PROSPECTS FOR UKRAINIAN COMPANIES IN DOMESTIC CLOUD COMPUTING MARKET

by

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LIST OF ABBREVIATIONS

PC Personal computer

PBX Private branch exchange

SQL Structured query language

HD High-definition

CRM Customer relationship management

CDN Content delivery network

CHAPTER 1. EXECUTIVE SUMMARY

This report was conducted to examine the capability of Ukrainian cloud computing firms to expand their market share, types of industries that are the most interested in cloud computing service, services are the most common among national and international providers and possible solutions for Ukrainian cloud providers to gain a competitive advantage against their foreign rivals.

To begin with, cloud computing became an important tool in the fast-growing business. With a well-established cloud system, the company can reduce the cost of production, get a competitive advantage and increase its value much easy. There are three main applications of the cloud services: SaaS (Software as a Service), PaaS (Platform as a Service) and IaaS (Infrastructure as a Service). It was forecasted that in 2018 the IaaS/PaaS market will amount to 65%, while SaaS market will amount to 35%. The total size of the Ukrainian cloud computing market reached value of 28.5 Mn USD approximately with a CAGR of 47% during 2012-2018. What is more, the market share of national companies is decreasing since 2014. The main goal of the research was to find out what is the main reason of this decline and how it is possible to change it.

The report draws attention to the market drivers and market restraints that exist on the market. It is important to highlight that a general economic and political situation can become both a trigger for the development of the cloud market and an obstacle for the future. Foreign investments in startups and the positive relationship between the state and IT are positive factors, while the number and brand name of the foreign competitors decrease the chances for the market to increase.

The value chain of cloud computing combines three layers of services: business-oriented support services, primary services and cloud-oriented support services. The primary services are the core of the functionality of any cloud service model. They include the basic services, like Hardware, Grid middleware, Software, Data, and Content. The cloud-oriented support services and the business-oriented support services integrate the activities which support and enable cloud computing in the market and business activity in the cloud industry respectively.

The report also evaluates the competitive rivalry, threat of new entrants, suppliers' bargaining power, customers' bargaining power and threat of substitution for the Ukrainian cloud computing providers. It was found that the biggest market share in the IaaS market belongs to MS Azure and AWS companies with a value of 43% together, while the Ukrainian leader is De Novo company with a share of 12%. The value of the HHI index is 1377, so the market is considered as a competitive marketplace. Since SaaS market doesn't capture a notable part of the market, the number and competitiveness of the firms is lower. Microsoft captures around 63% of the market, leaving Ukrainian services far behind.

Since the quality of the product and, especially, speed and stability of access to the data are the main concerns of the clients, the companies that provide those kinds of services should take care of the locations of their data centers.

In order to investigate which services are the most supplied on the IaaS/PaaS market the websites of the companies were analyzed and it was found that the market share of international companies prevail over the market share of Ukrainian-based companies in all the services offered. Big data management is the only service that has greater value. Speaking about the SaaS companies, because of a small market share there is almost no competition between domestic and foreign players.

Reliability of the cloud platforms also plays an important role. In general, the failure of the clouds is a rarity on the Ukrainian market, while global players report crashes in their data centers from time to time.

For Ukrainian businesses to compete with other IT companies a strong creative idea, strategic business vision, investment requirements, patents, knowledge, and assets are required.

Speaking about the suppliers' and customers' bargaining power, it was analyzed that customers have more dominance that the suppliers do. Of course, the dominance level depends on the market (either IaaS, PaaS or SaaS).

According to the SWOT analysis done, among the strengths of the Ukrainian data companies are reliability of the domestic data centers, price of the service, office location, currency calculations, and exchange rate. Weaknesses include the diversification of the services offered, data center location (in case Ukrainian company works with international clients) and trust issues. Among the opportunities are the expansion of the services offered and the possibility to enter new markets; threats include consumers' loyalty to well-known brands and data center location.

Based on the analysis done, the following recommendations are suggested:

- to increase the market share of the data management service and analytics on the national market;
- to extend networking and artificial intelligence services shares and suggest new tools and methods to attract both existing and new customers;
- to develop new data centers abroad;
- to launch new products in the SaaS market, rather than IaaS;
- to increase the competitiveness of the domestic providers by product differentiation;
- to launch an advertising campaign that is targeted on the advantage of the domestic companies.

CHAPTER 2. INDUSTRY ANALYSIS AND RESULTS

2.1. Industry overview

Background

Nowadays the business world is developing very rapidly. The economic downturns and losses are happening every day, companies are growing larger and larger, the number of business processes is extending and the world needs some useful tool in order to meet the increasing needs of a fast-growing business environment. In such case cloud computing becomes the resource that is fully available for small and large businesses in order to meet their needs and to achieve their goals.

Since all the businesses are trying to be more competitive by reducing the costs of their production – cloud services become a technological tool that can increase the value of the company. First of all, there is no firm nowadays that can make its activity profitable without the use of the Internet. That is why in order to get a competitive advantage and focus on developing good business application companies are changing their activities in the direction of cloud services.

However, as good and innovative as cloud computing may be, it is important to understand the growth potential of the industry and its possibilities of getting inside the new markets.

I have decided to concentrate my research on the rapidly growing Ukrainian market of cloud computing and the capability of Ukrainian firms to expand their market share. This paper determines which types of industries are the most interested in cloud computing service as the part of their day-to-day operations, what services are the most common among national and international providers and how Ukrainian cloud providers can gain a competitive advantage against their foreign rivals. Finally, I am trying to estimate the growth potential of the industry and the role it can play in the nearest future.

Business description

According to Siemens IT solutions and Services report[1], cloud computing is the innovation taking place in the IT industry. A few years ago, when a company wanted to use IT resources in order to do its business processes – it was buying the necessary hardware and operating systems instead of simply paying for the functional online platform.

IT companies offer a full range of on-demand services such as storage services, data management, virtualized infrastructures. Still, many IT firms are staying on the way to the transformation of their offerings and providing them in the modern way.

To begin with, cloud computing is divided into three main components in the form of applications: SaaS (Software as a Service), PaaS (Platform as a Service) and IaaS (Infrastructure as a Service).

The main point is that instead of buying a software platform or application, the customers can lease the cloud computing services temporary and then return them. The costs of shifting IT services are becoming money-saving variable costs. Businesses can use them to develop their activity and settle them every month. The most radical way of cloud computing arise when the traditional PC is replaced by a simple terminal.

This technology focuses mainly on multi-client architecture that can be accessed from anywhere. When a customer needs data that is stored inside the platform it uses the Internet which evolves the platform and gets the information needed.

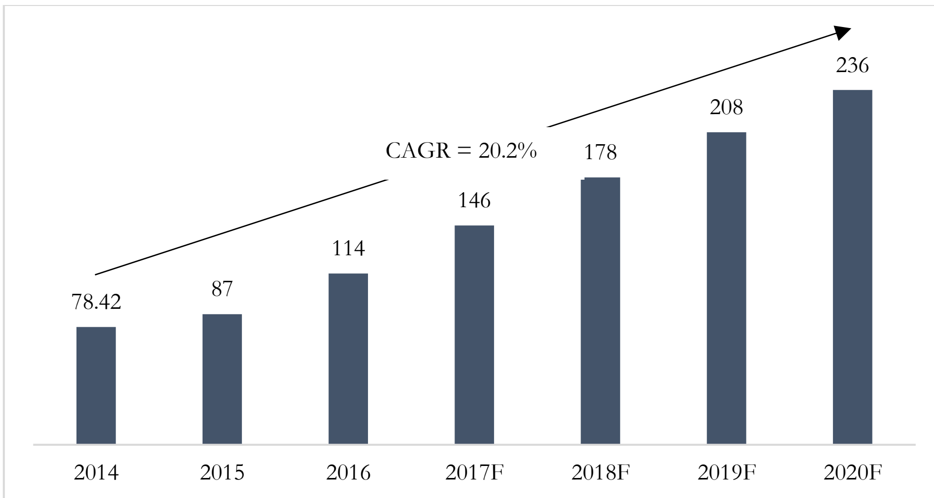
Industry Trends

The cloud solutions market in Ukraine has been growing for the last several years, which generally corresponds to the global trend. Since public cloud captures a significant market share on the global cloud computing market and different sources give its

[1] Jaekel, Michael, Achim Luhn, (2009), "Cloud Computing – Business Models, Value Creation Dynamics and Advantages for Customers Siemens IT Solutions and Services".

different estimation, I have decided to check the total size of public cloud computing market from 2014 to 2020 rather than the global market and the results are shown on the Figure 1. As one can see, the cloud computing market is growing with a CAGR of 20.2%.

Figure 1. The total size of the public cloud computing market, Bn USD



Source: Public cloud computing market worldwide 2008-2020, Statista

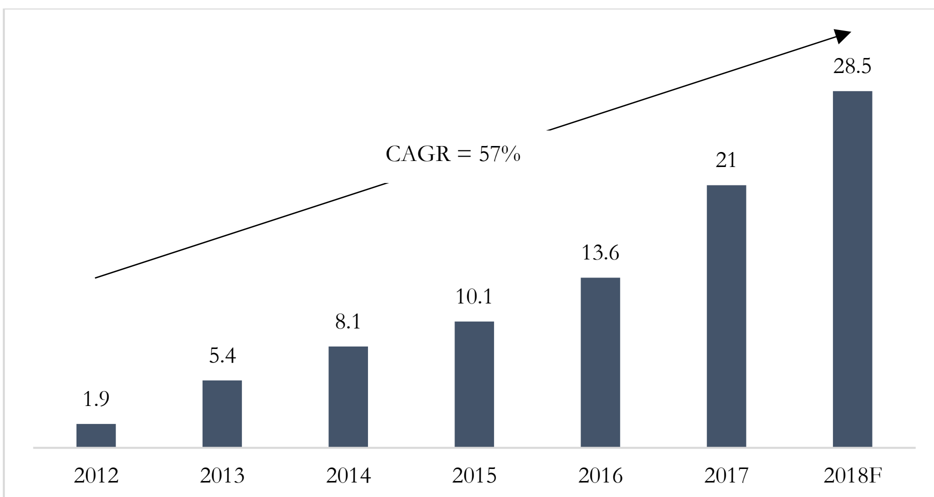
According to a new market research report published by MarketsandMarkets[2], since North America has a large number of firms with advanced IT infrastructure and the availability of technical expertise, it is considered as a mature cloud computing market. All the sectors of the government and economy majorly adopt cloud computing services. As a result they are becoming more evident and popular among other companies. Thus, "The US and Canada are the top countries contributing to the growth of Cloud Computing Market in North America." (Ibid.)

[2] Markets and markets, (2019), "Cloud Computing Market by Service Model (Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)), Deployment Model (Public, Private, and Hybrid), Organization Size, Workload, Vertical, and Region - Global Forecast to 2023".

Following the global trend, Ukrainian cloud market has grown significantly. The total size of the national cloud computing market in Ukraine from 2012 to 2018 is shown on Figure 2.

According to the annual "SiB" study[3], the segment's volume in 2017 has amounted to more than 21 Mn USD, which means an increase of more than 55% in relation to 2016. It was forecasted that in 2018 the total size of the market will get the value of 28.5 Mn USD. Unfortunately, there is no clear answer what is the value of the market in Ukraine and different sources give different estimation. The one point that every source is agreed on is that the cloud computing market is growing rapidly and the question arises when the peak of the industry development is expected and when the market will be stabilized.

Figure 2. The total size of Ukrainian cloud computing market in 2012-2018, Mn USD



Source: Kyryllov Igor, (2018), "Vse vyshe i vyshe. Rynok oblachnyh uslug v Ukraine stremitelno rastet"

Market shares of domestic and international companies in the Ukrainian cloud computing market (2012-2017) are given below.

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[3] Kyryllov, Igor, (2018), "Vse vyshe i vyshe. Rynok oblachnyh uslug v Ukraine stremitelno rastet" [Up and up. Ukrainian cloud services market is growing up].

Figure 3. Market shares of domestic companies in Ukrainian cloud computing market, %

Source: Kyryllov I., Ibid.

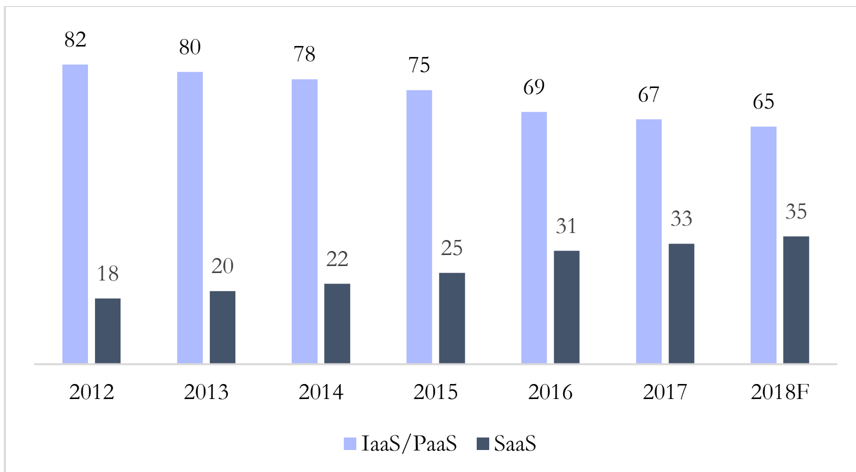
As ones can see from the graph, there was a decreasing trend in the cloud computing market among the International companies until 2014. The upward trend has started after and is important to say that it has decreased the possibilities of the domestic companies to extend their market share on the Ukrainian market and some barriers to entry have arisen which will be explained in more details later in this document.

The graph on the market share of domestic companies shows the opposite trend – growth until 2014 and decline after. The possible reasons why businesses have changed their priorities towards foreign competitors will be discussed later in this document.

Let us consider shares of different types of cloud services in the Ukrainian market. The graph is located below.

According to the annual "SiB" study[4], the most popular type of cloud services in our country is “infrastructure as a service” - IaaS, which gets about 65% of the market, another 2% is taken by the “platform as a service” PaaS (due to the relatively small value and actual proximity of the two concepts the share of PaaS will be further taken into account in the composition of IaaS). As we may see from the graph, the share of IaaS/PaaS services is constantly decreasing, while SaaS follows the positive trend.

Figure 4. Share of different types of cloud services in Ukrainian Market, %



Source: Kyryllov I., Ibid.

As for SaaS, this segment occupies about one third in the Ukrainian market - 33%. According to experts, this segment will continue to grow in the coming years, which is not surprising, because this is how users get modern technology at their disposal with no effort on their part.

Such a distribution of the components is contrary to global trends, where SaaS dominate significantly over IaaS/PaaS. Nevertheless, the share of SaaS is gradually increasing.

[4] Ibid.

Users of such services are organizations representing different sectors of the economy. Banks, industrial companies, retail chains, small businesses, and government agencies today use cloud resources. Customers are gradually becoming accustomed to the use of such decisions - the period of technological distrust has been overcome.

2.2. Market drivers and restraints

The following market drivers for the domestic firms exist on the Ukrainian market:

- the general dynamics of the economy, maintaining the course towards the EU and fundamental economic reforms. For example, the Ukrainian version of the "Cloud First" strategy is conscious and active transition to the use of cloud services in public administration[5];
- foreign investments in startups. In order to give Ukrainian cloud providers more freedom and possibility to function with a limited resources, foreign investments might become a helpful tool[6];
- creation of positive relationship between the state and IT. Such strategy should become a trigger to the economic sector, data centers and cloud services[7].

Some market restraints exist on the market and limit the opportunities of Ukrainian firms:

- influence of political factors. The development of the Ukrainian cloud computing market under the aggressive influence of political factors change behavior and preferences of the consumers. Due to a series of scandals related to incorrect behavior of the executive authorities in relation to IT companies and importance

[5] Igor Kyrylov, (2019), "Oblaka v Ukraine: rynok idet vverh" [Clouds in Ukraine: the market is going up].

[6] Kulikov Evgeniy, (2019), "Gotovy li ukrainskie predprijatija razmeshhat' v oblake kritichnye servisy?" [Are Ukrainian companies ready to put their services into the cloud?].

[7] Fomenko Iryna, (2018), "Pochemu u Ukrainy net shansov stat' vtoroj Silikonovoj dolinoj" [Why Ukraine doesn't have the possibility to become the second Silicon Valley].

of ensuring business continuity for the customers, cloud consumers prefer foreign cloud offers[8];

- number and brand name of the foreign players. Since foreign cloud computing providers entered IT market earlier than Ukrainian, they are more known among the Ukrainian customers. They are faster in innovations and expansion of their products and services. What is more, some people still think that it is more reliable to store and process their data abroad[9];
- negative situation on the relative markets. The monopolistic electricity market of Ukraine create restraints for the development of the business of data centers, where IT facilities of cloud operators are located[10].

2.3. Value chain

The following figure shows the Cloud value chain model of the services available on the market. According to the Cloud Computing Value Chains report[11], the model shows three layers that combine other services. Each layers border represents its own profit. The connections between the layers or services can be either horizontal or vertical.

Primary services level integrate core services that are required for the functioning of any cloud service model. This level contains the following sublevels:

- The hardware services (HW – Srv) include networking, processing, storage and other device services. These services usually are provided as autonomous systems form classical cloud computing providers;

[8] IDC, De Novo, (2016), "Oblachnyj rynok Ukrainy 2016" [Cloud market of Ukraine].

[9] Shvarcman, Darina, (2017), "Oblachnyj rynok Ukrainy vyros na 27%" [Ukrainian cloud market has grown by 27%].

[10] E&C, (2019), "Populjarizacija «oblakov» v mire polozhitel'no povlijaet na nash lokal'nyj rynok" [Popularization of the cloud services will influence the domestic market positively].

[11] Mohammed, Ashraf Adel Bany, Jörn Altmann and Junseok Hwang, (2009), "Cloud Computing Value Chains: Understanding Businesses and Value Creation in the Cloud. Economic Models and Algorithms for Distributed Systems".

- The Grid middleware services (GM – Srv) include resource, security, fault management and operating systems services (OS – Srv). This level is considered as a founding Cloud layer;
- The software services sublevel includes software applications (SW – App), Gridification services, developing tools (Dev – tools) and application support services (ASP);

Figure 5. Cloud value chain reference model

<table>
<tr><td rowspan="4">Business-oriented support services</td><td colspan="4">Business oriented value added services</td><td rowspan="13">Margins</td></tr>
<tr><td colspan="4">Brokers and Resellers (Risk broker, trust broker, value broker)</td></tr>
<tr><td colspan="4">Financial services (Bank services and financial accounting companies)</td></tr>
<tr><td colspan="4">Market place (Cloud services, SW, HW, CPU, NT, storage, content)</td></tr>
<tr><td rowspan="5">Primary services</td><td>Processing</td><td>Security management</td><td>ASP</td><td>Distributor</td></tr>
<tr><td>Storage</td><td>Resources management</td><td>SW - APP</td><td>Composer</td></tr>
<tr><td>HW - Srv</td><td>GM - Srv</td><td>SW - Srv</td><td>Data and Content srv</td></tr>
<tr><td>Network</td><td>OS - SR</td><td>Gridification</td><td>Data - Creator</td></tr>
<tr><td>Devices</td><td>Fault Management</td><td>Dev - Tools</td><td>Aggregator</td></tr>
<tr><td rowspan="4">Cloud-oriented support services</td><td colspan="4">Technology operators (Grid, SW, HW, CPU, NT, storage, content)</td></tr>
<tr><td colspan="4">Grid financial management services (Billing, accounting, charging, payment and SLA)</td></tr>
<tr><td colspan="4">Solution services and consultant services</td></tr>
<tr><td colspan="4">Cloud oriented value added services (Customized services)</td></tr>
</table>

Source: Mohammed, Ashraf Adel Bany, Jörn Altmann and Junseok Hwang, (2009), “Cloud Computing Value Chains: Understanding Businesses and Value Creation in the Cloud. Economic Models and Algorithms for Distributed Systems”.

- The Data and Content services sublevel includes data creation, aggregation and distribution services. The common technologies in this sublevel include data libraries, 3D multimedia data and research databases.

All of the primary level services can be provided as packages or independent services, it depends on the opportunity costs or value added to the consumer or provider.

The cloud-oriented support services level integrate the activities that support and enable the cloud computing in the market. These services are usually developed and customized according to specific needs. Services from this level are usually packed with the primary services and are provided together by the cloud computing providers. This level consists of the following sublevels:

- Cloud financial management services;
- Solution services and consultant services;
- Technology operators which activities include running, operating, troubleshooting core services (software, hardware, content services, networking and storage);
- Cloud oriented value-added services. This level supports specific of the customers by supplying niche services.

The business-oriented support services level integrate nontechnical business services that support business activity and cloud industry. This level includes the following sublevels:

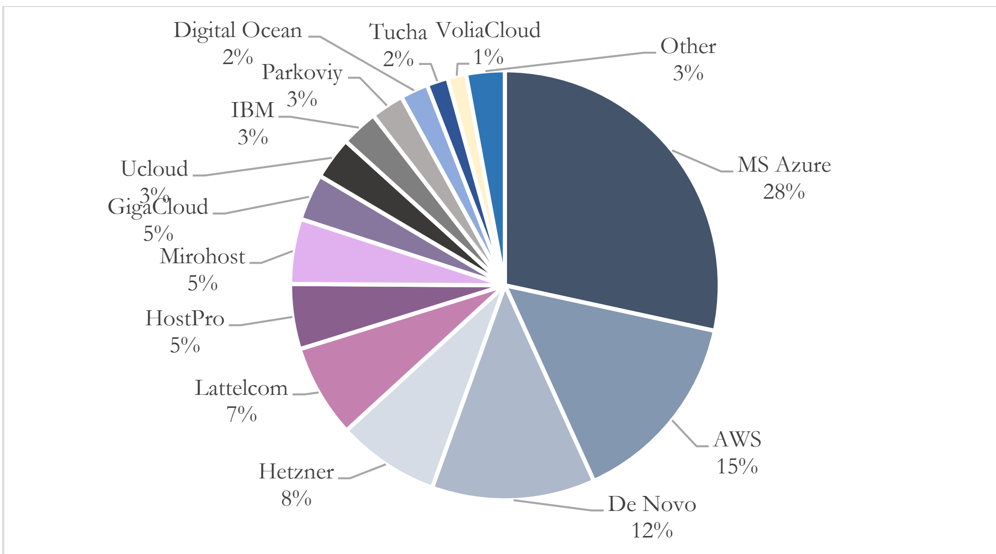
- Financial services (bank services and financial and financial solution companies);
- Brokers and reseller services (sellers, distributors, insurance companies);
- Market place services;
- Business oriented value-added services which are usually provided for innovative business solutions.

2.4. Five forces analysis

Competitive rivalry

Ukrainian cloud computing market consists of both Ukrainian and international firms who are performing their activity inside the borders of our country. The information about market shares of the most popular companies working with IaaS is given below.

Figure 6. Ukrainian cloud market IaaS in 2017, %



Source: Kyryllov I., Ibid.

According to the annual "SiB" study[12], the leader of the IaaS market, as in the previous year, is Microsoft and its Azure service with a share of 28.2%. The 2nd place takes Amazon Web Services (14.8%). Ukrainian cloud provider De Novo (12.3%) ranks third, the German low-cost operator Hetzner locates in the fourth position (7.7%), Lattelecom closes the top five of leaders (7%).

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12 Ibid.

Microsoft's success is easy to explain - the company provides not only a very powerful and reliable service but also has the most developed networking with cloud operators in Ukraine. Amazon Web Services clouds are popular among Ukrainian companies, engaged in offshore programming. The third in the list, De Novo, being a Ukrainian company, sells its services directly to customers.

In total, over 20 cloud-based providers are active in the Ukrainian market. Among not mentioned customers are OVH, Rackray, Baltneta, 3s, Oktawave, DEAC, Cosmonova, SIM Networks, Google Cloud Platform, ColoBridge, shares of which could not be established with acceptable reliability.

In order to measure a market concentration and market competitiveness, the Herfindahl-Hirschman index was used. The calculations are shown below.

$$\mathrm{HHI} = s_1^2 + s_2^2 + \cdots + s_n^2,$$

where s_n is the market share percentage of firm n expressed as a whole number, not a decimal.

Based on my own calculations the value of the index is 1377 and according to the U.S. Department of Justice[13], a market with an HHI of less than 1,500 is considered as a competitive marketplace, so in this case, the market is not much concentrated.

Speaking about the Ukrainian market of SaaS the situation is a little bit different. Since SaaS component doesn't get a notable fraction of the market as a whole, the number of firms that operate inside the industry is lower and the national firms are taking just a tiny part of the market (4%). International firms with Microsoft on the top have captured the enormous part in the market and there is almost no possibility for the domestic companies to have a competitive advantage.

[13] The United States department of justice, https://www.justice.gov/

Table 1. Shares of the IaaS companies in Ukraine in 2017

№	Name of the company	Shares, %
1	MS Azure	28
2	AWS	15
3	De Novo	12
4	Hetzer	8
5	Lattelcom	7
6	HostPro	5
7	Mirohost	5
8	GigaCloud	5
9	Ucloud	3
10	IBM	3
11	Parkoviy	3
12	Digital Ocean	2
13	Toucha	2
14	Volia Cloud	1

Source: Kyryllov I., Ibid.

HHI = 1377

According to the annual "SiB" study[14], the SaaS segment occupied 33% of the total cloud market in 2017, which corresponds to 6.9 Mn USD. Considering that in 2016 this indicator was 4.2 Mn USD, it can be concluded that this segment has grew by 65% over the year.

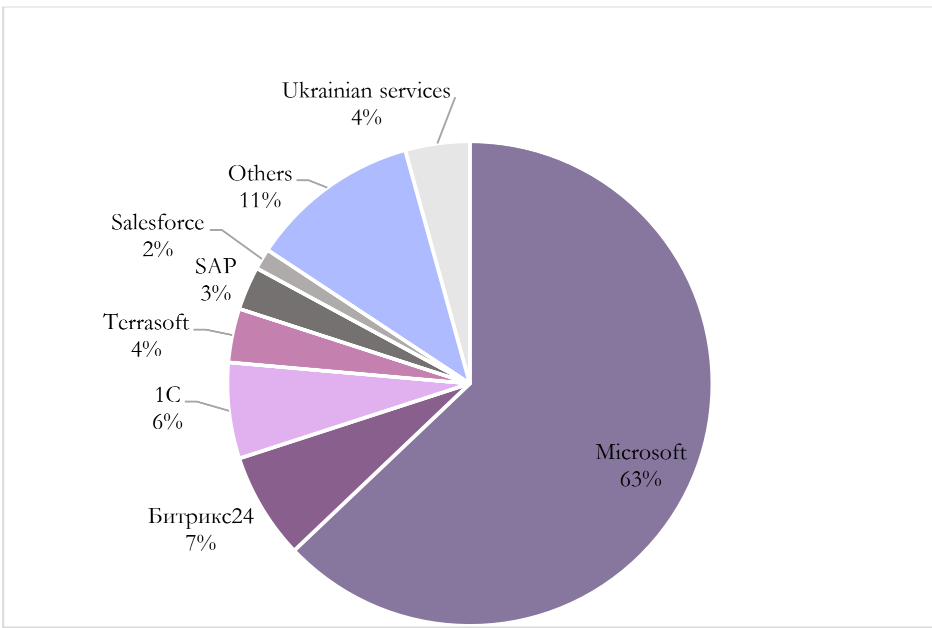
As in the case of IaaS, it is not possible to accurately calculate the revenues of companies operating in the Ukrainian market, since over 90% of the segment belongs to foreign operators. Therefore, in this case, when drawing up a picture of a segment, I will also resort to the analysis of expert assessments and indirect data.

[14] Ibid.

The segment, which is called Ukrainian services, includes companies that provide various cloud services only in our country - these are mainly cloud PBXs, virtual contact centers, warehouse accounting systems, etc. At the same time, Terrasoft, although it is Ukrainian, is in a separate category, since it belongs to international organizations by its status and operates in many countries of the world.

In such a changing environment of the cloud computing industry in Ukraine, it is important to understand what are the most crucial factors for today's consumers of IT infrastructure and what makes the foreign competitors capture such a big market share.

Figure 7. Ukrainian cloud market SaaS in 2017



Source: Kyryllov I., Ibid.

Since the quality of the product is one of the core factors affecting competitive rivalry, I have decided to compare the goods of the domestic and international companies in terms of their ability to meet the customers' expectations. Since cloud computing is the industry that operates mainly through the Internet – speed and stability of access to the data become one of the main concerns of the clients. No one wants to use a service that runs slowly or with interruptions - it annoys corporate users and pushes mass customers. In addition, many critical applications require a minimum response time, for example, for synchronization. In this case, delays in the data exchange process are simply unacceptable. The fact is that high-speed communication channels are now available to a huge number of end-users who generate and consume more and more traffic. To somehow cope with this problem, global operators and service providers take the only correct decision, which is to place the points of concentration of its IT equipment (data centers) as close as possible to the customer. This phenomenon even gave rise to a special term – "edge computing".

In order to understand the competitive position of the Ukrainian enterprises, I have considered how do they locate their data centers around the world. The table below gives the information need.

Table 2. Location of the datacenters of Ukrainian IaaS companies

Name of the company	Location of the datacenter
De Novo	Ukraine
HostPro	Ukraine, Poland, Netherlands, USA
Mirohost	Ukraine
GigaCloud	Warsaw, Ukraine
Ucloud	Warsaw, Ukraine
Parkovyi	Ukraine
Tuchacloud	Frankfurt
VoliaCloud	Ukraine

Source: Own research based on companies' websites

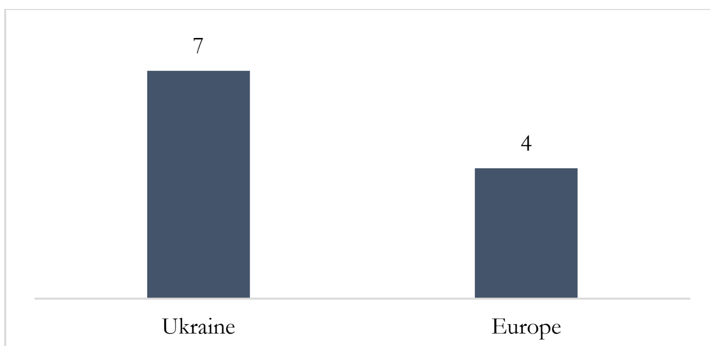
As ones can see most of the data centers are located in Ukraine, three of them separate their resources between domestic and foreign markets and only one enterprise locates its data center outside of Ukraine.

The following graph sums up the location positions of the top Ukrainian-based datacenters.

According to De Novo[15], the closer (physically) to the subscriber is located the data center, in which the cloud is deployed, the higher is the speed and stability of access, and therefore - the more complete will be the sense of customer satisfaction. The same is true in the case when a Ukrainian company works with foreign customers. Then, of course, the best choice will be to rent a cloud where the customer is located. But, if it is about the domestic market, then the local allocation of resources will be the best choice.

So why then Ukrainian business are choosing foreign firms? One of the possible reasons might be in the number of services which are offered by International cloud providers. For example, large foreign operators can often offer advanced services, which are simply not in the range of Ukrainian companies.

Figure 8. Location of data centers of Ukrainian cloud-computing providers in 2018



Source: Own research based on companies' websites.

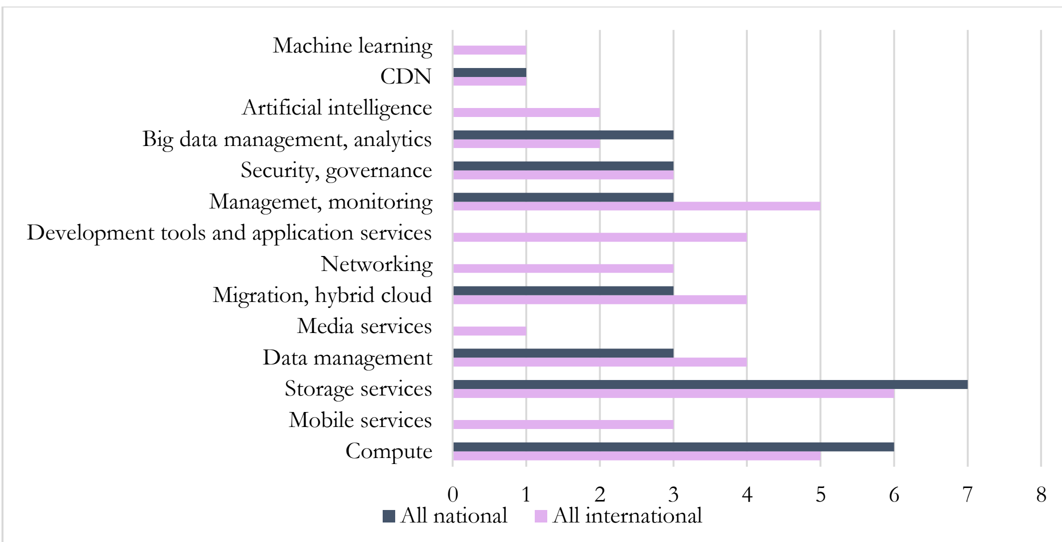
Let us consider which services are the most supplied on the market of IaaS/PaaS. According to the cloud computing industry, the services which are offered in the market can be divided into the following groups:

[15] De Novo, (2018), "Hmara lokalna I zarubizhna: Shcho obraty ukrainsiy kompanii?" [Local and international cloud: What to choose?]

- Computing services provide the possibility for the developers to publish and manage websites and allow to build their own ones using hosted websites;
- Mobile services enable a development team to build and monitor mobile applications and their back-end components;
- Storage services offer object, block and file storage for cloud data;
- Data management provides SQL and NoSQL databases, as well as data querying and migration tools;
- Media services provide a possibility for encoding, streaming or content protection;
- Migration, hybrid cloud provides tools to migrate apps to the cloud;
- Networking provides cloud networking services;
- Development tools and application services provide different tools for ongoing delivery, the release of the application process
- Management, monitoring provides a way for users to automate the manual, long-running, error-prone, and frequently repeated tasks that are commonly performed in a cloud and enterprise environment. It saves time and increases the reliability of regular administrative tasks and even schedules them to be automatically performed at regular intervals;
- Security, governance provides tracking of the activity and identity tracking, access management, and authentication;
- Big data management, analytics;
- Artificial intelligence uses special tools to deliver services such as machine learning, natural language processing, and visual recognition;
- CDN (content delivery network) for audio, video, applications, images;
- Machine learning.

The graph below shows the distribution of the services on both national and international markets. As ones can see from the graph the situation is not common between all the services. National companies prevail over international companies in such services as computing, storage services, big data management, and analytics, while international companies are more competitive in data management, migration services, management, monitoring and machine learning. There are services that are not even offered by domestic companies, which include mobile services, media services, networking, development tools and application services, artificial intelligence, and machine learning. There are services that are offered by the same amount of companies, which are security and governance and CDN services.

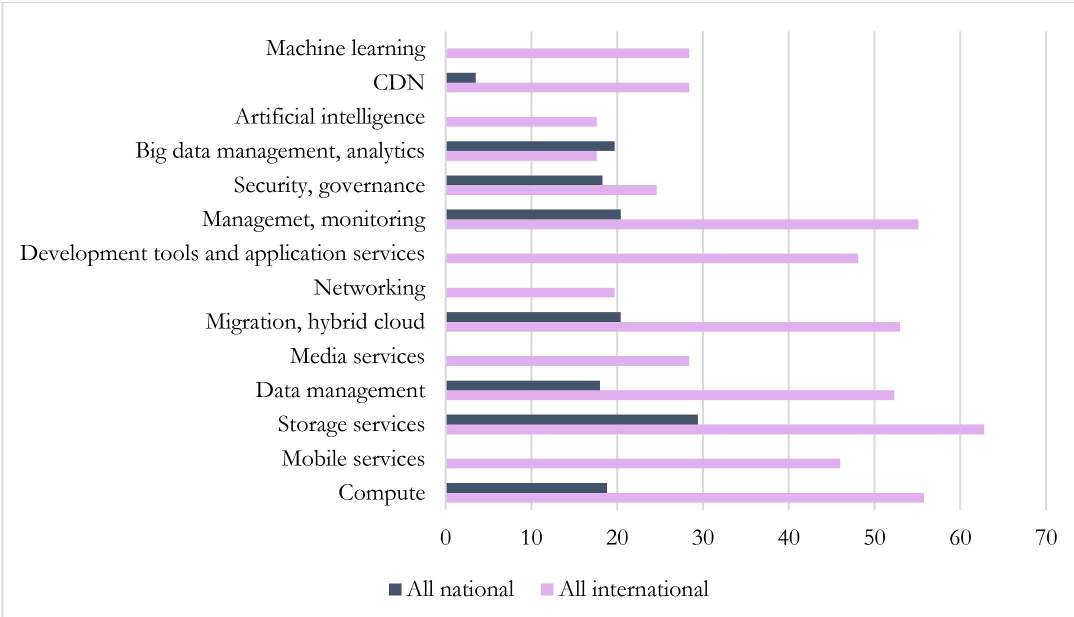
Figure 9. Ukrainian IaaS market in 2017



Source: Own research based on the companies' websites

But what if we take a look at the same data but taking into account the market share of these companies. The following graph shows the trend.

Figure 10. Ukrainian IaaS market in 2017, %



Source: Own research based on the companies' websites

As ones may see from the graph above, the market share of international companies prevail over the market share of Ukrainian-based companies in all the services offered, even if the number of domestic companies extends the number of international. The only service that has the greater value is big data management and analytics which is represented by such companies as De Novo, HostPro and Parkovyi. As we may see from Table 1, all these companies have their data centers located in Ukraine which give them a competitive advantage because of the high speed and stability of access to the stored information.

The same analysis was conducted for the SaaS component of the market. The following services are included in the SaaS:

- Corporate messaging and video conferences include conducting meetings over the web with HD video conferencing, screen sharing and instant messaging;
- Data storage includes sharing files internally and externally and controls who sees and edits them;

- Accounting services;
- Marketing services help to increase the competitiveness of the web page;
- CRM provides interactions between the company and the user of the data. Usually contains information about the clients;
- HR systems, time tracking systems include an e-calendar that is compatible with mail and scheduler tasks that can help to organize the time efficiently and set up the teamwork;
- Mobile services include mobile connections among the employees and even with clients.

Since Ukrainian-based companies occupy just a tiny part (4%) of the SaaS market there is almost no competition in the number of services between domestic and foreign players.

In general, analogous services of foreign cloud operators are significantly more expensive than the services of Ukrainian platforms.

Another advantage of territorial proximity - with the Ukrainian service provider you can always solve all the issues directly. Try to get a clear answer from foreign experts MS Azure or AWS - at best you will be sent to your local partner, and then, after long repossessions between technical support staff. And the secret is that the service abroad also costs a lot of money - the more paid, the better the attitude and the more prompt reaction.

It is also worth saying a few words about the fault tolerance of hardware and software platforms. Perhaps this sounds weird, but the reality is that Ukrainian platforms for statistics are more reliable than foreign ones. Since 2012 national operator De Novo had no crashes in the work. And in general, in the Ukrainian market, the failure of the clouds - a rarity. At the same time, large global players report crashes in their data centers from time to time, and as a rule, only those cases that have a significant impact on the work of clients become, as a rule, the public domain. For example, only in 2018, such troubles occurred at least twice with the AWS datacenters; in 2017-2018, failures were recorded on the sites of Microsoft Azure, OVH and other operators, and if to take the reference point for 2012, then the account of such situations will go on dozens[16].

Threat of new entrants

The threat of new entrants in the Ukrainian cloud computing market include:

- Product differentiation:
  - ease of operation – the product can easily be differentiated using extensions, quality of features and custom interfaces;
  - configurability – differentiation through network architectures, data storage options, server options, security systems, message queueing and storage tiering;
  - performance – differentiation through processing speed, memory speed, storage access;
  - customer service – differentiation through exceptional offerings and client support.
- Capital requirements. High capital investments are required. According to a Ventures Capital[17], a Kyiv-based venture fund invested 500 K USD in Spinbackup (cloud-computing start-up) in September 2017;
- Network effects. Network effect influence is high. Such famous brands as Microsoft Azure, Amazon, Salesforce which have already captured enormous market share are reducing the incentives for new firms to enter the market;
- Government policy. According to independent Ukrainian audit company Bakertilly[18]: there is a general regulation on data protection which controls the collection, standardization, and usage of personal information in EU countries starting from 25 May 2018. These regulations also apply to non-EU countries,

[16] DeNovo. Ibid.

[17] InVenture Investment Group. http://www.inventure.com.ua/

[18] Baker Tilly Ukraine, http://www.bakertilly.ua/

but if the firm is doing business with EU residents – it should comply with GDPR standards as well. It is obviously important for SaaS companies working with the data of customers from all over the world. Violations of the Regulation's provisions may result in penalties of up to 20 million EUR or 4% of the annual revenue.

Along with the analysis done, many barriers for one to enter into the cloud computing industry arise. In order to compete with other IT companies, one must have a strong creative idea, strategic business vision, investment requirements, patents, knowledge, and assets.

Suppliers' bargaining power

Suppliers' bargaining power is different between different components of the market:

- SaaS market – low switching costs and availability of many choices indicate high bargaining power of buyers;
- PaaS market – lack of compatibility standards and usage of proprietary development language lead to a trap of provider, which in turn leads to high switching cost for buyers. Thus, the bargaining power of suppliers tends to stay high because of the high switching cost.
- IaaS market – the product differentiation is low and the bargaining power of buyers is high.

According to "Industry Analysis": Cloud Computing Complied by Group: MIS Majors[19]: "suppliers are limited in bargaining with buyers because suppliers fear if they increase prices, some of their customers will switch to another company due to low switching costs. Three service models have different levels of bargaining power." The highest power belongs to IaaS due to high switching costs and the lowest – to SaaS

[19] BoYee Au-Yeung, Dave Chu, Mark Enfante, Graham Logan, Kevin Saelee. "Industry Analysis: Cloud Computing".

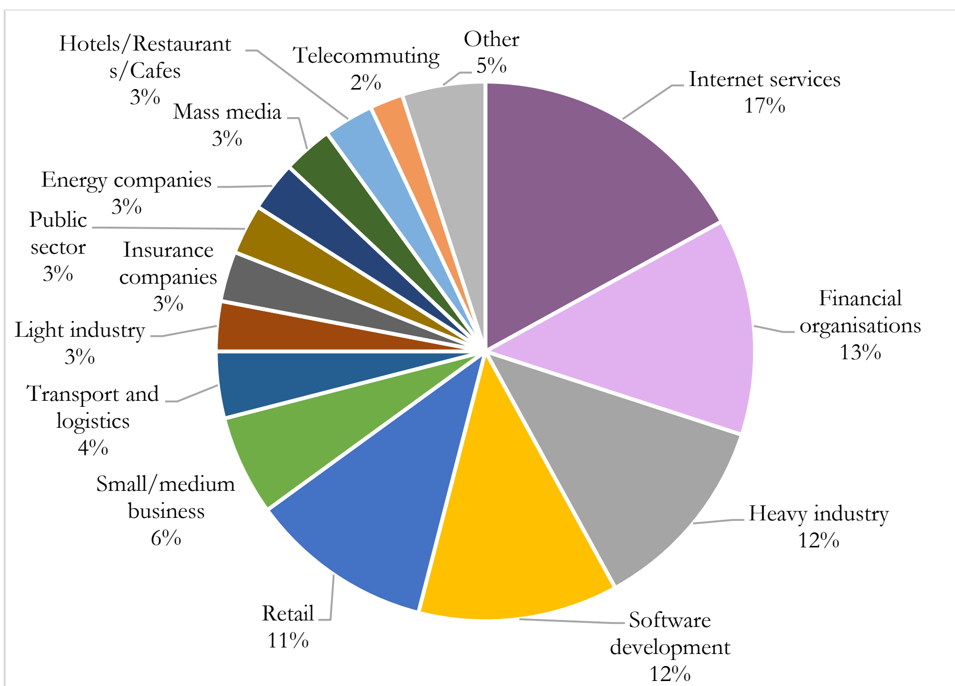
because of low ones. Anyway, the cloud providers are not able to dictate the market rules, since their main goal remains to keep the customer.

<u>Customers' bargaining power</u>

The Figure 11 shows what industries consumed the greatest amount of cloud computing service in 2017.

Since the cloud computing industry is developing rapidly, more firms are coming into the market, it is easy to understand that the power is shifting from suppliers to buyers of the service. Because of low switching costs from one company to another and a large number of companies in the market, SaaS component has the most apparent customers' bargaining power. While PaaS with the absence of development languages has the least. Because the business environment is changing significantly and new demanding requirements arise, buyers are driving the competition in the technology industry.

Figure 11. Ukrainian customers of cloud computing services, fields of activity in 2017, %



Source: Kyryllov I., Ibid.

According to the annual “SiB” study[20], the market of consumers of cloud services in Ukraine remains very segmented - none of the categories of consumers occupy even 20% on it. The most significant users of cloud services in 2017 were companies that provide various Internet services, financial organizations, heavy industry, and retail enterprises, as well as software developers.

Threat of substitution

Even though cloud computing industry in Ukraine has a competitive advantage, it still can be substituted by traditional IT. There is a market share that is not occupied by the cloud providers yet, thus there is a possibility to be expanded. For example through the product diversification. New entrants on the market force existing firms to look for new services to offer and this creates many diversified products that can be used as a substitute to a traditional IT.

Summary

The following table summarizes the competitive forces strength.

Table 3. Strengths of forces of competition

№	Forces of competition	Competitive force strength
1	Competitive rivalry	High
2	Threat of new entry	Medium
3	Suppliers’ bargaining power	Low
4	Customers’ bargaining power	High
5	Threat of substitution	Low

Source: Own research based on analyzed information

[20] Kyryllov, I., Ibid.

2.5. SWOT Analysis

Strengths:

1. Reliability of Ukrainian datacenters

   According to De Novo study[21], Ukrainian platforms for statistics and data centers are more reliable than foreign ones. Since the time when De Novo company was introduced, the operator hasn't had any crashes in the work. The same situation among all the domestic providers. At the same time, large public providers report constant crashes in their data centers that have a significant impact on the clients' workflow. For example in 2018 such crashes occurred at least twice with the AWS datacenters; in 2017-2018, failures were recorded on the sites of Microsoft Azure, OVH and other operators.

2. Price

   According to De Novo study[22], analogous services of foreign cloud operators are significantly more expensive than the services of Ukrainian platforms. At the same time, the reality is that foreign companies have gained considerable experience in pricing manipulations – it is often difficult to figure out exactly what the customer pays for. At first, the cost does not look high, everything can begin with a low price, and end up with a bill of several thousand dollars at the end of the month, for services that were not needed at all. In this regard, the pricing of Ukrainian operators is much more transparent.

   In our country, full technical support is usually included in the cost of the main service. In general, for a certain amount of money and with an identical set of services, the foreign provider will provide only basic support while Ukrainian operator will literally carry the client in his hands.

3. Office location

[21] DeNovo, Ibid.

[22] DeNovo, Ibid.

According to De Novo study[23], with the Ukrainian service provider, it is always possible to solve all the issues directly. In order to get a clear answer from foreign experts MS Azure or AWS - at best you will be sent to the local partner. And the secret is that the service abroad also costs a lot of money - the more is paid, the better is the attitude and the more prompt is the reaction.

4. Currency calculations and exchange rate

   Ukrainian-based cloud providers accept payment in hryvnias, foreign counterparties - in euros or US dollars. This situation, on the one hand, complicates the settlement procedure, while on the other it has certain exchange rate risks. After all, in case of decreasing value of the national currency, the price of services of foreign companies is increasing immediately, while tariffs of the local operators provide a certain time lag and increase with a certain delay. In other words, the Ukrainian provider shares part of the exchange rate risks with the client.

<u>Weaknesses:</u>

1. Services offered

   As was said above, large foreign operators can often offer advanced SaaS/PaaS services that are simply not in the range of Ukrainian companies.
2. Data center location

   Data center, located in Ukraine can become a weakness in case the Ukrainian company works with International clients.
3. Trust issues – one of the most significant issues that restrain the continuous growth of demand for Ukrainian cloud providers is the lack of knowledge in the information field. According to De Novo study[24], 40% of cloud services are launched without the participation of IT specialists, which, leads to the emergence of additional threats to the information security of companies.

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23 Ibid.

24 DeNovo, Ibid.

Opportunities:

1. Expansion of the services offered

   The constant growth of Ukrainian cloud computing market stimulates customers' requests to expand and thus – push domestic cloud providers to develop the number and quality of services they provide. As was shown above, an unoccupied by the cloud providers market share in some industries still exists so there are possibilities for the cloud services to be launched.

2. Entering new markets

   As was shown above, the quality of Ukrainian cloud providers are not less competitive than its international competitors, but even more reliable, thus there is an opportunity for the domestic cloud providers to enter international markets with the high-quality services.

Threats:

1. Consumers' loyalty to well-known brands

   Ukrainian customers are very loyal to international brands like AWS, Microsoft Azure and are choosing them mainly because of mainstream tendencies, rather than smart decisions. Thus, if the brand name is going to be the main driver of the growing demand of the cloud computing market – there is no opportunity for domestic companies to survive.

2. Data center location

   Location of the data center becomes a threat when a company works with foreign customers. The further (physically) to the client is located the data center, in which the cloud is deployed, the lower is the speed and stability of access, and therefore - the less complete it will be in the sense of customer satisfaction.

CHAPTER 3. CONCLUSIONS AND RECOMMENDATIONS

According to the analysis done the following conclusions were made:

- The Ukrainian cloud computing market is growing with CAGR of 47% during 2012-2018 and was expected to reach 28.5 Mn USD in 2018;
- The market share of the national companies decreases since 2014 and had the value of 34.3% in 2017;
- SaaS service was expected to occupy around 35% of the Ukrainian market in 2018, the rest – by IaaS/PaaS services;
- Among the top five industries that are the customers of the cloud computing services are: Internet services, financial organizations, heavy industry, software development and retail. All together they capture around 65% of the clients;
- International providers are presented by the following services: machine learning, CDN, Artificial intelligence, Big data management and analytics, Security and governance, Management and monitoring, Development tools and application services, Networking, Migration and hybrid cloud, Media services, Data management, Storage services, Mobile services and Computing services. Ukrainian companies doesn't provide such services as Artificial intelligence, Networking, Media services and Mobile services.
- National cloud providers get a competitive advantage mainly because of: the reliability of the datacenters, which report crashes considerably less number of times than the foreign competitors; price of the service, which is much lower than international providers; office location, where it is always possible to solve all the issues directly; currency calculations and exchange rate;
- The main factors that prevent Ukrainian companies to be growing are customers loyalty to well-known brands and the number of services provided.

Based on all the information analyzed and the SWOT analysis made, the following strategies could be suggested for the Ukrainian-based companies to extend their market positions in the domestic market:

According to the strength of the Ukrainian companies:

- since domestic companies have a competitive advantage in the reliability of the datacenters it would be recommended to maintain its position and keep the quality on the same level. Of course, the awareness about the cloud services increases and the number of the information the companies are going to process increases as well, but that should not be the reason of the low quality service. In this case the companies should look for innovations and introduce new technologies to support the quality existed;
- the price of Ukrainian services is much lower than of the foreign competitors which makes a big influence on the choice of the customers. For the price not to go up, it is important to keep the expenses of the service providers on the acceptable level which can be achieved, again, by the technology improvement;
- even though the data center location of the Ukrainian companies gives advantage for the domestic customers, it is important to develop new data centers abroad to make it possible for the domestic companies who work with foreign clients to work with stable access. The expansion of the offices locations also might be a good idea. In this case, clients will be able to solve all the issues directly.

According to the weaknesses of the Ukrainian companies:

- it was analyzed that the foreign competitors can offer more advanced services, which create some disadvantage for domestic companies. Accordingly, it was discovered that big data management service and analytics are the most developed services of Ukrainian cloud providers, since they have the greater market share on the domestic market and thus, might compete with international ones – it is recommended to increase its market share on the national market. What is more, networking and artificial intelligence services shares of international companies don’t occupy more than 20% of the market there is still the possibility for the domestic firms to extend their activities there and suggest new tools and methods to attract both existing and new customers;

- trust issues provide a big disadvantage for Ukrainian companies that restraint its demand growth mainly because of the lack of knowledge in the information field. In this case the advertising campaign that is targeted on the advantage of the domestic companies compare to the international ones might be launched to increase awareness of the customers about the benefits they can get while using national service.

According to the opportunities of the Ukrainian companies:

- the expansion of the services offered might be done through in the SaaS segment, rather than IaaS, since it is the one that is growing on the market. Increase in the competitiveness of the domestic providers might be done with the product differentiation through the quality of features, custom interfaces, server options, security systems, exceptional offerings, and clients support;
- the company might attract new customers by entering markets abroad, which might expand their clients database and to raise the companies' revenue.

According to threats of the Ukrainian companies:

- national companies can do nothing with customers' loyalty to well-known brands, because their choice is based mainly on mainstream tendencies, rather than smart decisions. The only thing that might be recommended to do is to increase the awareness about the benefits of Ukrainian companies by advertising campaigns that was discussed previously.

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