INTRODUCTION

COVID-19's many opposite impacts

As COVID-19-related changes ripple through the industry, challenges and opportunities abound for telecom companies. Initial positives include increased demand for services due to the likes of work-from-home and customers spending more time online. However, there are also areas where companies are seeing new risk exposures.

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TELECOMMUNICATIONS RISK FACTOR SURVEY

Top-5 risks faced by telecommunications companies in 2018 vs 2020 globally

- **Exchange rate / foreign currency changes**: 76% vs 90%
- **Unfavourable changes to regulation**: 65% vs 92%
- **Interest rate pressures**: 67% vs 94%
- **Increased competition**: 76% vs 90%
- **Credit risk**: 69% vs 90%

COVID-19-related risks for the telecommunications industry

COVID-19 put pressure on telecom operators in terms of the growing necessity of connectivity.

- Inability to provide resilient connections
- Limited productivity
- Supply chain disruptions
- Modified customer profiles

Technological advances are driving new trends

- **5G**: More resilient and stable connections with higher speed and lower latency.
- **Edge computing**: Tools and storage located closer to the end-users, which prevents disruptions in application operations.
- **UCaaS**: System of communication tools such as file sharing and instant messaging ensured by the cloud vendor.
EXECUTIVE SUMMARY: CHANGING RISKS

2020 led to challenges, disruptions, and changes for the telecommunications industry. Increased data security regulations and the vanishing line between telecom companies and technology providers contributed to an increased focus on innovative solutions, new partnerships, and transforming business models. The goal: to stay ahead of the curve and meet major challenges — including the impact of COVID-19.

BDO’s 2021 Telecommunications Risk Factor Survey explores the risk landscape that telecom companies are facing. The report is based on risks identified in financial reports by almost sixty companies that operate in the telecommunications industry across the Americas, EMEA, and Asia-Pacific.

TOP-5 risks of 2020

In the previous edition of the BDO Telecommunications Risk Factors report, the main risks affecting telecom companies were exchange rate/foreign currency changes, increased competition, the fast arrival of new technologies, access to finance, and interest rate pressures. In 2020, these risks were accompanied by economic uncertainties due to the pandemic and lockdowns, which lead to new issues, especially related to financial risks.

TOP-5 risks currently affecting telecom companies:

- Interest rate pressures
- Unfavourable changes to regulation
- Exchange rate/foreign currency changes
- Increased competition
- Credit risk

Telecommunications risk radar

Notes: (1) Among 59 analysed companies, only 11 have posted annual reports for 2020 as of 1 September 2020 and 8 companies were not considered due to the lack of information; (2) Europe, the Middle East, and Africa; (3) The increased volume of risk is based on the comparison of the percentages of surveyed companies in 2018 and 2020.
TELECOM COMPANIES IDENTIFY INTEREST RATE PRESSURES AS TOP RISK

1. Interest rate pressures

Fluctuating interest rates present a major challenge to telecommunications companies. They are capital intensive and often undertake large-scale M&A deals and infrastructure projects. Cash flows tend to be stable without big revenue spikes. The financial fallout of COVID-19 leads to increased capital requirements to cover interest rate risks.

Telecommunications companies often also have middle- and long-term investments at variable rates tied to an increasing number of M&A deals. All of these factors lead to high exposure to volatility arising from changing interest rates.

Interest rate pressures were identified as a top risk by 67% of telecommunication companies in 2018 to 94% in 2020.

The strong growth of the telecommunications industry and high capital expenditures push especially Asian companies to borrow money from international organisations, even if many loans carry floating interest terms. The pressure resulting from changes in interest rates is highlighted by 100% of analysed companies in Asia-Pacific (2018: 67%). Telecom companies in EMEA and the Americas also feel the increased relevance of interest rates and 94% and 93% of companies noticed it (2018: 66% and 69%, respectively).

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Share of companies that identify interest rate pressures as a risk for their businesses

- **Globally**
  - 2018: 66.7%
  - 2020: 94.1%

- **92.9%** of companies in the Americas
- **93.5%** of companies in EMEA
- **100.0%** of companies in Asia-Pacific

Notes: (1) Only 6 analysed companies were from the Asia-Pacific region
INABILITY TO FOLLOW REGULATION CHANGES CAN HAVE FINANCIAL CONSEQUENCES

2. Unfavourable changes to regulation

In the digital era, consumers have become increasingly concerned about personal information protection. Companies worry about both this and their own data protection. Telecom companies are often international and must consider every relevant regulatory change in all active markets. Implementation of new technologies and changing national security regulations are strategic priorities for countries across the world.

In 2020, 100% of telecom companies in the Americas marked unfavourable changes to regulation as a risk (2018: 88%), followed by Europe with 90% (2018: 63%) and Asia-Pacific with 83% (2018: 17%).

Our analysis shows that data protection is the most critical regulation change topic for analysed companies. GDPR¹ is an often-mentioned example. It has changed business activities for all telecoms with activities in the EU market. Other countries and regions are passing data protection laws, including several US states.

As telecom companies work with massive amounts of consumer data, they need to consider special procedures to stay compliant with privacy legislation. Failure to do so can damage a company’s reputation, customer trust, and lead to fines.

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Notes: (¹) General Data Protection Regulation
RATE CHANGES ONE OF 2020’S BIGGEST REPORTED RISKS

3. Exchange rate / foreign currency changes

Most telecommunications companies face exchange rate change risks due to investments made in foreign currencies, internationalisation of business activity and customers, and market volatility. In 2020, volatility was increased by COVID-19’s impact.

The impact of exchange rate fluctuations in 2020 is particularly significant in the Asia-Pacific market where 100% of analysed companies marked them as a risk (2018: 83%), followed by EMEA and the Americas with 97% (2018: 78%) and 71% (2018: 69%), respectively. Multinational mobile network operators immediately feel exchange rate fluctuations as their revenues are generated in local currencies. Additionally, telecom companies can expect significant currency exchange effects on the price of network equipment. As the telecommunication industry is a capital-intensive industry and has a competitive environment, it attracts many international investors, which means that currency fluctuations could harm investments.

Share of companies that identify exchange rate fluctuations as a risk

- 75.9% in 2018
- 90.2% in 2020

Globally

- 71.4% of companies in the Americas
- 96.8% of companies in EMEA
- 100.0% of companies in Asia-Pacific

Notes: (1) Only 6 analysed companies were from the Asia-Pacific region.
INTENSIFIED COMPETITION FACING MOST TELECOM COMPANIES

4. Increased competition

Considering technological transformation and connected ease-of-access to new markets, more parts of the telecommunications space become attractive targets for industry incumbents and new market entrants. Active market players are facing increased competition, especially from technology players entering the telecommunications industry.

As a result, 90.2% of the telecommunications companies analysed identified increased competition as a risk. Competition is particularly felt in the Americas, where 100% of companies surveyed (2018: 84%) identify it as a risk. In EMEA and Asia-Pacific, the percentages were 87% (2018: 66%) and 83% (2018: 30%), respectively.

In some areas, the telecommunications industry is saturated, and it is increasingly difficult for telecom companies to expand market shares. Meanwhile, competitive pressure from outside telecom operators, such as over-the-top (OTT) services, is also on the rise.

Telecommunications companies may need to adapt their product portfolio by offering cross-functional packages of services and lower prices than competitors to keep pace with new competitors.

<table>
<thead>
<tr>
<th>Share of companies that identify higher competition as a risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>75.9% 90.2%</td>
</tr>
<tr>
<td>2018 2020</td>
</tr>
</tbody>
</table>

Globally

100.0% of companies in the Americas

87.1% of companies in EMEA

83.3% of companies in Asia-Pacific

Notes: (1) Only 6 analysed companies were from the Asia-Pacific region
5. Credit risk

Technological development within the telecommunications industry increases competition. Telecommunications companies are trying to secure customer growth by offering attractive deals and products. The financial pressure of COVID-19 on individuals and businesses may lead to increased default rates, thereby increasing credit risks.

Asia-Pacific telecoms seem particularly vulnerable. All analysed companies in the region mention it as a risk (2018: 83%). Almost 93% of analysed businesses in the Americas (2018: 81%) identified credit risk as one of the risks that require risk management measures, while the number in the EMEA market was 87% (2018: 59%).

Identifying, preventing, and managing risks at the point of sale and throughout the customer’s lifecycle became even more important in 2020.

A well-designed and innovative receivables management process and operational parameters can help reduce credit risks and improve timely payments.

<table>
<thead>
<tr>
<th>Share of companies that identify credit default as a risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Globally</strong></td>
</tr>
<tr>
<td>2018: 68.5%</td>
</tr>
<tr>
<td>2020: 90.2%</td>
</tr>
<tr>
<td><strong>92.9%</strong> of companies in the Americas</td>
</tr>
<tr>
<td><strong>87.1%</strong> of companies in EMEA</td>
</tr>
<tr>
<td><strong>100.0%</strong> of companies in Asia-Pacific</td>
</tr>
</tbody>
</table>
## Financial Risks Are the Top Risks in All Regions Except for the Americas

### Top-5 Risks of 2020

<table>
<thead>
<tr>
<th>Risk</th>
<th>Change in Ranking Compared to 2018</th>
<th>Change in Percentage of Companies That Identify This Risk, p.p.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange rate/foreign currency changes</td>
<td></td>
<td>+18.7</td>
</tr>
<tr>
<td>Interest rate changes</td>
<td></td>
<td>+27.9</td>
</tr>
<tr>
<td>Unfavourable changes to regulation</td>
<td></td>
<td>+27.8</td>
</tr>
<tr>
<td>Credit risk</td>
<td></td>
<td>+27.7</td>
</tr>
<tr>
<td>Increased competition</td>
<td></td>
<td>+21.5</td>
</tr>
</tbody>
</table>

**EMEA**

Overall, the Top 5 risks in EMEA reflected the global ranking, although the order was slightly different. In 2020, exchange rate change risk and interest rate change risk were chosen by most of the companies in the region. The same was the case in 2018. In general, the ranking of risks included in Top-5 remained the same between 2018-2020, except for the risk of intensified competition, which was identified by a smaller number of companies and, thus, was ranked lower.

### Top-5 Risks of 2020

<table>
<thead>
<tr>
<th>Risk</th>
<th>Change in Ranking Compared to 2018</th>
<th>Change in Percentage of Companies That Identify This Risk, p.p.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfavourable changes to regulation</td>
<td></td>
<td>+26.3</td>
</tr>
<tr>
<td>Increased competition</td>
<td></td>
<td>+15.8</td>
</tr>
<tr>
<td>Cyber-security threats</td>
<td></td>
<td>+26.3</td>
</tr>
<tr>
<td>Technology substitution</td>
<td></td>
<td>+36.8</td>
</tr>
<tr>
<td>Fast arrival of new technologies</td>
<td></td>
<td>+21.1</td>
</tr>
</tbody>
</table>

**Americas**

Four out of the Top 5 risks identified in 2020 were identical to those from 2018, although ordered differently. Technology substitution is a new inclusion. The percentage of companies that considered it as a risk rose by 36.8 p.p. in 2020 compared to 2018. All risks in the Top 5 apart from increased competition saw 20+ p.p. increased in the number of companies reporting it as a risk.

### Top-5 Risks of 2020

<table>
<thead>
<tr>
<th>Risk</th>
<th>Change in Ranking Compared to 2018</th>
<th>Change in Percentage of Companies That Identify This Risk, p.p.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange rate/foreign currency changes</td>
<td></td>
<td>+60.0</td>
</tr>
<tr>
<td>Interest rate changes</td>
<td></td>
<td>+70.0</td>
</tr>
<tr>
<td>Liquidity/cash flow shortage</td>
<td></td>
<td>+60.0</td>
</tr>
<tr>
<td>Credit risk</td>
<td></td>
<td>+60.0</td>
</tr>
<tr>
<td>Unfavourable changes to regulation</td>
<td></td>
<td>+73.3</td>
</tr>
</tbody>
</table>

**Asia-Pacific**

The regional ranking of risks in Asia-Pacific generally reflects the global tendencies and included almost the same risks except for liquidity/cash flow shortage risk. Three out of Top 5 risks in 2020 kept the same position as in 2018. However, the percentage of companies that chose these risks rose significantly. The position of such risks as interest rate changes and regulatory changes in the ranking changed between 2018 and 2020.

*There was a change in sample size in Asia-Pacific from 2018.*

Notes: (1) Percentage points
COVID-19 RAISES DEMAND FOR TELECOM SERVICES AND CREATES NEW THREATS

Global telecom services spending forecast, Bn Euro

<table>
<thead>
<tr>
<th>Year</th>
<th>2019</th>
<th>2020F</th>
<th>2021F</th>
<th>2022F</th>
<th>2023F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bn Euro</td>
<td>1,401.8</td>
<td>1,304.5</td>
<td>1,314.6</td>
<td>1,323.0</td>
<td>1,335.6</td>
</tr>
</tbody>
</table>

COVID-19 led to rising digital infrastructure needs, including for work-from-home and remote work, such as videoconferencing, data sharing, and cloud systems. The pandemic put pressure on telecom operators’ systems in terms of maintaining smooth functioning and connectivity under increased demand.

Despite the increased importance of the telecom industry, clients’ spending on services declined, mainly due to economic uncertainties and pressures. A lot of businesses are facing either temporary or permanent shutdowns. In 2020, global spending on telecom services fell by 6.9%. It is expected to see a recovery in 2021 and beyond, reaching 1,335.6 Bn Euro by 2023.

Risks arising from COVID-19 for the telecom industry

Connectivity issues
The increased need for dispersed internet and mobile connectivity throughout the day raises the traffic volumes, which can in turn decrease transfer speeds and create challenges for operators.

Limited productivity
Telecommunication companies conduct work at various sites. Due to the pandemic, options for on-site work that cannot be done remotely have been limited, which disrupts regular operations and reduces efficiency.

Supply chain disruptions
Due to the increase in demand for telecom equipment, the need for efficient logistical and supply chains increases. However, the introduction of lockdown and trade restrictions result in continuous delays.

Changed customer profiles
Companies specialised in roaming services may need to shift their focus due to the pandemic’s influence on tourism, while business-focused telecoms risk losing clients due to companies’ inability to stay afloat.

Selected governmental initiatives in collaboration with telecom businesses

Response to fake news related to COVID-19
The UK Parliament implemented an obligatory requirement for telecom operators and media sources to block fake news sites related to the COVID-19 pandemic, including in relation to 5G.

Free-of-charge offering of services
Egyptian authorities in collaboration with telecom operators, granted 3,000 minutes and 10 gigabytes per month for free to all personnel engaged in the work of COVID-19 hospitals.

Boosting broadband capacity
At keeping people and businesses connected during COVID-19, the Ministry of Communications in Israel worked with the Israeli Internet Association to introduce expanded connectivity between local providers and submarine cable operators, retailers and end-users.

New Fixed Wireless Access networks
Chinese governmental bodies deployed 5G network at the Wuhan Hospital within 24-hour, secured high-speed internet coverage for those involved in telemedicine and health records.

Source: Statista, UK Parliament, ITU Telecommunication Development Bureau
Notes: (1) Telecom services spending includes wireless and fixed telecommunication services spending; (2) Calculated on the basis of EBC exchange rates
CHALLENGES AND OPPORTUNITIES

Need for 5G
Telecoms have been investing heavily in building out 5G networks. Changes in work styles (remote work and work from home) can increase the business cases and market opportunities for the new networks.

Quality targets
Telecoms looking to increase service portfolios or market shares are many places in strong position to acquire distressed quality assets.

Divestiture impacts
Negative impacts on secondary business units, including media and technology investments, need to be overcome. Telecoms may look to divest certain assets to offset these impacts.

Challenge Turning physical to digital
In a pandemic, closed shops and inability to carry out on-premise work has taken its toll on telecom companies' efficiency and bottom line. Finding ways digitising services and workflows remains pivotal.

Second wave closures
Continued economic uncertainties and market dynamics increases the likelihood of a 'second wave' of contract defaults for both individual and business customers.
Perhaps Elon Musk’s least-known endeavour is already busy at work above us. The StarLink project aims to be a direct competitor to telecoms, delivering internet via a network of satellites and has already been successfully launched. If the networks prove competitive – or perhaps dominate the need for increased connectivity - it could undermine telecoms’ earnings projections for the launch of expensive 5G networks.

It could also help to achieve broadband connection in remote areas where traditional fibre connections/full scale 5G networks economically are not meaningful. So there’s also the chance of partnerships with traditional telecoms to help them achieve their targets/regulatory requirements in terms of broadband connections.
BIG TELECOM PLAYERS PROACTIVE IN COVID-19 RESPONSE

Mobile network operators’ (MNO) in the time of the crisis

Deutsche Telekom

Deutsche Telekom (Germany) was asked by the government to help develop a contact tracing application.

Most of the company’s employees have been transferred to remote work. New workplace safety measures were introduced for those employees who could not work from home (face masks, disposable gloves, shoe covers). The company began creating fabric masks from old, unused fabrics for its employees. In addition, customers could sign their orders online.

AT&T

AT&T (USA) actively supported digital learning during the lockdown. Thus, the company created the Distance Learning and Family Connections Fund to acquire the tools needed to educate students and teachers online.

Additionally, AT&T announced three months of free wireless service for nurses and physicians on the FirstNet network, through which they can video chat with their patients in the USA.

TIM

2/3 of Telecom Italia (Italy) staff was working from home during the lockdown.

According to its reopening plans, around 23,200 employees, including customer support, will continue to work from home. For those returning to the office, the outdoor desks are reorganised in a chessboard-like arrangement, allowing social distancing.

T-Mobile

T-Mobile (USA), as a part of German Deutsche Telekom, established its customer support department working 24 hours per day and enabled its customers to receive their orders through online registration via their website.

The company unveiled T-Mobile Connect, a lower-price smartphone plan, and added cheaper options for Metro by T-Mobile. T-Mobile provided ‘Paid Time Not Worked’ for those employees in high-risk categories who are sick or those who needed intermediate support for childcare arrangements during school closures.

Airtel

In Uganda, Bharti Airtel (India) introduced Airtel Money, an e-banking service, in order to ensure flawless payment of bills without the need for physical presence.

In Kenya, the company made the transactions free-of-charge across all brands enabling all Kenyan citizens to exchange money via the internet for free.

Telefónica

Telefónica (Spain) promoted remote work for all functions of the company. The company signed an agreement with UNI Global Union®, UGT® and CCOO® which includes the plan to return to centres after the COVID-19 crisis.

Telefónica collaborated with health institutions, offering its services and donating 25 Mn Euro for purchasing respirators and medical equipment.

Impact of COVID-19 on the selected MNOs’ revenue

The growth of revenue for three quarters of 2020, year-to-year

<table>
<thead>
<tr>
<th>Company</th>
<th>Jul-Sep</th>
<th>Apr-June</th>
<th>Jan-March</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telefonica</td>
<td>-50%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>Telecom Italia</td>
<td>-5%</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>Bharti Airtel</td>
<td>20%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>10%</td>
<td>0%</td>
<td>-5%</td>
</tr>
<tr>
<td>T-Mobile</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>Deutsche Telekom</td>
<td>-10%</td>
<td>0%</td>
<td>10%</td>
</tr>
</tbody>
</table>

The growth of revenue for January-September 2020, cumulative

Source: Bloomberg; Telecom from The Economic Times; Companies’ media; Press releases; Quarterly reports
Notes: (1) Technology that allows health services to find out who an infected person has interacted with in order to track the pathways of infection with COVID-19; (2) AT&T’s broadband network dedicated to public safety; (3) Global union federation that represents workers from trade unions in over 150 countries; (4) Unión General de Trabajadores — General Union of Workers in Spain; (5) Confederación Sindical de Comisiones Obreras — Trade Union Confederation of Workers’ Commissions
FUTURE RISKS IN TELECOM REVOLVE AROUND ADOPTION OF NEW TECHNOLOGIES

Future telecom trends

The telecommunications industry is strongly impacted by technological advances, which are the foundation of many new trends. Among the main trends affecting telecoms now and in the nearest future are:

- **5G**: more resilient and stable connection with higher speed and lower latency.
- **Edge computing**: tools and storage located close to the end-users, which prevents disruptions in application operations.
- **UCaaS (Unified Communications as Service)**: system of communication tools such as file sharing and instant messaging ensured by the cloud vendor.

Although emerging technologies upgrade both the quality of telecom services and user satisfaction levels, they can create challenges. Due to the ever-rising uncertainties within the global economy, telecoms can expect to face new and changing risks, such as those outlined below:

- **Cyber-security**: The rising spread of digitisation in terms of both corporate and customer data results in a higher risk of those data being either stolen or becoming non-accessible due to cyberattacks.
- **Customer reluctance to innovative technologies**: With 5G, society is exposed to various information about both opportunities and threats of new technology. Thus, there is a risk of clients being unaware of real prerequisites for establishing high tech and, as a result, customer resistance to their introduction.
- **Changing client needs**: Many telecom clients are increasingly focused on the quality and mobility of services and require a personalised approach.
- **Digitisation of internal processes**: Telecom operators often introduce innovative solutions in services for clients, while internally costly innovations in the digital domain are not a priority. However, the company could fall behind the competitors, which implement digital solutions to improve the operations.
- **Regulatory inconsistency**: The speed of new technologies generally exceeds the speed of regulatory changes. Therefore, the governance of the use of these technologies might vary from country to country and create barriers for the telecom market players in terms of compliance.
- **Market tensions**: Due to the recent uncertainties in terms of COVID-19 and growing political issues between global economic leaders, the telecom industry might experience sudden changes, including limited access to certain markets.

Forecast of 5G mobile subscriptions on a global scale, million units

<table>
<thead>
<tr>
<th>Year</th>
<th>2019</th>
<th>2020F</th>
<th>2021F</th>
<th>2022F</th>
<th>2023F</th>
<th>2024F</th>
<th>2025F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.8</td>
<td>190.5</td>
<td>461.3</td>
<td>896.5</td>
<td>1,438.5</td>
<td>2,051.9</td>
<td>2,792.8</td>
</tr>
</tbody>
</table>

CAGR 148.6%

5G is predicted to affect the whole industry in terms of a higher level of integration with users and increase new opportunities. Access to and the use of SaaS as well as Internet of Things will rely on 5G, which in turn might enable the complete transformation of many sectors (e.g., healthcare, education, and entertainment).
# RISK MITIGATION IS A VITAL ASPECT OF TELECOM COMPANIES’ OPERATIONS

<table>
<thead>
<tr>
<th>Types of risks</th>
<th>Risk mitigation activities</th>
</tr>
</thead>
</table>
| **Operational and supply chain risks** | ▶ Consider non-traditional open-source suppliers and expand supplier options in order to improve supply chain flexibility and resilience  
▶ Reassess supply chains to uncover weak links, especially in commonly affected areas  
▶ Develop contingency plans to meet demand in case of service delivery disruptions or supplier failures  
▶ Use analytics to identify potential bugs and likely points of failure, and develop proactive communication plans to keep customers informed |
| **Regulatory risks**                | ▶ Continuously monitor regulations and policy and evaluate the impact of changes, especially the adjusted imperatives in customer-data privacy, security, and customer trust  
▶ Develop abilities to flexibly reengineer processes due to changing regulations  
▶ Consider prioritising new business models that incentivise public-private partnerships, rather than following traditional subsidy-based approaches  
▶ Align internal human resources-related policies and external regulations, especially in relation to employee management |
| **Financial risks**                 | ▶ Implement continuous monitoring of financial reporting requirements and connected audit impacts  
▶ Revisit key financial projection assumptions  
▶ Develop contingency plans to meet financial compliance obligations  
▶ Analyse and update liability projections for revised forecasts, such as effective interest rates, and re-evaluate projected allowances  
▶ Improve tech-enabled functionality to ensure timely access to required information and continuous communication with shareholders and investors |
| **Competition risks**               | ▶ Analyse industries and trends and evaluate market players in order to take advantage of new opportunities and changing market conditions  
▶ Monitor market value proposition and invest developing product and service portfolio through R&D, investments, collaborations or acquisitions  
▶ Review and update the company’s product portfolio continuously and perform regular competitor analysis |
| **Customer risks**                  | ▶ Survey customers systematically and collect feedback in order to understand their needs and expectations  
▶ Communicate with customers and constantly keep them informed about their rights and changes to existing services to increase their cybersecurity awareness  
▶ Ensure business model flexibility to be able to adapt to the fast-changing customer demands |

Notes: (1) An open-source supplier is a vendor that develops and distributes open-source/licensed products. It’s publicly accessible and is often cheaper, more flexible, and has more longevity than its proprietary peers because it is developed by communities rather than a single author or company.
Methodology

The analysis was based on the companies’ financial reports. It included statistical and qualitative analysis of the risks mentioned therein. In 2020, the total number of companies considered for the statistical analysis was 59. However, only 51 were analysed due to the lack of available data for eight companies. The companies were divided by such three regions as EMEA with 31 companies, Americas with 14, and Asia-Pacific with 6.

The risks in each region were calculated by the percentage of companies that specified a given risk in their reports in comparison to the number of companies analysed in this region. Based on this evaluation, the Top-5 risks were identified for each geographical area. In some cases, several risks included in the Top-5 had the same ranking due to the equal percentage of companies which mentioned this risk. Thus, two risks may be ranked with the same rating.

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