Economic sciences

UDC 658

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TENDENCIES AND CHALLENGES THAT IT-BUSINESSES ARE FACING DURING THE PANDEMIC AMID INTRODUCTION OF TELECOMMUTING WORLDWIDE AND THE WAYS TO MANAGE THEM

Summary. *The paper describes the challenges which the IT-industry encountered when the pandemic began; presents the official statistics about digitalization, telecommuting; compares aspects of managing businesses*

remotely and in the office; suggests several ideas of business supporting basing on our own business model.

Key words: *pandemic, IT-business, business management, business model, KPI analysis, statistics.*

Introduction. Since the very beginning of 2020, the COVID-19 pandemic has been an issue that we all have had to deal with. The impact of the disease has been so disastrous to the world economy that many compare the situation to the one that was after WWII in 1945. The long list of areas which are vulnerable to the virus include leisure and hospitality jobs, mining and oil extraction jobs, travel, and transportation jobs etc. Needless to say about the huge change in our lifestyle, working schedules and time spending. The pandemic forced the companies to introduce remote work to their staff and everybody learned how to live in a new reality.

In the case of the IT-business, it would be quite interesting to investigate the impact of the COVID-19 pandemic on its development as well as the ways the IT-society has found to adapt and preserve the long-term tendency to market expansion. The IT-industry has faced many issues in production, distribution, marketing etc. Among the most pertinent and long-lasting effects are shortages disrupting the global supply chain. The outbreak in China impacted facilities producing components, which caused shortages of many different goods. Customers are delaying purchases because the pandemic shook an already uncertain global economy. Technology support may struggle to keep up with increased customer needs on applications.

The companies are particularly vulnerable in terms of workforce as the strict measures of lockdown have been deployed worldwide. Employees around the world have been sent home for work to reduce the chances of transmitting the virus in the office. Along with other businesses, IT-companies have to focus on arranging remote work facilities which include various technical equipment and

applications. This is a problem not only for the IT-industry but, of course, one of the most serious.

Nevertheless, there are also the numbers which show some positive growth of IT-markets in several countries. Ukraine demonstrated 20 percent IT-market growth in 2020, exceeding $5 billion in total exports for the first time. Another example is the Indian IT-industry with revenues growing from $190 billion in 2020 to $194 billion in 2021. In general, it has already become clear that several aspects of the development of the industry make the IT-market stay stable and experience some expansion.

Taking into account such controversial data, we decided to research the current state of the world IT-industry. Our goal is to analyze the data which is published by many credible sources – research centers, financial organizations, governmental institutions etc. We should focus on the problems which are either common for every area or distinguished only for the IT; make their impact on the industry clear for others and, of course, analyze the possible ways of work organization during the pandemic including designing an efficient business model as well as making its KPI (Key Performance Indicators).

A. The analysis of current situation in businesses because of the pandemic

Due to the devastating impact of COVID-19 pandemic on businesses across the world the ways of running them have changed according to the challenges we faced.

Firstly, it is crucial to demonstrate the tendencies of digitalization which the COVID-19 brought about in 2020. Figure 1 shows the sharp increase of the percent of digital customer interactions as a proportion of all customer interactions, globally and across the three regions – Asia-Pacific, Europe, and North America.

All the four indicators of 2020 are above 50% with the lowest point of 53% in Asia-Pacific region, and 65% for North America. Moreover, such an

extraordinary result was achieved in record terms – less than 8 months counting from December 2019. Basically, the world economy reached such numbers for the first time, and nowadays the majority of customer interactions are made online.

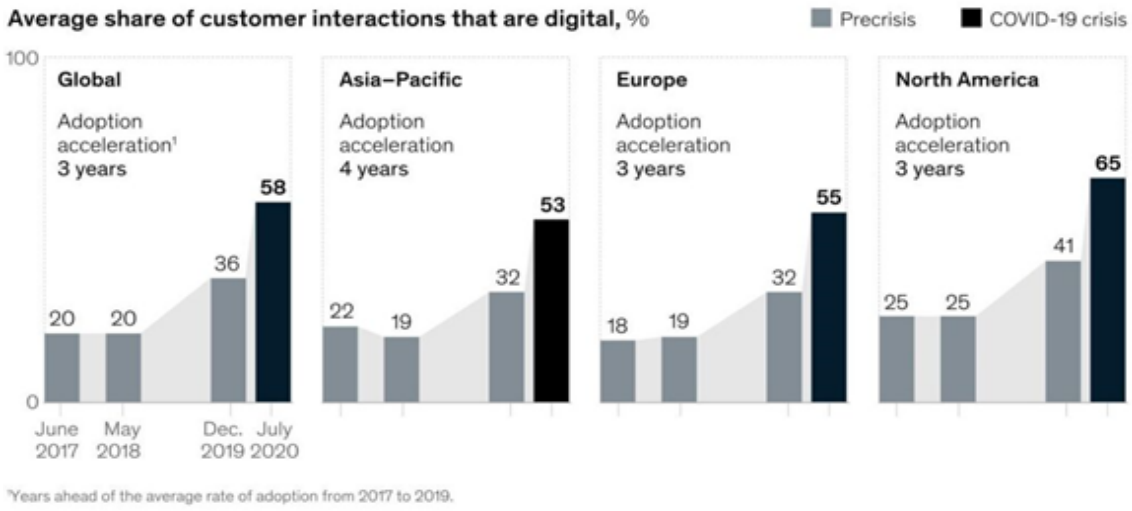

Fig. 1. Acceleration of digitalization of customer interactions in 2020 [1]

The same accelerated speed can be seen in the emergence of a variety of digital products and services. Companies started to create digitally enhanced offerings or refocused their existing products [1]. The study shows that the average share of partially or fully digitized products has exceeded 50% in most developed or developing countries.

When thinking of what has been happening since the beginning of the world pandemic in February 2020, we cannot diminish such an important part of global work organization as a rollout of remote work facilities. Due to the severe quarantine measures the employers couldn't be allowed to keep workers in offices, and that is why hundreds of millions of people were introduced to new conditions of their work.

From [3] we can understand that, having the quarantine measures been implemented, many developing countries experienced the decrease in broadband speed during March and April 2020, likely reflecting peaks in Internet access

combined with changes in behaviour and traffic flow as, for instance, more people began to work from home. [3, p.10].

Apart from technical issues, like the one mentioned before, there also have been concerns about the mental health of employees who have been forced to change their usual work schedule. The result of the survey conducted by [4] shows the COVID-19 being the main reason for people working remotely – about 45% of all respondents said so. At the same time, 46% of respondents said the companies they work for would rather keep telecommuting after the pandemic (Fig. 2).

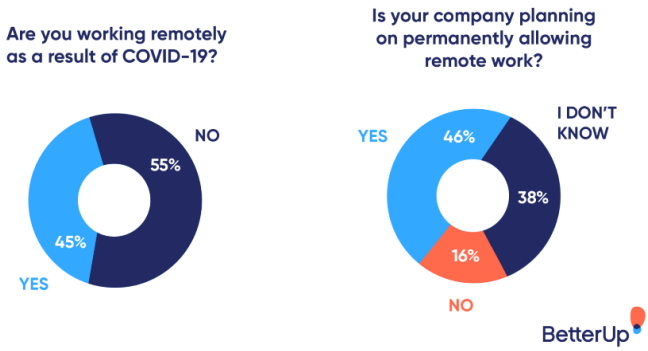

Fig. 2. Telecommuting

Undoubtedly, almost everyone struggles when working remotely, and there are many reasons why. Figure 3 represents the issues which the people find the most challenging when working from home. Apart from loneliness, which is typical in such situations, there are problems with person-to-person interaction, dealing with several technical aspects of telecommuting, concentration on work, and, which is the most crucial one, motivation - which usually stands as the main contributor to work.

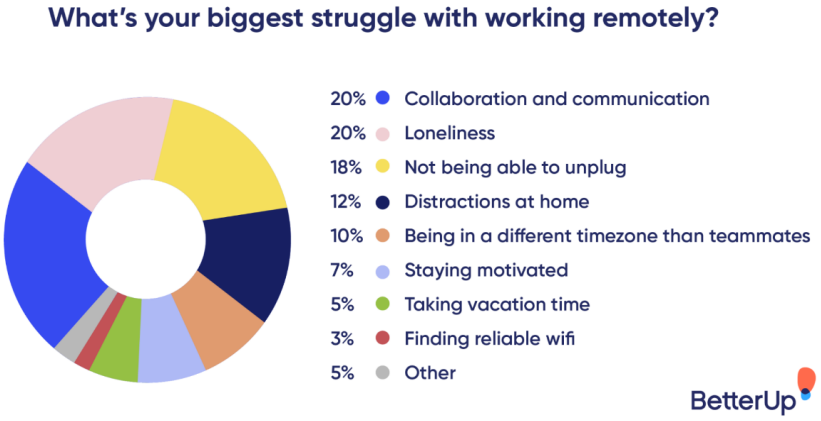

Fig. 3. Biggest struggles of people working remotely

The shift from a physical workspace to a remote office was a big challenge both for employees and managers. Nevertheless, some companies reported accelerations in digitalization of their internal processes like back-office and production, indicating multiple times faster move to a remote work model than they thought it would take (Fig. 4).

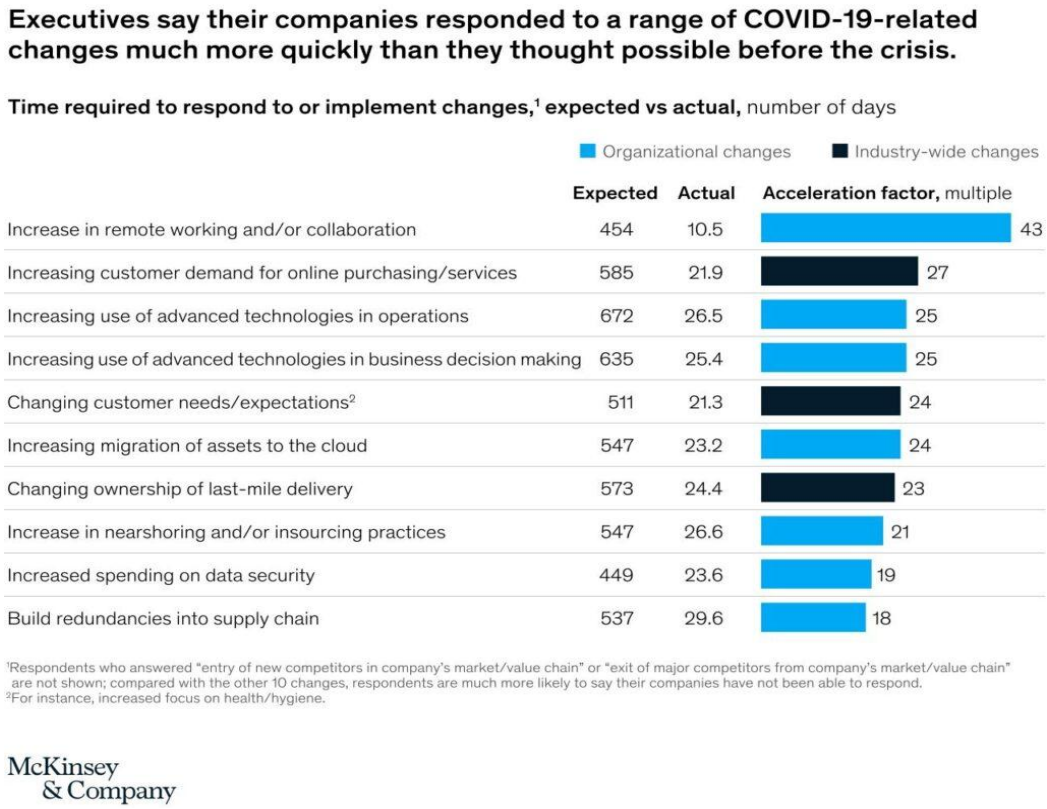

Fig. 4. Time required to implement changes

B. Tendencies and issues faced by the IT business during the pandemic

A recent World Bank working paper uses the World Bank Enterprise Surveys (ES) from 2019 and 2020 along with a series of follow-up surveys conducted since the outbreak of the pandemic to assess the effect of the COVID-19 on business closures [5]. The original ES data collection shows that firms that survived the COVID-19 crisis are older and more productive; they also tend to be innovators and use digital technology.

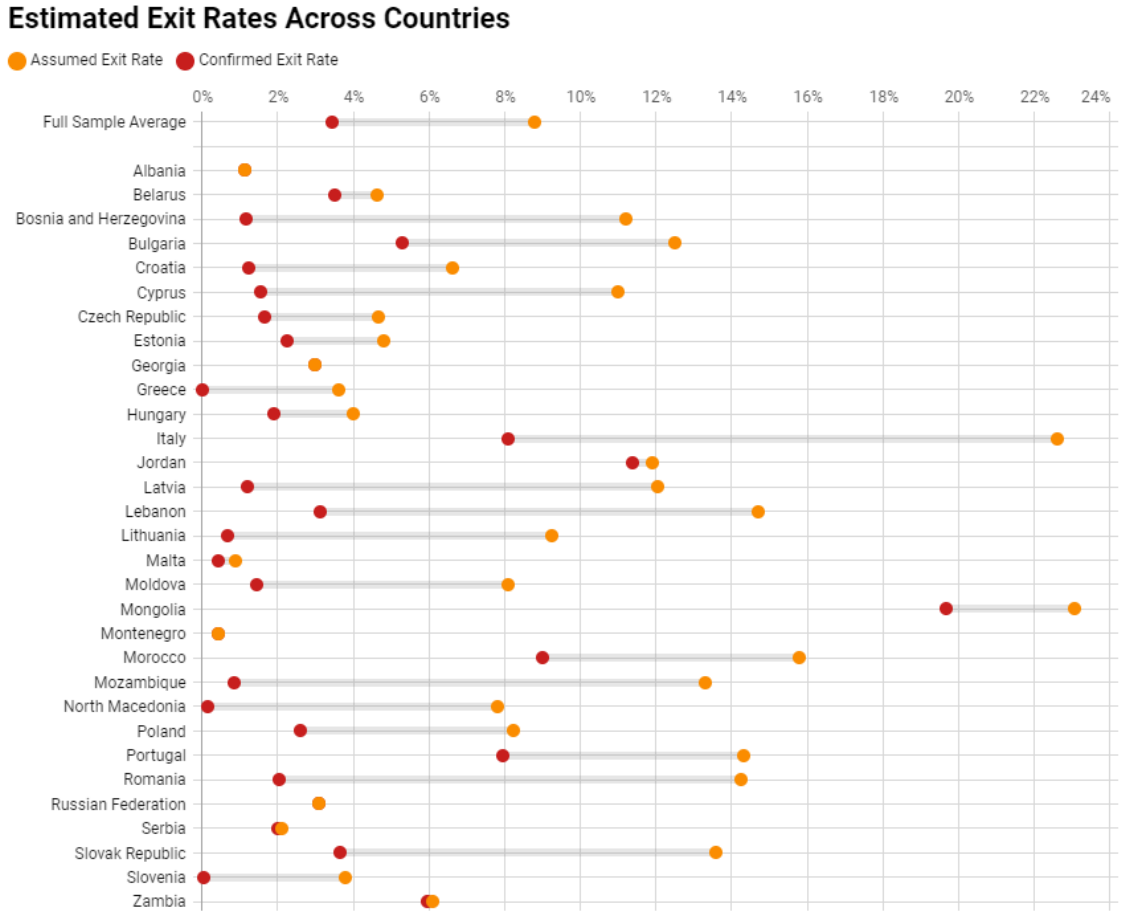

Fig. 5. Exit rate of different businesses during the pandemic [5]

There are certain IT-business characteristics which improve the likelihood of businesses surviving. The introduction of new products on the market shows the significance of businesses' ability to adapt to rapidly changing market conditions to increase firms' resilience in a time of crisis. Similarly, the use of technology, which has become particularly relevant during the COVID-19

pandemic to offset the physical remoteness imposed by the social distancing requirements, is crucial for survival. The role of mitigating factors, such as innovation and digitalization, is stronger for smaller firms.

Most IT-companies already have business continuity plans, but those may not fully address the fast-moving and unknown variables of COVID-19 [6]. Typical contingency plans are intended to ensure operational effectiveness following events like natural disasters, cyber incidents, and power outages, among others. They don't generally consider the widespread quarantines, extended school closures and added travel restrictions that may occur in the case of a global health emergency.

The crisis raises several unique challenges for IT-businesses. Some of them are mentioned below.

- Cybersecurity risks are likely to rise because of more people working remotely.

To respond to pandemic-related changes, IT teams had to connect thousands of endpoints and personal devices of each employee. Due to the speed of the adjustments, security wasn't a top priority for organizations. The primary goal was to provide network access to workers.

Today, high-tech firms face more security threats than ever before: the increasing number of networks and end-user devices produce additional vulnerabilities. The existing security infrastructures require constant improvements. A lot of companies heavily employed AI and machine learning technologies to prevent and combat sophisticated cyber-attacks. To improve cybersecurity in your company, a strong VPN security policy must be defined. Also it is recommended to identify critical features that need to remain onsite, and which can be removed; to develop customized protocols based on the security threats faced by the company.

- A slowdown in recruiting resulting from the crisis could affect a future pipeline of skilled workers.

The problem is that due to the pandemic, the number of qualified IT engineers has decreased, and the demand for them is still great. Companies should think about ensuring a continuous flow of new staff to save themselves from the lack of experienced workers in the future.

- The crisis underscores the need for flexible, resilient business models, including increased focus on cash-flow forecasting, impacts on supply-chain and remote-working technologies.

Remote working is much less likely to meet customer expectations better than it did before the crisis; the changes that have done so best are, unsurprisingly, responses to the increasing demand for online interactions and to changing customer needs. Investments in data security and artificial intelligence are the changes respondents most often identify as helping to position organizations better than they were before the crisis.

However, the crisis also gives opportunities to improve or develop new business strategies [7]. We collected some common business strategies that companies have adopted to survive and thrive during the pandemic.

Investing in innovation

To stay afloat, IT-companies have had to ensure that their employees are able to continue working from home, and their services can be bought or accessed online. This has meant the development of new software, digital systems, and communication methods.

Taking businesses online

Due to the pandemic companies that had never considered going online were suddenly forced to digitize their businesses. Online shopping – eCommerce – has become the main method of purchasing for consumers globally. This is also a good opportunity for IT outsourcing firms to provide their services to such companies.

Changing the business model

To survive, businesses must be resilient, adaptive, and creative. One solution is agility. Business agility is an organization's capability to adapt quickly, respond rapidly, be creative, lead change and maintain its competitive advantage when faced with difficult problems. If a business can remain agile throughout these periods, then its chances of success and survival are much higher.

Rebranding the company image

With fewer resources to fall back on and a smaller network of customers, small businesses have suffered from the pandemic more than larger ones. One strategy for keeping up with the larger companies is rebranding. This is because it helps to change customers' perceptions of the brand and encourages them to engage with it.

More of daily life now takes place online as consumers adopted mobile banking, video calls, remote education, eCommerce, telehealth. Web replaced in-person interactions during disruptions, and online channels became the major means of communication. Here are three technologies that have been increasingly incorporated during COVID-19:

- Moves to the cloud. Organizations accelerated their plans to move additional workloads to the cloud computing platforms to gain the flexibility needed to handle eventuality.
- Telehealth. Virtual doctor visits and other forms of remote-tracking software helped alleviate the crowds at hospitals and bring more care to more people.
- Automation technology tends to require only minimal maintenance and human intervention in most cases. Plus, computers can't be affected by global pandemics.

C. Remote vs Office. Things needed to be considered when working remotely.

1. Comparison of remote work and work in the office

As we already mentioned before, the development of the pandemic led to the need to create safe working conditions for employees. It is for this purpose that companies have begun the transition to remote work. However, many of them are already openly declaring their intention to continue working remotely (in whole or in part) even after the end of the pandemic. In our opinion, this is due to the fact that the remote system has other potential advantages over a full-fledged office format.

If we talk about these advantages in terms of ordinary workers, we can highlight the following points:

- There is no need to spend time and money on the way to the office.
- Workers presumably have more free time for themselves.
- It gives them an opportunity to work "at their own pace".
- Comfortable atmosphere at home.

And if we take into account the impact of remote work on the company as a whole, then there are also some pros. More specifically:

- Opportunity to attract talented specialists, regardless of their location.
- Reducing the cost of renting premises and arranging office space.
- An increase in employee productivity (which is proven by a 2-year Stanford research) [9].
- It becomes easier to grow and scale the company as there is no need to worry that you will outgrow your office.

We can be sure that the representatives of the domestic IT field agree with the advantages of remote work described above, analyzing the results of the survey of the Ukrainian IT-professionals [10]. We decided to choose this one

because Ukraine is a country where the IT-industry is developing quite rapidly amid COVID-19 pandemic.

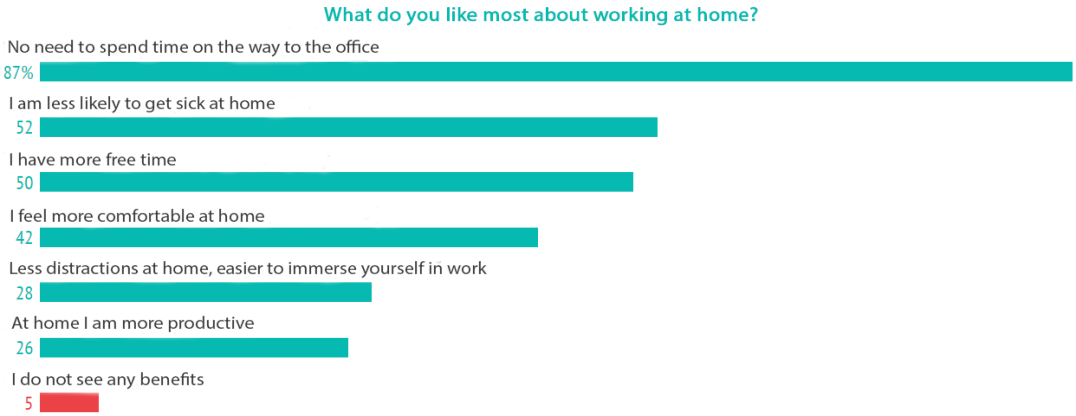

Fig. 6. Benefits of working at home according to Ukrainian IT-sector workers

However, here we can also see that 5% of respondents do not see any significant benefits in remote work. And if you consider the following diagram, it becomes clear that not all employees of IT companies are satisfied with the remote form:

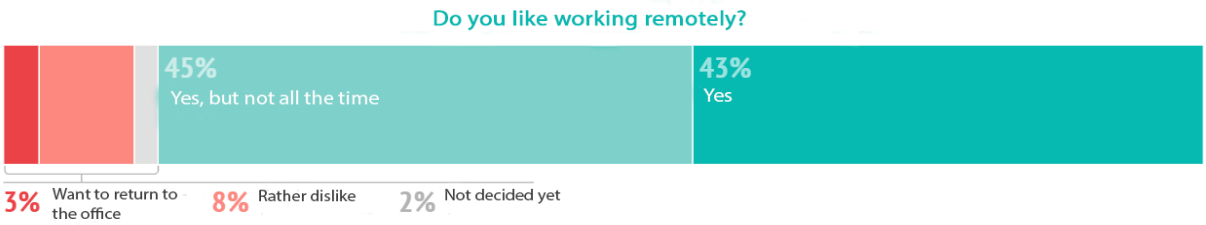

Fig. 7. A diagram showing preferences of IT-sector workers in working conditions

If we consider the benefits of office work from the employees' point of view, we can highlight the following statements:

- Live communication and socialization.
- Ease of communication with colleagues, faster resolution of work issues.
- A clearer schedule (during teleworking, many work overtime).
- Easier to concentrate.
- Well-equipped workplace.

- A clear work-home separation that helps more effectively resist burnout.

And from the point of view of company in general:

- Easier to monitor employee productivity.

Employers are worried that employees may be misleading them. For example, complain about the lack of the Internet, disconnection and delay the submission of reports. And these worries are not in vain: in 2020, the job search service JobList conducted a study involving 958 people from the United States. As a result, 83% of respondents honestly admitted that since the transfer to the remote form of work in one way or another they deceived their managers and colleagues [11].

- Easier document management.
- Higher level of security for storing corporate information.

The fact is that in the remote form of work, employees mostly use their own technological means, often completely unprotected from any intrusions from the outside. These devices become objects of storage of corporate data, personal and other confidential information. Thus, the parameters and content of professional communications from the standpoint of their storage become the area of responsibility of ordinary employees.

Most of these points can be proven, once again, by analyzing the results of the aforementioned survey of Ukrainian IT-community. For example, the following diagram shows exactly what benefits the employees see in working from office and the results obtained coincide with the conclusions we reached:

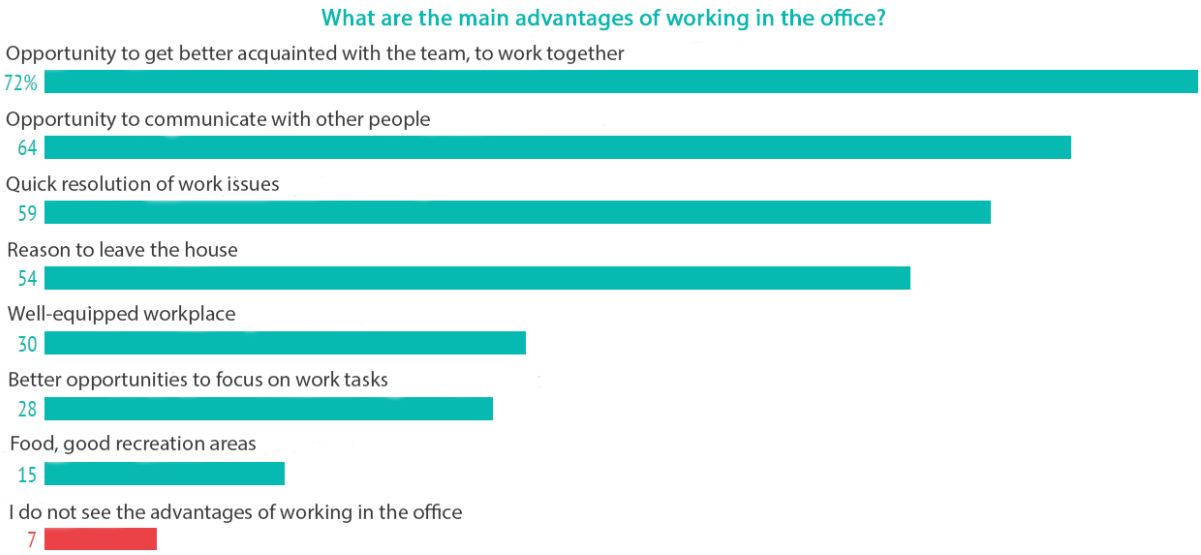

Fig. 8. Results of the survey about pros of working in the office

So, although telecommuting has a number of advantages over the office, both in terms of ordinary workers and their employers, it is still not ideal and creates a number of new challenges for companies that they still have to overcome.

2. Key features that should be considered when the remote work is being arranged

In A, we described the results of the rapid digitalization which became possible due to the pandemic. In addition, we showed the results of the survey concerning the possible future of telecommuting - nearly half of the respondents thought that they expect it to be kept by the employers after the pandemic ends. However, the companies might experience several technical issues if it comes to replacement of the work at office by telecommuting. That is why we want the employers as well as their employees to pay enough attention to these things:

- Technical equipment. The IT-industry is a huge field and there are situations when a person does not have a thing that they used to have in the office. This must be a concern of both an employer and an employee.
- Corporate services. On the part of employees, there may be a decrease in the level of availability of corporate services. That is, the more people use the

same service from the corporate network, the worse the connection will be. Nowadays, this is solved in two ways: using clouds and scaling services [13].

● Mental condition of IT-workers. Although the respondents from the previous survey consider working at home very comfortable, the feeling of loneliness as well as inability to change the working environment might affect the mental state of a person. This can be resolved by providing the staff with flexible timetables and long breaks. Moreover, if it is possible, the company should arrange the communication facilities for the staff so that they can chat or speak online without delays.

● Cybersecurity. As we mentioned in B, cybersecurity is certainly an important thing to consider when the staff have to work from home. Strong security policy is required.

After detailed analysis of the business models during pandemic and tendencies which we have observed above we may propose our own business model based on some existing models [12] considering all benefits we can use from pandemic and avoiding risks.

We have highlighted the following features:

● Products must be distributed only online as in eCommerce because a large part of people stay at home due to the pandemic. In addition to directly selling goods and services, eCommerce involves customer service and support.

● All resources must be distributed wisely and in this case outsourcing comes to help. Also, gathered professional knowledge and free capacity can be monetized and new expertise accumulated. All of the above can be used in the future to improve internal processes and restore the main line of business.

● Main goal is to offer the exact opposite of the competitors' image and traditions. The novelty of the value proposition attracts customers who favor ideas and concepts that differ from the mainstream and popular offers.

● To increase the chances of survival of our business we should use the benefit of the "Shop inside shop" model and offer our products and services on

other existing shops. The existence of such a combination is characterized by increased efficiency, which has a beneficial effect on both sides. The host establishment benefits from an influx of customers attracted by the goods or services of a small branch and from receiving rent

- Company's resources must be used not only internally but can be sold to other companies. Thus, "inactive" resources contribute to the receipt of additional income over and above the proceeds from the main value proposition.

Considering all those features we have reduced risks of business exit by reducing all expenses and adapting to the pandemic situation while retaining competitiveness.

The only and the most significant disadvantage of this business model is that transformations of existing models into this one may be too complicated and probably unnecessary because they are not yet oriented on the virtual market and it is likely that those businesses have no option to give out part of the work to outsource or sell unused resources to other companies for their own profit. Large part of online shops have already created their own one and they have no need to collaborate with other shops or take part inside other giant shop. Businesses founded on this model must be very stable and will have potential of growth, but they are much less likely to grow rapidly unless the business will have an extremely innovative product.

In addition to creating a business model we have created our KPI which can be used to estimate workers' productivity very precisely and efficiently. This is a crucial part for every business, because aggregated KPI data can show us what workers can improve and what they lack in daily work. Here are some of the most likely worker types that can appear in our business model and their KPI:

Table 1

KPI

Programmers	completed tasks per day considering difficulty
	salary
	software/hardware costs
HR manager	people reviewed per day
	salary
	emails amount per day
Team lead	given tasks per day
	milestones completed
	projects released
Marketing/sales manager	created plans
	created strategies
	income per week
	repeated income
SMM manager	followers flow per day
	likes/comments per post in social media
	amount of posts per day (their quality is evaluated by indicators above)

Conclusion. We conducted research on the current state of the world IT-industry, based on the data provided by several research institutions. Due to the pandemic, businesses were forced to make changes in work organization, which impacted a lot on. On the other hand, the process of digitalization has sped up having more than a half of the total number of customer interactions being digitized. Also, telecommuting as an outcome of the strict quarantine measures worldwide has become a challenge both for employers and employees. Such issues like the decrease of Internet speed have been possible due to an unexpected shift to telecommuting in many fields of economy, including IT. We compared the features of telecommuting and working in the office, and presented the opinions of Ukrainian IT-industry workers concerning the pros and cons of both types of working conditions. The following stage of our work was the development of a business model that would take into consideration the results of the previous research. It ensures business resilience and safety during the

pandemic because of using eCommerce, outsourcing, benefits of the "Shop inside shop" model and "inactive" resources contribution. On the last stage of the work, we presented a KPI (Key Performance Indicators) of our business model.

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