

Clear dominance of an operating system is observable also on the market of personal computers, because Microsoft Windows is about as dominant as the Android platform on mobile devices. The situation of the software distribution is extremely different though. Despite the effort of Microsoft and other developers, centralized approach of software distribution is not a common practice on any widespread operating system, majority of users are still using the conventional application download via third parties.

After the massive success of the AppStore on their desktop operating system, Apple was the first company, who launched a centralized application portal in 2011 for MacOS, the Mac App Store. It is of course strictly regulated by Apple, the store applications have to comply with regulations, which in many cases protect the interest of Apple and other software companies. For instance, these applications can’t be similar in look or function to current Apple products or other apps which are already in the Store like Adobe Illustrator, and they are not allowed to be a free software, which is licensed under the General Public License (GNU). These restrictions limit the competition on this marketplace and pushes the users form a more open market into a controlled, proprietary software market.

The mentioned limitations, furthermore sandboxing restriction of apps in the store and 30% commission from the revenue deterred developers from the platform, so it couldn’t replace the original software distribution methods. (Gartenberg, 2017) Despite the lack of break-through success, Apple still tries to push Mac App Store with replacing their downloadable software, system updates and other modules, like Safari extensions from their website to the store.

Microsoft, as the leader of the market, also didn’t want to miss out the opportunities of an own platform, so they also introduced Windows Store in 2012, which was intended to be a universal platform for Windows 8 and Windows RT. The latter was a now discontinued mobile operating system, which ran on 32-bit ARM architecture. That means, the system ran only on tablet computers and other mobile devices, which applied mobile CPU-s. These machines were not commercially successful, moreover they have caused serious problem in the Windows Store, which surely one of the reasons why this platform didn’t start to catch up. As a journal formulated, “Windows Store was a confusing mess in 2012. Windows 8 ran on Intel’s x86 / x64 architectures, while Windows RT ran on ARM, but the two shared a store, meaning that the apps on offer had to be ARM compatible since everything in Windows Store had to also run on RT.” (Gartenberg, 2017) This meant for the developers too much effort, because they had to build their applications from scratch and they had to abandon their well-known frameworks of .NET or Win32 in order to develop apps for the store.

Despite lack of success, Microsoft didn’t give up the idea of a centralized application store for Windows. They learned the lesson of the first attempt and introduced the Universal Windows Platform (UWP), which is a universal developer platform for various devices like PC, Xbox One, HoloLens. It is basically common application programming interface (API) on all devices that run Windows 10, so it made possible for Microsoft to merge all its distribution platforms like Xbox store and Windows Phone Store and others into one centralized application store, the Microsoft Store. (Microsoft, 2018) The company has so much trust in its idea, that they not just added an option in Windows 10 to block all applications, which were not installed via the Microsoft Store but they also introduced a new version of Windows, which only runs the store applications, which is somewhat similar to the existing mobile operating systems.

Google has also entered into the market of operating systems on personal computers. The Chrome OS, which is a Linux kernel-based operating system was announced in 2009, so it is relatively new compared to its competitors. This system has a completely different concept from the conventional operating systems, because it was built around the Chrome web browser. This means that at the beginning, it was basically only able to host web applications, and the Chromebooks, which are lightweight netbooks running Google’s operating system, had to be constantly connected to the Internet for the full functionality. They also added functions, which were available offline, like the file browser or the media player software, which was also integrated into the desktop Chrome browser. After a while, Google started to move the it into the direction of native apps. The first step towards this concept was the introduction of the App Runtime for Chrome in 2014, which is basically a compatibility layer, which made able Android applications to run within the web browser. The idea of making Android applications to run on Chrome OS shows that Google also moved fast towards a centralized application distribution method. Basically, they implemented the concept as soon as they recognized that their operating system is not usable enough only with web applications. The implementation of this concept didn’t stop at that point, in 2016 they announced that Google Play Store will be available for their system, which means that the supported Chromebooks are able to run most of the applications, which are available on Android. (Google, 2019) However, lack of commercial success of Chrome OS incite Google to try even other ideas than implementing the mobile apps on a desktop computer, so they also announced in 2018 that Google Chrome OS will run Linux apps, but this solution is only in beta phase yet.

To conclude the situation on the consumer PC software market, big players are trying to push the consumers into their centralized distribution points, which have some clear advantages like security of course, but their negative effect on the free competition is also unquestionable. It is not easy to change customers’ behaviour and convince developers, that these kinds of limitations are at the end will be beneficial for both parties, and this is also proven by the lack of success in case of those operating systems, which are built on exclusively centrally distributed application ecosystem like the ChromeOS, for example. Due to those considerations, the takeover of software distribution process on PC is still only a plan on the desk of the big companies.

### Enterprises

Enterprises also need software in order to operate, but the process of software distribution is completely different in the case of enterprises. It is not just because they use different functionalities and the quality standards are much stricter, because a software failure can influence their core business functions. It is also different since license terms must be much more individualized for the needs of the particular company, while on the consumer software market these license terms and product offers are standardized. These attributes indicate that on the enterprise software market the direct connection between the user (enterprise) and the software developer is much more important, which doesn’t mean that partner companies are not involved for the distribution.

For instance, Microsoft is a big player on this field, they are not just supplying Windows operating system, but also other enterprise applications like ERP software or cloud computing solutions. For companies, especially for bigger ones, license distribution one by one would be extremely inconvenient, so companies like Microsoft offer volume licensing, which provides authorization for usage of software on a larger number of computers rather than just only one machine. Furthermore, the company provides complex solutions, which integrate many services and software under only one license. This is of course convenient for the companies, since they don’t have to negotiate license terms with different suppliers and they also can benefit from lower prices due to economy of scale. The website of Microsoft describes the Microsoft Enterprise Agreement as it “offers the best value to organizations with 500 or more users or devices that want a manageable volume licensing program that gives them the flexibility to buy cloud services and software licenses under one agreement.” (Microsoft, 2016)

The convenience of these combined licenses may result in market distortions though. Companies, which are providing so wide range of products as Microsoft, can easily use their dominance to sideline their competitors and monopolize the whole software supply of their customer companies. Moreover, strong functional integration of these theoretically independent software or services create ecosystems, which in fact makes really difficult to use components from third parties. A good example for that is the integration of Microsoft Office with One Drive, and the One Drive integration into Microsoft Windows. If the customer decides to use different operating system or other cloud solution, it must give up specific functionalities in both cases, because the components just don’t work with each other that well.

However, the conventional volume licensing is now replaced in many companies, with Software as Service (SaaS) solutions, and in this field beside Microsoft, Google and Apple are providing also their own solutions. It is now common licensing and delivery form of office suits, accounting software, customer relationship management (CRM) or enterprise resource planning (ERP), human resource management (HRM) systems and many others. These solutions seem to be more and more popular in firms, according to research vice president at Gartner “(…) more enterprise use of cloud services — instead of buying their own servers, they are turning to the cloud. As enterprises continue their digital transformation efforts, shifting to ‘pay for use’ will continue. This sets enterprises up to deal with the sustained and rapid change that underscores digital business.” (Gartner, 2018) Moreover, software market growth is driven by the SaaS segment now, according to the same analysts cloud software’s growth will be more than 22 percent in 2019, while other forms of software will only be able to grow 6 percent.

G Suite from Google is for example a package of functionalities for enterprise users, which includes services like Gmail, Calendar, Hangouts, Drive, Docs and many others. (Google, 2019) Of course, Microsoft has also their own service for enterprises. This product is called Microsoft 365 Enterprise and provides an interconnected solution for business, which includes Office 365, Windows 10 and enterprise mobility and security solutions. (Microsoft, 2019) Apple also provides different products for enterprises, but these solutions are concentrating more on the hardware though. (Apple, 2019) All the above-mentioned services are tuned for the enterprise usage, so they provide different settings for the administrators, as well as many other functionalities like managing unique domains.

SaaS is according to Gartner is a “software that is owned, delivered and managed remotely by one or more providers. The provider delivers software based on one set of common code and data definitions that is consumed in a one-to-many model by all contracted customers at anytime on a pay-for-use basis or as a subscription based on use metrics.” (Gartner) The typical pricing method is also different by these services, because most of them use a subscription system with an annual or monthly fee to pay.

Application of SaaS solutions means that the distribution process is much more virtualized, there is no need for physical distribution channel or even installation process on the client computer, because most of the SaaS products are available from a simple browser software. This makes also the traditional distribution chain via partner companies unnecessary, those intermediaries can be simply bypassed, and the terms can be negotiated directly with the developer company. This was particularly observable by Google’s G Suit, and Microsoft 365 Business, where the service can be ordered directly from their website, however Microsoft also offers the services of partner companies, if the customer needs a help with the preparation of their organization. All in all, the trend of SaaS also leads towards

# Creating proprietary markets

### Pre-installed Operating Systems

If we think about the demand of average users, it is understandable why personal computers with preinstalled operating systems are so popular. These users don’t want to deal with the installation and configuration process, and they are willing to pay a little more for that comfortability. This practice has incredible impact on the market freedom though. For example, it is really hard to compete with Microsoft Windows on the consumer PC market, because majority of PCs in every store comes with a pre-installed Windows out of the box. In this situation, it is extremely hard for any competitor to convince the user to replace the default system.

On the market of mobile devices, the situation is even more clear, as there isn’t any device, which comes without operating system. The users of these devices don’t have full control over them, because certain restrictions are applied both in Android and iOS. Moreover, many manufacturers of Android powered devices claim in their documents that modification or change of software will void the warranty. Typical modification is gaining root access (administrative permissions) in order to replace the operating system for example. Losing warranty sounds threatening to the customers, however the statement is not compatible with the European law. According to Directive 1999/44/EC of the European Parliament and of the Council, statutory warranty may not be affected by rooting the device, it is only applicable for voluntary warranty, which is not mandatory by law. (Directive 1999/44/EC of the European Parliament and of the Council, 1999)

In the case of Apple’s iOS this process is much more complicated, as the device must be exploited, and the kernel must be patched every time the user turns it on. This process is classified as a hacking process by the manufacturer, which is “a violation of the iOS end-user software license agreement and because of this, Apple may deny service for an iPhone, iPad, or iPod touch that has installed any unauthorized software.” (Apple Inc., 2018)

This all means that there is a big effort and a cooperation of the hardware and software companies to offer the devices with preinstalled operating systems and to prevent the user to replace them, which may have some positive sides for the user like stability and comfortability, but creates rigid market, so it is hard to enter for smaller players.

### Pre-installed Applications

### Bloatware

The developer company of a popular operating system has not only an advantage in the distribution of the system itself, but also it is in an ideal position to use this for selling other software as a bundle. This has also become a channel of software distribution, because the manufacturers are not just packing their own software solutions into their system, but they also receive payments from other software companies to pre-install their product. These applications are often categorized as bloatware, which is an inconsistently used term but also used for unwanted preinstalled applications, which in some cases fatten the minimal storage requirements of the system significantly. For example, smartphones of Samsung are coming with a Microsoft app package by default (Fingas, 2015) and also the Home edition of Microsoft Windows is shipped with demo version of games like Candy Crush Soda Saga and Disney Magic Kingdom. (Hachman, 2018) This situation is even worse in case of some manufacturers, who are preinstalling their own utility software tools on top of that.

### Functional Applications

There is also another category of the preinstalled software, which has the role to enhance the functionality of the pure system. These are media players, browsers and other functional applications, which provide a base set of tools, which is expected by an everyday user. They are, unlike the above-mentioned bloatware, of course really convenient for the user, because it saves the effort of installation process of basic applications at the beginning of usage of the product. It also has a negative effect on the software market openness though, as the bigger players on the operating system market can shepherd users towards those products, which are developed by them or by their partners.

The practice of preinstalling has also led to legal debates, because sometimes it arose that companies are abusing their dominance. For instance, Microsoft faced with legal consequences in the European Union (EU) after it was accused of forcing competitors out of the market through anti-competitive practices. The concrete plaintiff was Sun Microsystems, they claimed that Microsoft didn’t disclose technical interfaces to Windows NT. The EU however started not just to investigate this practice but also broadened its investigation to question how streaming media technology was integrated into the Windows operating system. In the end of this case the judgement obligated Microsoft to release a Windows version without integrating the Windows Media Player, which has been branded as Windows XP N. (Microsoft v Commission, 2007) The European Commission claimed that even Microsoft treated Media Player as a standalone product, because it had separate licensing agreement and it was planned to run later on Apple’s Mac OS X as well, however this project has been discontinued. This means, according to the judgement, that the company just tied its media player software to its dominant product, which is the Windows. After a few years, there was also another case, which followed this logic, and in which case the company had to change its business practice again in order to be compliant with the competition law. In 2009, the European Commission also investigated whether Microsoft also tied its Internet Explorer browser to Windows. Microsoft argued that preinstallation of the browser benefits users, but the preliminary view of the Commission confirmed that statement and also mentioned that this practice may infringe the European Community Treaty rules on abuse of dominant position, because it represses the competition on the web browser market. (European Commission, 2009) This was followed by a settlement between the Commission and the company, in which Microsoft agreed to introduce a screen in the operating systems, which provides the user to choose between twelve popular browsers, which were offered in a random order. This feature was implemented in March 2010 and it was discontinued not much later, in the Windows 7 Service Pack 1, in February 2011. The company claimed that the absence of it was just a “technical error”, even though it was still absent after 14 months. After warning of the EU organizations, Microsoft apologised and restored the function, but it wasn’t enough to avoid the 561 million Euro penalty, however the corporation was co-operative during the investigation. (BBC News, 2013)

But Microsoft is not the only company, which faced with consequences due to its abuse of dominance. Google has also been investigated several times, for instance in 2018 the Commission fined the company due to its Android restrictions, which are able to protect its dominance in the market of internet search. Even though Android is an open source mobile operating system and it is licensable for third party manufacturers, Google has a tight control over it. This control is accomplished via proprietary services and the whole application distribution process, because more than 90% of applications on Android devices are downloaded from the Play Store, which is operated by the company. However, in order to pre-install the Google Play Store and Google Play Services, which is a “must-have” according to the manufacturers, these manufacturers have to install also other Google applications. According to the Commission, Google license terms are tying illegally the Google Search app and the Google Chrome browser to these essential parts of the Android operating system. These two applications are able to preserve the status quo on the internet search market, as both a browser and a search app are gates for the usage of the internet on the mobile devices. The Commission also found evidence, that these kind of company practices has incredible influence on the user habits. The result of the investigation claims that on Windows Mobile devices, where Google Search and Chrome were not preinstalled, 75% of the search queries were made via Microsoft’s Bing Search and only 25% of the queries happened in Google Search. These numbers on Android operating systems are completely different, as on those devices 95% of all queries are made in Google Search.

However, the Commission found Google guilty, not just due to the tying practices, but also due to the requirement of the exclusive pre-installation of its applications. The company also offered some manufacturers and network operators significant financial reward, if they installed Google Search exclusively on their Android devices. According to the investigation, this practice between 2011 and 2014 was illegal, however the company argued that “payments based on exclusivity were necessary to convince device manufacturers and mobile network operators to produce devices for the Android ecosystem.” (European Commission, 2018) Not only Android manufacturers receive payments from Google to ensure its dominance on the market of search engines though. Apple also receives a huge financial compensation for keeping Google’s service as its Safari browser’s default search engine. According to press reports, this payment will reach in 2019 will reach 12 billion US dollars.

Of course, Apple has been also accused with abuse of its dominance, however these cases are not necessarily connected to the preinstallation practices, as the company produces its own hardware and software, so these cases are explained in the next chapter.

### Controlled ecosystems

The term “ecosystem” originally comes from biology, it means the living organisms and other non-living components of the environment can live and operate together, as a system. As an IT term, ecosystem means something similar, this means that the different IT components are interacting with each other, just like an ecosystem in the nature. Those components include hardware, software and services, which are integrated with each other in order to provide a seamless user experience for the customer. Creation of ecosystems has business relevant “side effects”, which are not negligible, and which provide a great incentive for IT companies to push the concept of ecosystems. These systems are not interacting with each other, or if they do so, the interaction is not that seamless, which raises switching cost of the users, who want to switch to devices, services or software from another ecosystem. This attribute will create then a lock-in effect, which means that since users are trying to avoid unnecessary switching costs, they will stick with the products of the ecosystem and they will tolerate much more other types of additional costs, like raise of prices. Moreover, customers seem to be much more patient with the product, if the embedding ecosystem is created so, that switching costs would be extremely high. In this manner, these companies become independent from the opinions of their customers about their product, which of course has nothing to do with free competition. It has been already proven that at least some of these companies consciously use these effects in order to uphold monopoly, event though they know that competitors have better performance objectively. For instance, according to European Commission documents, an internal Microsoft memo by C++ General Manger Aaron Contorer for Bill Gates contained the following statements: “The Windows API is so broad, so deep, and so functional that most ISVs [independent software vendor ed.] would be crazy not to use it. And it is so deeply embedded in the source code of many Windows apps that there is a huge switching cost to using a different operating system instead. [...] It is this switching cost that has given customers the patience to stick with Windows through all our mistakes, our buggy drivers, our high TCO, our lack of a sexy vision at times, and many other difficulties. […] Customers constantly evaluate other desktop platforms, [but] it would be so much work to move over that they hope we just improve Windows rather than force them to move. […] In short, without this exclusive franchise called the Windows API, we would have been dead a long time ago.” (European Commission, 2004)

This ecosystem concept also hinders the creation of common standards in the industry, because partly the own-developed proprietary standards provides the main value of ecosystems. It is obviously important for companies to differentiate their products from their competitors’ offer but it seems like that it is not the only reason why they are trying to resist industry-wide standardisation. Selling their own standards for other producers, which are making hardware or software components to their ecosystem is obviously a good source of income for them, but they also don’t want to give up another barrier, which hinders competition even more, because lack of standardisation also means that users must pay even more switching costs, and therefore they are hardly interested in switching any component of the ecosystem, even if they would gain benefit with that.

### Apple’s Devices

It is obvious to start with Apple, if we talk about ecosystems, as their ecosystem services are regularly mentioned in the press and tech forums. (Villas-Boas, 2016) Since competitors have overtook Apple in the field of hardware, nowadays Apple’s unique selling proposition (USP) is the extremely well optimized ecosystem across their devices, which also makes their price premium reasonable for many users. This means in practice, that if a user owns a MacBook, an iMac, an iPhone and an iPad, these devices work together seamlessly. Apple provides different hardware solutions integrated into the software framework of iOS and MacOS, which make able to users to move their files across these devices easily (AirDrop), receive and make phone calls from their laptops, while their iPhone on the same network and other useful features for an everyday user. Synchronization of settings and other personal data is also extremely easy through Apple’s cloud solution (iCloud) and since the AppStore is available across all of their devices, it is also part of the ecosystem. Common attribute of these Apple services, that devices are shipped with them out of the box, after a relatively easy configuration process they are ready to use, which is obviously convenient for their users. (Apple Inc., 2019) These services are of course only available on Apple devices though, and Apple has no intention to provide passage between their products and other ecosystems. This business practice heavily motivates users to buy every device from Apple, which provides them the seamless functionality of the ecosystem. This leads to extremely high switching costs for users of their devices, which makes hard to their smaller rivals to enter into those market segments where Apple has a stable position, which strongly affects market openness.

### Microsoft’s software and services

As it was mentioned earlier, Microsoft built its business model for decades on one ecosystem, which is their operating system, Windows. (European Commission, 2004) Nowadays this approach has changed a lot, the company is no longer able to use its operating system as a tool to lock in users and to abuse its monopoly power in the way it did before, because mobile devices partly took the place of the personal computers. (European Commission, 2009) Hence, software ecosystem is still important for them, they moved into a completely different direction. If we take the consumer market, it is obvious that Microsoft tries to create a software and service platform, which operates across all kind of ecosystems. Their products like OneDrive or the Office applications are integrated with each other and functioning as an ecosystem, but they are not tied to their operating system exclusively, they are also available on Android or Apple devices. The new ecosystem of Microsoft is much more relevant on the enterprise software market though. The company’s enterprise products are forming a much more integrated system than their consumer solutions. The combination of their cloud services and other enterprise solutions like decentralized identity management, e-mail client, cloud-based file storage, collaboration tools are tightly connected to each other, which makes hard for big enterprises, which are already implemented some elements of the above-mentioned solutions to choose a rival solution, which doesn’t work as seamlessly with a single sign-on, for example. (Microsoft, 2019)

### Google’s services

Google has also built an enormous ecosystem around their internet-based services, which contains Gmail, YouTube, Google Search, Drive and many others. These services are also collaborating with each other, and special file formats of Google Documents, which are applied in Google Drive if the user create a new document, also typical example of abandoning the existing standards of the industry in order to create an ecosystem. The parallel usage of Google services like e-mail client, notes application, calendar, cloud storage provides also so many benefits for the customers, that it is hard to get rid of only one component of the ecosystem and switch that to another one.

The above-mentioned services are joined by a central identifying method, which is the Google Account. However, Google’s ecosystem is also present on the smartphones, since they control the Android operating system. On this system, Google services are also seamlessly integrated, for example all the personal data from the smartphone can be synchronized into the Google Account as a backup. This kind of deep integration between the operating system and the Google services also strengthen the lock-in effect of their services.

# Impact on the Market Openness

### Consumer Market Analysis

Even though Microsoft earlier concentrated more on consumer segment, nowadays Google and Apple have much more power in that market area. The numbers show that these two companies parallelly built up a huge market power since the internet services and the smart mobile devices become the part of the life of everyday users. According to a study, in the United States, 69% of the participants claimed that they use Google services and products on daily base. It is not surprising that the half of the leading smartphone apps in the US are produced by Google. They are also leading the smartphone and tablet operating system market with Android. Since 2009 the number of participants of this market has fallen drastically. In those years there were 4 relatively big players (Windows Mobile, iOS, RIM and Symbian), but now there are only two, Android and iOS. Apple’s OS is in the second place but only with 11% in 2018. Apple has an incredible brand value and revenue; their revenue was for example double of Microsoft’s and Google’s in 2018. Despite the shrinking of the segment, Microsoft is still the leader of the PC operating system market, since Windows had a 75% market share in the globally. (Statista, 2019)

### Business Market Analysis

In the market of enterprise applications Google and Apple is not represented significantly, Microsoft has a massive market position since they are in the second place behind SAP on the list of vendors, which generated the most revenue from enterprise applications between 2015 and 2016. (Statista, 2019)

### Recent Trends and Predictions

Analysts think that fuel of growth in the enterprise focused IT industry are now services and this trend is going to continue in the future. Cloud computing, software as service push up the revenues of those companies, which are represented in these segments. In the consumer facing segment, analysts think that the market of the physical devices reached an equilibrium state, so there is a stable demand, but greater growth is not predicted. In this state firms are currently moving towards services in the consumer market as well. (Gartner, 2018)

# Conclusion

After the observation business practices of the three tech giants nowadays and in the past, the conclusion is clear that the core business strategies are showing towards the direction of less market openness. Since the trends in IT recently shows more centralization, this endeavour seams to pay off for them. The market analysis also shows that there are less participants in the market and the observed firms together dominate wide spectrum of the IT industry. Moreover, recent trends like cloud computing and software as service also push the market towards centralization and not openness. On the contrary, it is not obvious that these trends could not change in the future in case of breakthrough technological innovation, which probably will bring in other new players into the IT market.

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