



**CSM RESEARCH REPORT**

# THE IMPACT OF TECHNOLOGY ON THE FUTURE OF WINTER SPORTS (IN TIMES OF COVID-19)

COMMISSIONED BY MASTERCARD

# INTRODUCTION

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Dear readers,

In 2018/19, the winter sports industry experienced “the best season of the current millennium” (Vanat, 2020) with high visitor numbers and sector growth projected to rise for the foreseeable future. The ski equipment market was forecasted to experience a compound annual growth rate of more than three percent between 2019 and 2026 (Verified Market Research, 2019). A key driver of this growth was the increase of skiers globally as new winter sports resorts pop up around the world. In China, winter sports are seen as “the next big thing” (Neville, 2019) in accordance with the government’s attempt to inspire 300 million Chinese winter sports enthusiasts for Beijing 2022, the XXIV Olympic Winter Games. While China is giving rise to the greatest winter sports boom in history, the American and European winter sports industries remain on the upswing (ISPO, 2019), despite declining popularity of winter sports among younger generations.

Like most industries, winter sports were hit severely by the COVID-19 pandemic. Fortunately, the negative economic effects on the 2019/20 season were somewhat limited, given the timing of the pandemic outbreak around February/March 2020. For the 2020/21 season, however, concerns are more serious as many players in the winter sports industry have already suffered. Some are questioning whether they can survive another disruption, and the questions are big: Where do we stand right now? Will there be a 2020/21 season? What’s the plan to survive? What do we do if our plans cannot be implemented?

Despite all the uncertainty, there is hope for better times in a new normal—when the global pandemic comes under control. With the support of renowned winter sports experts, we conducted a scientifically based Delphi study on the impact of technology on winter sports<sup>1</sup> in times of COVID-19. Our study is not intended

to answer short-term questions, though pressing; instead, we aim to keep the discussion going on a mid- to long-term basis. We know that the current level of uncertainty will be temporary, as Albert Einstein said: “In the midst of every crisis, lies great opportunity.”

Our Delphi study is designed to help key stakeholders of winter sports – athletes, consumers, and managers – to sustainably shape their future in the best way possible. We first look into decision-making in times of COVID-19. According to our experts, the severe economic uncertainty is an enormous struggle for most stakeholders and it could prevent decisions that would be most desirable for a sustainable future of winter sports. Based on expert opinions, we develop a view on how technology might impact winter sports in the future. Our experts emphasize numerous promising applications of technology, but they also address shortcomings and required change. Looking more closely at the mid- to long-term effects of COVID-19, our experts believe that the winter sports industry, in general, and live attendance, in particular, will take at least two to three years to reach pre-COVID-19 levels. Considering the serious consequences of COVID-19, it is surprising that the majority of experts assess the long-term consequences for the winter sports industry as slightly positive rather than negative.

In addition, the study also looks at gaming and eSports in winter sports. While most experts are not overly excited about it, there does seem to be several opportunities which could benefit the industry.

Finally, our experts re-assessed the 13 projections on the future of ski sports examined in last year’s report (Schmidt et al., 2020). It’s refreshing to see that important topics such as safety and security, environmental friendliness, and sus-

tainability continue to be areas of focus. In face of the current challenges, this heralds a better tomorrow for winter sports.

## DELPHI STUDY

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The desire to predict the future is part of human nature. In ancient Greece, the Oracle of Delphi foretold the future and became one of the most famous cult sites in history (Häder, 2009). For our scientific “view into the crystal ball,” we did not consult the Oracle of Delphi, but rather collected the opinions of leading minds in the winter sports industry. We included industry officials, former elite athletes, managing directors of ski resorts, technology experts, equipment manufacturers, eSports developers, and media representatives.

Using the Delphi method (Dalkey & Helmer, 1963), a total of 53 proven experts from 15 countries evaluated and commented on six projections on the future of winter sports. Each projection was assessed in terms of probability, impact, and desirability of its occurrence; the experts provided comments and arguments. In addition, the experts assessed 91 non-Delphi survey questions.

This study was conducted in close cooperation with Mastercard. We would like to thank Nicole Krieg, Hannah Bruckner, and Miriam Brownstone for their excellent collaboration. We would also like to thank Vikki Jaconelli, Bertie Turner, Sam Wilson, Doris Steiner, and Nicolette Barg-Szalachy as well as their teams for their expertise. Finally, a big thank you to the experts who participated in the study and provided their valuable input for this report.

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<sup>1</sup>While many aspects are relevant for the broader winter sports industry, we mostly focus on the future of skiing.

# CONTENT

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<b>KEY FINDINGS</b>	<b>4</b>
<hr/>	
<b>UNPRECEDENTED UNCERTAINTY?</b>	<b>5</b>
How consciously dealing with uncertainty may help preparing for the future	
<hr/>	
<b>ATHLETES, CONSUMERS, OR MANAGERS?</b>	<b>7</b>
How different users in winter sports may benefit from technology	
<hr/>	
<b>ANY HOPE IN TIMES OF COVID-19?</b>	<b>11</b>
How the crisis may accelerate technological change	
<hr/>	
<b>ESPORTS AND GAMING AS AN OPPORTUNITY?</b>	<b>15</b>
How the next generation of skiers may be attracted	
<hr/>	
<b>WHAT HAS CHANGED SINCE LAST YEAR?</b>	<b>18</b>
How the experts re-evaluate the projected developments to 2025	
<hr/>	
<b>STUDY DESIGN AND METHODOLOGY</b>	<b>20</b>
<hr/>	
<b>REFERENCES</b>	<b>22</b>
<hr/>	
<b>ABOUT WHU AND CSM</b>	<b>24</b>
<hr/>	
<b>ABOUT THE AUTHORS</b>	<b>25</b>

# KEY FINDINGS

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**1** | *Winter sports face unprecedented levels of uncertainty, but there is also hope as new opportunities arise*

P. 5

**2** | *Technology may change winter sports for the better as it provides value for athletes, consumers, and managers – if only the cost weren't so high*

P. 7

**3** | *The consequences of COVID-19 will change the winter sports industry slightly for the better despite severe, short-term challenges*

P. 11

**4** | *eSports and gaming are unlikely to become a key driver of winter sports by 2025, however, online offers and activities will be key for success*

P. 15

**5** | *Climate focus, gender parity, and the use of modern technologies to further develop the industry remain key priorities in winter sports*

P. 18

# UNPRECEDENTED UNCERTAINTY?

How consciously dealing with uncertainty  
may help preparing for the future



# WINTER SPORTS FACE UNPRECEDENTED LEVELS OF UNCERTAINTY, BUT THERE IS ALSO HOPE AS NEW OPPORTUNITIES ARISE

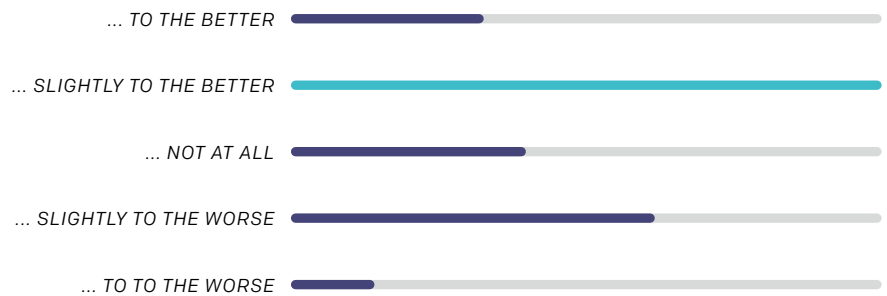
**WITH THE EMERGENCE OF THE COVID-19 PANDEMIC, A PERIOD OF UNCERTAINTY HAS BEGUN. THIS REQUIRES ALL STAKEHOLDERS OF WINTER SPORTS TO COPE NOT ONLY WITH OVERCOMING ACUTE CHALLENGES AND ECONOMIC SETBACKS, BUT ALSO PLAN AND PREPARE FOR THE SHORT, MID- AND LONG-TERM.**

In our study, we have given an almost impossible task to our experts: to make predictions about the future of the industry under exceptional uncertainty. While it is always difficult to predict the future, COVID-19 has pushed levels of uncertainty to unprecedented heights (e.g., Baker et al., 2020). Consequently, it was even more difficult than usual for our experts to assess the future impact of technology on winter sports. The result is hopefully a valuable contribution to the discussion on mid- and long-term developments, even though it might not answer pressing short term questions. What is important is that while “we are not at the end of the COVID-19 pandemic, [...] it is not too soon to build the strategies that will foster broad-based growth” (Sneader & Singhal, 2020). Therefore, throughout this report, we will look at the opportunities that technology holds for winter sports.

## UNCERTAINTY AND RISK

Uncertainty arises when we can neither assign probabilities to a variety of possible outcomes nor predict the outcomes in an accurate manner (Knight, 1921). In contrast, the probabilities for risks are known or can at least be assumed to be known (Tversky & Fox, 1995). A typical risk – or risky outcome – in the winter sports industry is bad weather conditions or lack of snow. We can mitigate

FIG. 1.1  
**IN THE LONG RUN, THE CONSEQUENCES OF COVID-19 WILL CHANGE THE WINTER SPORTS INDUSTRY...**



this risk with the use of snow machines or by means of insurance.

While risk can be managed, uncertainty is substantially more difficult to deal with. Uncertainty means unknown unknowns, a popular term describing that there are things of which we do not know that we don't know them (risk could then be associated with known unknowns, or things we know we don't know). An uncertainty in winter sports could be an almost unimaginable global crisis that limits tourism to winter sports destinations and even causes an official (though temporary) prohibition of operation – in other words: COVID-19.

## MANAGING UNDER UNCERTAINTY

In the pre-COVID-19 world, most business sectors were relatively stable and companies were mostly striving for growth. Despite occasional crises, most risks were somewhat predictable and could usually be mitigated with established risk management tools. This allowed managers to predict the future accurately enough to choose a strategy. However, in our tur-

bulent environment, most managers fail to consider uncertainty appropriately in strategy-making (Bradley et al., 2018). This is a precarious approach for two reasons. Reason number one is simply the threat of damage to an organisation when uncertainty is underestimated. Reason number two is less intuitive: It is the loss of opportunity provided by higher levels of uncertainty (Courtney et al., 1997).

The purpose of proactively addressing uncertainty is to increase the reaction potential and to stimulate thought, shift perspective, and make our mindset more reactive as a consequence – all of which should help the winter sports industry to achieve a bright future. The images we create by looking a few years ahead can thus serve as tools for consciously dealing with uncertainty about the future.



# ATHLETES, CONSUMERS, OR MANAGERS?

How different users in winter sports  
may benefit from technology

# TECHNOLOGY MAY CHANGE WINTER SPORTS FOR THE BETTER AS IT PROVIDES VALUE FOR ATHLETES, CONSUMERS, AND MANAGERS – IF ONLY THE COST WEREN'T SO HIGH

**TECHNOLOGY AND SPORTS HAVE A DYNAMIC RELATIONSHIP AND HAVE BEEN INTERTWINED FOR HUNDREDS OF YEARS. FOR ALMOST ALL WINTER SPORTS, TECHNOLOGY IS A NECESSARY CONDITION FOR EXISTENCE (LOLAND, 2009), GIVEN THE CONSTITUTIVE FUNCTION OF TECHNOLOGY (NO SKIING WITHOUT SKIS...). TODAY, TECHNOLOGY IN WINTER SPORTS IS TAKING AN INCREASINGLY COMPREHENSIVE ROLE AS THE INDUSTRY BECOMES MORE AND MORE HIGH TECH.**

Technology is typically a combination of hardware and software that is instrumental in achieving a desired outcome (Rogers, 2003); it may include physical tools, machines, and devices as well as knowledge, methods, or skills. When we look at technology in sports, we are typically interested in two things: (1) Which technology is used? (2) For whom is the technology intended? We can approach these questions by applying the Sports-Tech Matrix (Frevel et al., 2020), which captures how different types of technologies provide solutions to different user groups. It consists of a user angle (the three relevant user groups in sports: athletes, consumers/fans<sup>2</sup>, and management) and a tech angle that groups technologies into three different categories relevant in sports. Category I includes advanced materials, sensors, devices, internet of things, and biotech – i.e., mostly physical technologies that often-times play a key role in capturing data. Category II includes data, artificial intelligence, and machine learning – i.e., data handling and processing. Category III includes information, communication, and extended reality – i.e., human interaction. According to our experts, Category I will have the biggest impact on winter sports in the next five years (M = 5.21), followed by Category III with high impact (M = 4.85), and Category II with medium to high impact (M = 4.65).

For this study, we have asked our experts to assess how much they think the different user groups in winter sports will be impacted by technology in the next five years. Our study has not focused on consumers/fans<sup>2</sup>, but overall our experts expect the potential impact of technology on fan experience to be very high (M = 5.72).

## ATHLETES

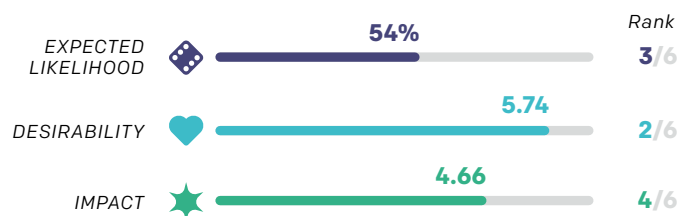
Athletes include not only professionals but anyone who participates in winter sports. On a pro-level, our experts believe that the impact of technology on the sportive performance of athletes will be high to very high over the next five years (M = 5.45). For amateurs, they expect the impact on performance to have a medium impact (M = 4.60). Without differentiating between the groups, the experts expect sensor-based technology for on-slope feedback and coaching on skiing technique to have high potential (M = 5.08). Similarly, they expect smart wearable sensors measuring skiers' biometric data to increase both their safety and experience (M = 5.38). The potential for smart ski tracking systems capturing speed, distance, vertical drop data, technique, etc. is estimated to be even higher (M = 5.79). When we look beyond performance, smart

tracking systems for live information on occupancy of lifts, routes, restaurants, etc. have the highest potential impact according to our experts (M = 5.92).

## MANAGEMENT

Management includes a wide range of stakeholders from ski resort managers to officials at associations. When we asked our experts how much they think different players/institutions in winter sports will be impacted by technology in the next five years, they saw the lowest impact for associations (M = 4.72). In their view, the largest impact for management will be in media (M = 5.66), followed by agencies (M = 5.55), ski resorts and lift operators (M = 5.34), winter sports resorts representatives such as hotels and tourism in general (M = 5.23), and events such as the Hahnenkamm race (M = 5.15). For the winter sports industry, our experts agree somewhat that technological advancements (resulting from the COVID-19 induced break) will benefit the industry in the long-term. With regards to winter sports resorts, the experts agree that cashless payments have become the norm (M = 5.47) and that, in fact, most resorts will be able to provide an almost entirely contactless experience by 2025

**FIG 2.1**  
**BY 2025, TECHNOLOGY HAS SIGNIFICANTLY IMPROVED DISABILITY ACCESS IN WINTER SPORTS AND HAS ENABLED MORE PEOPLE TO ENJOY WINTER SPORTS.**





(M = 5.57). Finally, our experts do not see a major change in the profiles of winter sports managers, as they are not convinced that the required qualifications for management positions in winter sports will shift significantly towards digital capabilities by 2025 (M = 4.85).

## TECHNOLOGY FOR IMPROVED ACCESS

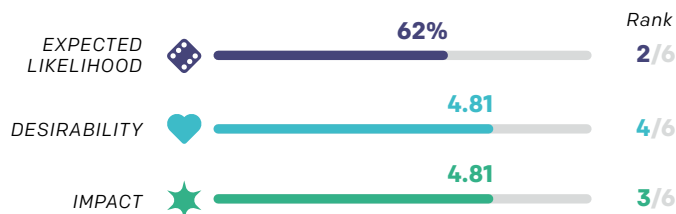
The projection that “technology has significantly improved disability access in winter sports and has enabled more people to enjoy winter sports” yielded the second highest desirability of all projections in our study (see Fig. 2.1). This indicates that technology can – and is even expected to – play an important role in some of the most relevant topics such as inclusiveness and accessibility for all. At the same time, the projection “only” ranked midfield for expected probability (rank three out of six projections) and impact (rank four). Our experts not only question the feasibility, but they also question the extent of the impact. Reasons include the inherently smaller groups of people being affected and the difficulties of implementation, particularly for smaller winter sports resorts.

**“WE ALREADY HAVE THE TECHNOLOGY TO HELP PEOPLE WITH DISABILITIES OR SPECIAL NEEDS. NOW WE ARE JUST WAITING FOR IT TO BE MORE ACCESSIBLE – IT’S VERY EXPENSIVE”**

The experts agree that increasing accessibility to winter sports and reducing barriers is the right thing to do, or in their words: inclusiveness and accessibility is “what we stand for.” The experts believe that if the sport becomes more inclusive, companies might have to follow suit. This is due to accessibility becoming more important and recognised by individuals in the sport. In doing so, the winter sports industry will make itself more attractive not only for visitors, but also for sponsors, investors, and politicians.

FIG. 2.2

**BY 2025, TECHNOLOGY WILL HAVE SIGNIFICANTLY IMPROVED SKIERS’ EXPERIENCE, CONVENIENCE AND SAFETY WITH HIGH-TECH FEATURES FOR HELMETS AND OTHER SKIING EQUIPMENT.**



Experts commented that there has already been progress as much of the technology needed to make the sport more inclusive to those with disabilities already exists. In the last five years especially, accessible skiing has greatly improved leading to optimism about improvements in the next five years, for both amateurs and professionals. These improvements might benefit Para- and Special-Olympics athletes greatly. However, our experts do not yet see that accessibility for people with disabilities has changed in a disruptive manner or will do so any time soon.

Consequently, our experts expect innovation and R&D budgets for solutions in this market to be reduced in the short term. Given the limited immediate return on investment for accessibility improvements, public or governmental support is suggested as one possible solution. In general, the experts pointed out that ultimately the regulator/state will have a say in the degree of accessibility achieved and that the result may vary significantly between regions and countries.

The survey results suggest that even if not everyone will get access to the slopes, soon, technologies such as augmented or virtual reality may become a useful tool for bringing part of the winter sports experience to the people and their homes.

## TECHNOLOGY FOR IMPROVED EXPERIENCE, CONVENIENCE, AND SAFETY

In our first Delphi study on the future of winter sport (Schmidt et al., 2020), we found that modern technologies significantly contribute to the advancement of ski sports. The use of technologies to increase athletes’ safety and sportive performance achieved the highest desirability and the second highest probability and impact in the view of our experts. Our new survey has revisited this topic to add experience and convenience to safety and performance. This includes looking at technologies such as in-helmet head-up displays with customized routing plans tailored to the user’s abilities and preferences or technologies to improve skiing

technique with in-boot sensors and audio coaching while skiing. It also includes more advanced technologies such as face recognition for contactless access control or smart wearables to collect skiers' biometric data. The question as to whether "technology will have significantly improved skiers' experience, convenience and safety with high-tech features for helmets and other skiing equipment" led to a

real advancements, or – and this is the majority here – they consider it undesirable. For them, one of the most important aspects of winter sports is to connect with nature. In this endeavor, technology is often more of an obstacle. In fact, they believe that skiing is viewed by many as a way to immerse themselves in nature and take a break from screens. They could foresee a "less tech and back to basics"

ers and early adopters of technology, but they have limited expectations that use of such technologies will skyrocket.

Last but not least, there are some interesting notions about safety in particular. On the one hand, some experts consider technological advancements a threat to overall safety as the danger from technological distractions for skiers might outweigh the benefits of increased safety through other technologies. In a similar vein, it was mentioned that winter sports resorts could greatly benefit from solutions to make some of the slopes safer, especially those where skiers with different levels of experience meet. On the other hand, a couple of experts have emphasised the potential for increased safety through use of technology, particularly avalanche protection technology. This not only includes avalanche beacons or airbags, but also advanced analytics in risk assessment. Big data, forecasting resources, and collective intelligence may prevent skiers from getting caught in an avalanche in the first place.

## **"TECHNOLOGICAL PROGRESS WILL ALLOW MORE PEOPLE TO PARTICIPATE IN WINTER SPORTS. AS A CONSEQUENCE PARA- AND SPECIAL-OLYMPICS COULD GROW"**

lot of debate among our experts and they could not reach a consensus. On the one hand, this projection received the second highest probability score of all projections as well as high impact, rank three (see Fig. 2.2). Conversely, and somewhat surprisingly, desirability only ranks fourth of all six projections.

On this projection, our experts are split into two groups. The first group is excited about the technological advancements and sees great potential. They believe that many skiers will be interested in using these technologies to improve their experience and convenience. In line with current trends, they believe skiers will be interested in having the possibility to check and compare their performances and they might even be curious about elements of gamification. As has been shown in the past, the rental market could be a great entry point for new technologies. Despite all the optimism, experts in this group also raised some questions: Will these technologies be able to penetrate the entire market or only reach a small audience? How will questions about data privacy be handled and resolved? Will improvements actually be significant or rather marginal, given the great advancements in the past? How durable are these solutions, given that they typically cost a lot and become outdated quickly?


The enthusiasm is rather limited in the second group. They either do not see any

movement, at least for some skiers. And even if experts in this group buy into certain technological advancements for increased experience and convenience, they consider them rather gimmicky and less suitable for mass adoption.

This brings us back to a rationale we have heard before: cost. Many of the experts believe that such technological "gimmicks" will add additional cost to an already expensive sport. They show concern that skiing might become an even more exclusive sport, excluding people with lesser financial means. Several experts see a niche market for first mov-

<sup>2</sup> The word "consumers" may be misleading here. In the SportsTech Matrix, a consumer is defined as anyone who consumes sports, which encompasses all possible ways of engaging with a sport without performing the sport oneself. Basically, it is about how fans interact with sports and how access to sports content is provided (e.g., broadcasting and media). Athletes, on the other hand, are not limited to professional athletes, but include anyone who performs sports, no matter if it is on a professional, amateur, or even purely recreational level. Typical applications where technology can provide value to athletes include training, preparation, skills, performance, recovery, injury (prevention), motivation, etc.





# ANY HOPE IN TIMES OF COVID-19?

How the crisis may accelerate  
technological change

# THE CONSEQUENCES OF COVID-19 WILL CHANGE THE WINTER SPORTS INDUSTRY SLIGHTLY FOR THE BETTER DESPITE SEVERE, SHORT-TERM CHALLENGES

**COVID-19 IS THE BIGGEST GLOBAL CRISIS SINCE WORLD WAR II. COVID-19 FORCED SPORTS TO TAKE A BACK SEAT TO PUBLIC HEALTH. THE EFFECTS ON THE WINTER SPORTS ECOSYSTEM HAVE BEEN SEVERE FOR MILLIONS OF EMPLOYEES INCLUDING PROFESSIONAL ATHLETES, TOURISM AGENCY EMPLOYEES, AND EVEN AMATEUR SKIERS AND WINTER HOLIDAY ENTHUSIASTS.**

**“THE COVID CRISIS WILL LEAD TO A RETHINKING OF SEVERAL AREAS IN THE WINTER SPORT INDUSTRY.”**

Most notably between March and May 2020, executives in several sports had to make crucial decisions on the future of their industry despite a high level of uncertainty (Parnell et al., 2020). For example, the discontinuation of sports competitions suddenly became a major discussion point that resulted in governing bodies deciding to cancel or postpone all events for the remainder of the season (Sportschau, 2020). While these cancellations and postponements were largely inevitable from a health perspective, governing bodies immediately had to deal with challenges like re-start considerations or broadcasting compensations (Ahmed & Memish, 2020). Many athletes were denied their season finales – not only a sporting disaster, but also a severe financial one with regards to prize money and sponsorship deals. Coaches and managers, in turn, had to maintain the physical and mental fitness of their athletes for a possible restart of competition and were often concerned with the questions of when and how to return to competition (Carmody et al., 2020; Dores & Cardim, 2020).

Despite the many negative effects, many experts in our study expect COVID-19 to have positive effects on the winter sports industry in the long run (see Fig. 1.1). However, according to our experts, it will take at least two to three years for the winter sports industry to return to pre-COVID-19 levels. The crisis may benefit the industry as a catalyst to

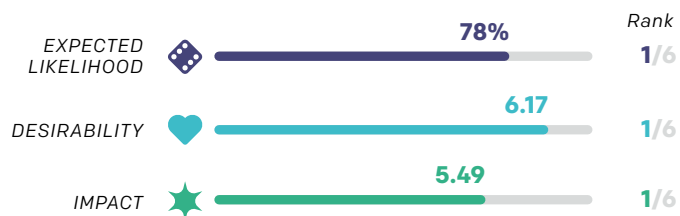
accelerate technological change. During the pandemic, the sports industry developed innovative strategies to resume the season. Our experts believe that COVID-19 will accelerate the technological innovation and digitisation in the winter sports industry (M = 4.85).

Technology is vital for future success — on and off the slopes. In a sense, athletes are like entrepreneurs who experiment, fail, start again, and eventually succeed. Off the slopes, winter sport executives must anticipate trends, nurture ideas, and act faster than others. Being successful will require strong networks that encompass all the players, including athletes, consumers/fans, and managers; additional help might come from public authorities, private benevolent funds as well as tech experts, startups, and academia.

## CONTACTLESS WINTER SPORTS RESORTS

We projected for 2025 that “most winter sports resorts will be able to provide almost entirely contactless experiences for visitors (e.g., contactless payments, check-ins, food orders, etc.)”. Our experts agree that this would be highly desirable and impactful, and they also consider it highly probable. In fact, this projection achieved the highest scores of all our projections along all three dimensions (see Fig. 3.1). In our first Delphi study on winter sports (Schmidt, et al., 2020), we proposed two similar questions to the experts: a. if ski resorts would become cashless and b. if ski sports ecosystems would offer a seamless experience for recreational visitors through digital technologies. The ex-

**FIG. 3.1**  
**BY 2025, MOST WINTER SPORTS RESORTS WILL BE ABLE TO PROVIDE ALMOST ENTIRELY CONTACTLESS EXPERIENCES FOR VISITORS (E.G., CONTACTLESS PAYMENTS, CHECK-INS, FOOD ORDERS, ETC.).**



perts estimated a probability of 65% and 62%, respectively, significantly lower than this year's 78%. This is an example of how COVID-19 has worked as a catalyst to accelerate technological change.

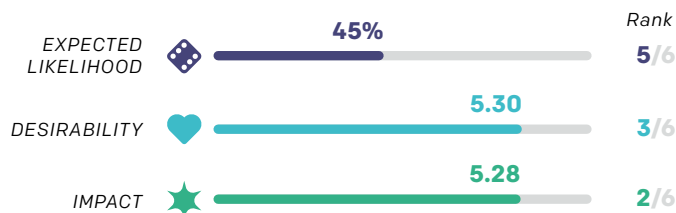
Our experts point out that there will be a higher level of acceptance of contactless and mobile payment due to COVID-19 and that it will even be a clear consumer expectation and a must rather than a desire. The pandemic has significantly increased consumer preferences for cashless payment (M = 5.57). While the experts consider contactless payments "absolutely a big future topic," they also note that winter sports are lagging behind market standards. The time for contactless payments is now. Not only does it make winter sports safer and more secure, but also it increases convenience by making processes faster and more efficient. Such technologies could even help to manage the flow of visitors and distribute them geographically and in a time sensitive way, which may further improve visitor experience. As additional benefits, this may also reduce entry barriers for newcomers to winter sports and it hold significant value for many stakeholders for marketing purposes and business potential.

**"CONTACTLESS, BARRIER-FREE PAYMENT IN THE SKI AREA IS ABSOLUTELY A BIG FUTURE TOPIC. THE SITUATION AROUND CORONA COULD FUEL THE TOPIC"**

There is no doubt among the experts that it would be technically feasible to make these changes happen by 2025. Examples already exist—cashless resorts, touchless rental processes, and so on. The required technology is mostly there, but a few concerns remain. Some experts challenge 2025 as a realistic date. Reasons for this include the traditionally reserved winter sports industry and a potentially limited willingness for technology adoption, the dependency on other stakeholders that does not allow for autonomous implemen-

FIG. 3.2

**BY 2025, THE COVID-19 PANDEMIC WILL HAVE HAD A POSITIVE EFFECT ON THE ENVIRONMENT AND HAS LED TO SIGNIFICANT IMPROVEMENTS IN RESORTS DUE TO THE DECREASE IN TRAFFIC.**



tation of some of the solutions, and the lack of funds to invest in the required infrastructure. The latter is by far the biggest hurdle. In particular, smaller resorts might not have the financial means to make such investments and, as a result, may struggle to keep up. If such technological advancements became a requirement, or even mandated by federal/state authorities, the consequences may be too severe for small resorts. By 2025, we will see greater advancements in contactless experiences in winter sports. However, in some areas, this change will not happen in the next five years and rather in the next 15+.

ment, improved snow and water technologies, and technologies to preserve the environment. We asked our experts to assess whether "the COVID-19 pandemic will have had a positive effect on the environment and led to significant improvements in resorts due to the decrease in traffic."

At 45%, this projection has achieved the second lowest probability of all projections. However, impact was rated as high, the second highest overall. Likewise, desirability was rated as high (see Fig. 3.2). There was lively debate among the experts—in their words it was "a tough and polarizing thesis." Some of the experts believe that the COVID crisis and the enforced break will bring certain benefits such as decreases in traffic and new knowledge with respect to terrain usage and snow management as a result of access-controls during COVID-impacted winter months. To make a virtue of necessity, the potential pressure to extend the season and increase skiable days might also result in better and more-efficient snow-making equipment. It is important to note that some of these experts consider 2025 too early and expect this change to take 10+ years to take effect.

**COVID-19 AND THE ENVIRONMENT**

In recent years, climate change and its consequences has attracted increasing attention in the winter sports industry and this year is no exception. The interruption caused by COVID-19 may lead to a renewed drive by the winter sports industry to make itself more sustainable and resistant to crises. This may include measures like better traffic manage-

Another group of our experts believe that the COVID crisis will lead to significant re-think. There is an opportunity to use the pandemic as a way to change and improve the image of the winter sports industry which has been criticised in previous years, especially in terms of sustainability its impact on the environment. The experts highlight how "today's improvements are tomorrow's standards." A potential reset

in consumer expectations, caused by reflection during the COVID break, may accelerate such developments.

Then there are experts who believe that the associated cost will be too high for many stakeholders. Especially now, with considerable financial constraints, sustainability will not be a priority. Unfortunately, according to our experts, it might take a couple of years until financial resources become available again for sustainability improvements. Even worse – our experts show deep concern that some winter sport resorts may simply vanish.

A potentially counterintuitive point of view is represented in our results as well. Conventional wisdom suggests that visitor numbers in mountain areas would go down in response to the COVID pandemic, giving nature space and time to recover.

## **“IN 2025, WINTER SPORT RESORTS WILL BE MORE SUSTAINABLE AND ECO-FRIENDLY”**

However, our experts only somewhat agree that this crisis has given the environment the opportunity to regenerate (M = 4.51). Many experts even argue – and point to data-based evidence – that the opposite has happened. They indicate that COVID-19 has led to a revival of backcountry skiing (M = 5.36), as many winter sports enthusiasts seek activities that avoid crowded spaces (M = 5.23). Accordingly, many regions have seen more visitors than usual over the summer months

and more remote areas and backcountry trails have suffered in particular. Even though they would be very happy to see more positive effects for the environment, the experts doubt that society will learn its lesson and take appropriate action. Going forward, we might even experience an increased desire among visitors to return to recreational and outdoor activities. This might certainly help winter sports resorts in the short term, but it might not be in the best interest of nature.



A man wearing VR goggles and holding ski poles, standing on a ski simulator in a room with shelves of boxes. The image has a blue tint.

# ESPORTS AND GAMING AS AN OPPORTUNITY?

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How the next generation of skiers  
may be attracted

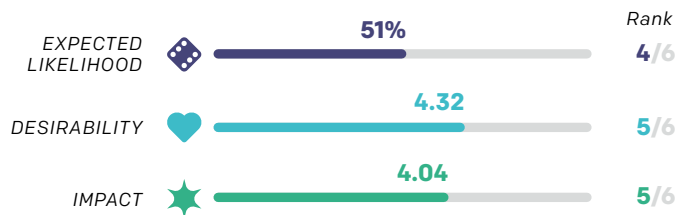
ESPORTS AND GAMING ARE UNLIKELY TO BECOME A KEY DRIVER OF WINTER SPORTS BY 2025, HOWEVER, ONLINE OFFERS AND ACTIVITIES WILL BE KEY FOR SUCCESS

**EMERGING TECHNOLOGIES AND CHANGING SOCIETAL INTEREST MADE GAMING ONE OF THE LARGEST FORMS OF MODERN ENTERTAINMENT (SCHOLZ, 2019). BOOSTED BY THE ABSENCE OF TRADITIONAL SPORTS DURING THE GLOBAL PANDEMIC, ESPORTS ROSE FROM A NICHE SUB-CULTURE INTO A GLOBAL PHENOMENON (SCHMIDT, 2020). WHILE DECISION-MAKERS IN SPORTS WERE RELUCTANT FOR YEARS, COMPETITIVE VIRTUAL EVENTS, GAMING, AND ESPORTS ARE NOW BECOMING AN INCREASINGLY VITAL ELEMENT OF TRADITIONAL SPORTS.**

Nowadays, gaming has become a widespread part of our social life and has extended far beyond children’s bedrooms, with around 2.7 billion casual video gamers globally (Statista, 2020). With more than 500 million annual spectators, competitive eSports is filling iconic arenas and gaining serious sport media coverage (Newzoo, 2020; Jenny et al., 2017). Despite virtual sports and simulations not being amongst the most popular eSports titles globally like League of Legends, Dota 2, or Counterstrike (Esports Charts, 2020), the exposure to young millennials has encouraged more traditional sports to engage both in virtual simulation games and professional eSports.

The consequences of social distancing have boosted the emergence of virtual sports competitions and prompted traditional sports around the globe to resort

FIG. 4.1  
**BY 2025, THE WINTER SPORTS INDUSTRY HAS MADE SIGNIFICANT PROGRESS IN ONLINE OFFERS/ACTIVITIES AS WELL AS GAMING AND ESPORTS.**



to eSports. Sport organisations like football and basketball have played with their official eSports teams. Several traditional sports engaged fans in virtual events and ran virtual video game competitions with professional athletes like the Virtual Bundesliga Home Challenge or the Formula 1 Virtual Grand Prix series (Ke & Wagner, 2020). These competitive, virtual entertainment formats attracted a record-breaking number of spectators and created significant social media attention.

**DEVELOPMENTS IN ONLINE, GAMING, AND ESPORTS**

Only every second expert expects that “the winter sports industry has made significant progress in online offers/activities as well as gaming and eSports” by

**“SO FAR, THERE ARE NO RELEVANT WINTER SPORT GAMES THAT ARE RELEVANT FOR THE ESPORTS COMMUNITY”**

2025 (see Fig. 4.1). Experts largely agreed that winter sports “is very much behind in the field of gaming and eSports,” especially since “there are no relevant winter sports titles and games that are relevant for the eSports community” so far. Many experts noted that future collaborations with game publishers would be needed to raise attention to virtual winter sports games.

While the experts were consistently reluctant to name gaming and eSports as a relevant source of revenue in the winter sports industry in 2025, several of them argued that further development of online activities and incorporation of gaming could bring new opportunities and would be desirable. The given arguments

**“YOUNG PEOPLE AND TEENAGERS ARE SKIING LESS AND LESS. ESPORTS MAY HELP CHANGE THIS TREND”**



referred to the attractiveness of winter sports for young customer groups as well as the potential to improve the overall skiing experience.

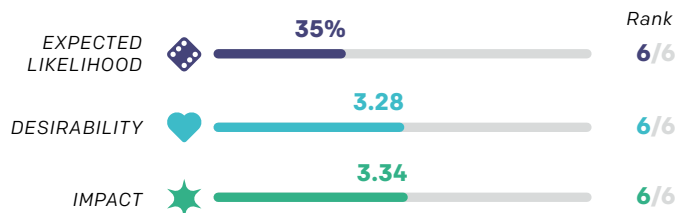
On the one hand, gaming and eSports are perceived by half of the experts as potential measures to “improve fascination to and attraction of young skiers” and to reduce the average age of winter sport athletes of 44 years (Roth et al. 2018). This is a remarkable increase from our previous Delphi study of 14 percent (Schmidt et al. 2020). Otherwise, several experts stated “there is potential to improve the overall ski experience” in addition to the mountain experience, for example, through entertainment in valley stations, ski lifts or offerings “to preview a course virtually before skiing it in reality.” Furthermore, there is potential to “better use the existing infrastructure by enticing summer participation in winter recreation areas” through ski simulators.

## COMPETITIVE VIRTUAL WINTER SPORTS

Will we see ski world cups where all athletes, independent of gender, age, or disability compete against each other in the same virtual competition? This was the underlying question of our future projection that, “competitive virtual winter sports will be officially regulated and will be an integral part of winter sports competitions.” The answer, according to our experts, is: unlikely.

FIG. 4.2

**BY 2025, COMPETITIVE VIRTUAL WINTER SPORTS WILL BE OFFICIALLY REGULATED AND WILL BE AN INTEGRAL PART OF WINTER SPORTS COMPETITIONS.**



**“THERE IS A PLACE FOR SKI SIMULATORS BUT ALWAYS AS AN ADDITION TO AN ON-MOUNTAIN EXPERIENCE”**

Experts agree that competitive virtual winter sports will not become an integral part of existing winter sports competitions or even replace classic winter sports by 2025 (see Fig. 4.2). Today’s winter sport fans are not expected to be interested in watching virtual competitions, especially because the physical competition and the alpine nature are essential characteristics of winter sports and an important motive for fans.

While virtual winter sports might not be an integral part of competitions, several experts see potential in developing and

integrating virtual competitions into live attendance events in the distant future. For winter sports enthusiasts, competing against a professional athlete or even beating an Olympic champion is more than a dream. Yet, virtual winter sports competitions could allow amateur skiers to compete against their idols or enable them to try new elements of the sport like ski jumping in (virtual) reality. This isn’t an unrealistic challenge; sports such as cycling have proven that it’s possible with the development of online platforms such as Zwift, which allows amateurs to hold races against professionals.

A person wearing a dark winter jacket and light-colored pants is standing on a snowy mountain slope. They are holding a newspaper or magazine open and looking at it. The background shows a vast, snow-covered mountain range under a clear sky. The entire image has a blue color overlay.

# WHAT HAS CHANGED SINCE LAST YEAR?

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How the experts re-evaluate  
the projected developments to 2025

# CLIMATE FOCUS, GENDER PARITY, AND THE USE OF MODERN TECHNOLOGIES TO FURTHER DEVELOP THE INDUSTRY REMAIN KEY PRIORITIES IN WINTER SPORTS

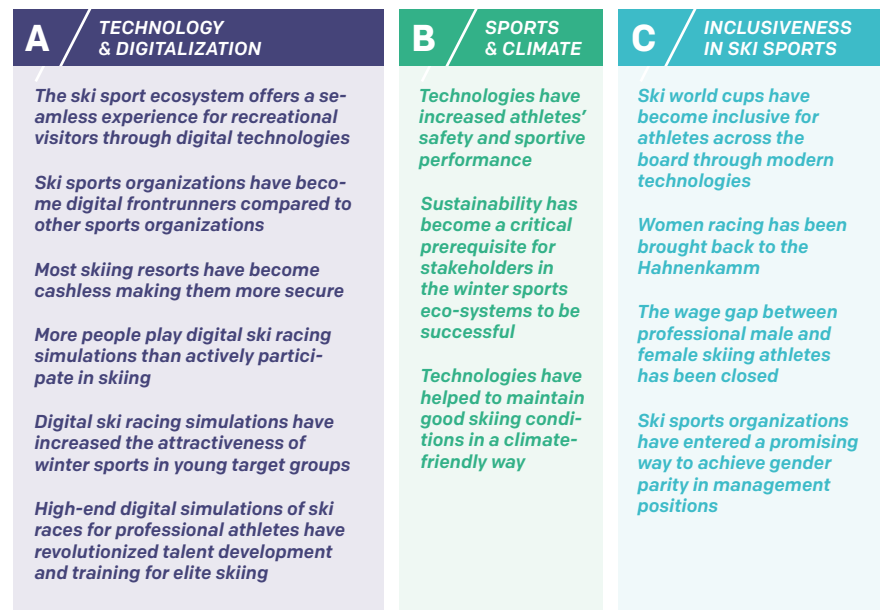
**BY 2025: CLIMATE FOCUS REMAINS INEVITABLE. MODERN TECHNOLOGIES WILL ADVANCE SKI SPORTS. RECREATIONAL SKIERS WILL HAVE SEAMLESS EXPERIENCES IN SKI RESORTS. GENDER PARITY REMAINS A CHALLENGE. GAMING AND ESPORTS WILL NOT PLAY A VITAL ROLE.**

In principle, Delphi studies are set up for a longer period of time and are only repeated every few years. Since 2020 was an exceptional year—we had to cope with a global pandemic that turned our world upside down and led to a new reality—it makes sense to look again at the projected development to 2025, especially as a comparison to the results of our first winter sport Delphi study (Schmidt et al., 2020). We had our experts re-assess the 13 projections on the future of ski sports examined in last year’s report.

Compared to last year, the optimism of our experts has increased significantly for some of the projections for 2025. They strongly believe that winter sports resorts will become more secure as they transition towards a cashless model. While digital ski racing simulations are still not considered a significant game changer by 2025, the experts are now more hopeful that they will help to reach younger target groups and engage people in skiing.

For gender parity, we find mixed results. The belief that ski sports organisations will develop a realistic way to achieve gender parity in management positions by 2025 has strengthened. Similarly, there is significantly increased confidence that female races will be brought back to the Hahnenkamm. However, even if women were to race on the Hahnenkamm, they are unlikely to profit as much as their male counterparts: Our experts still do not believe the wage gap between professional male and female skiing athletes will be closed by 2025.

FIG. 5.1  
PROJECTIONS FROM LAST YEAR’S REPORT (SCHMIDT ET AL., 2020)



There are two more areas in which our experts have reduced their expectations. The greatest decline was in the prediction that ski sports organisations will have become digital frontrunners compared to other sports organisations by 2025. While there was slight optimism last year, our experts are more skeptical this time. Similarly, our experts have lowered their expectation that sustainability will become a critical prerequisite for stakeholders to be successful; this is not surprising due to the financial distress experienced across the winter sports industry.

Lastly, several assessments remain unchanged. Experts continue to expect that modern technologies will make the Ski World Cup accessible for athletes across the board by 2025, though there is a slight increase in contention. Further, our experts still agree that technologies will enable climate-friendly maintenance of good skiing conditions and that

ski sport ecosystems will offer seamless experiences for recreational visitors through digital technologies; though both of these expectations have tempered slightly. In contrast, they have slightly increased their expectation of the technological benefits for athletes, such as high-end digital simulations for professional athletes, to improve talent development and training for elite skiing. After achieving the second rank last year, the projection that technologies will increase athletes’ safety and sporting performance by 2025 now has the highest level of agreement amongst our experts.

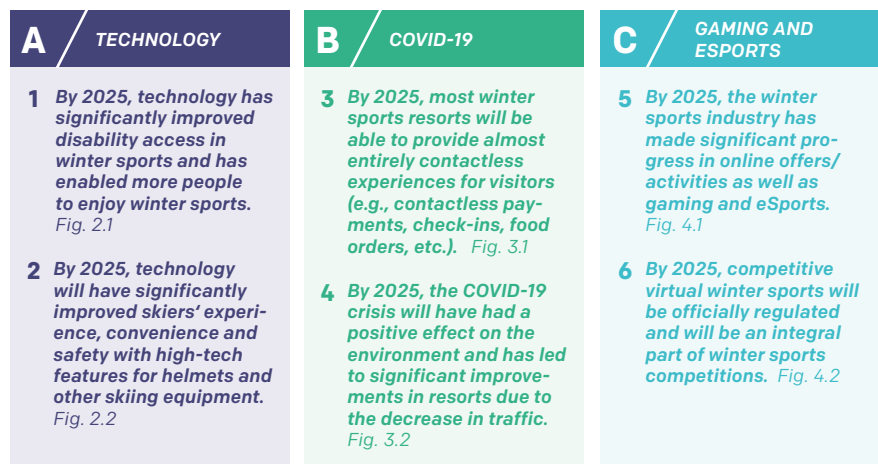
All in all, our study has given us the impression that there are many reasons for hope and many opportunities in the winter sports industry despite the COVID-19 pandemic. In the face of the current challenges, this heralds a better tomorrow for winter sports.

# STUDY DESIGN AND METHODOLOGY

**THE FIRST PART OF THE PRESENT STUDY IS BASED ON THE DELPHI METHOD THAT WAS INVENTED BY THE U.S. RAND CORPORATION.**

The Delphi technique is a scientifically established research method that solicits opinions from a panel of experts in an iterative survey process (Grisham, 2009). As part of the method, selected experts evaluate pre-formulated future theses, so-called projections, according to their probability of “occurrence” (in percent), as well as their “impact” and their “desirability” on a seven-point Likert scale from one (very low) to seven (very high). The experts support their quantitative evaluations with comments and arguments. Upon completion of their own evaluation, experts get access to the evaluations of the entire panel. Moreover, they are provided with summary statistics such as the median or the level of consensus/agreement by projection. Experts may choose to maintain or modify their evaluations in subsequent iterations (von der Gracht, 2012). This study applied a so-called “Real-time Delphi,” which is an advanced form of the Delphi technique where experts can immediately compare their responses to those of other participants and change their opinion as often as they like (Gnatzy et al., 2011). The methodology has proven to enhance validity, acceptance, plausibility and consistency of future-oriented studies by allowing experts to effectively discuss complex matters in a structured and anonymous group communication process (Linstone & Turoff, 2011).

**FIG. 6.1 DELPHI-STUDY SHOULD TACKLE THREE MAJOR TOPIC AREAS FOR PROJECTIONS IN 2025**



The present Delphi study was conducted in three steps as depicted by Figure 6.2. In step one, the future projections were formulated. In step two, the actual Delphi survey was conducted. In step three, the survey results were aggregated and analyzed by means of descriptive statistics and coding of the qualitative arguments to derive scenarios.

The second part of the present study contains 91 non-Delphi survey questions. Most items were measured along a seven-point Likert scale with anchors such as “no impact at all” (1) and “full impact” (7) or “strongly disagree” (1) and “strongly agree” (7), as ordinal or quasi-interval scales (cf. Gaski & Etzel, 1986). Exceptions include

the questions on the industry outlook for consequences from COVID-19 that were measured with a five-point Likert scale with anchors at “to the worse” (1) and “to the better” (5) as well as interval scales for time frame questions. Demographics were measured with nominal scales.

## FORMULATION OF FUTURE PROJECTIONS

The relevant literature (e.g., Gausemeier et al., 1996) recommends the derivation of Delphi projections from several sources. Our process for this study was as follows: Future drivers of winter sports were iden-

**FIG. 6.2 PROCESS OF THE DELPHI STUDY (BASED ON VON DER GRACHT & DARKOW, 2010)**



tified through input from experts and via desk research of largely internet-based sources. To structure the insights, all drivers were assigned one of the three overarching themes: (i) technology, (ii) COVID-19, and (iii) eSports and gaming. For each theme, a series of projections were formulated that best condensed the respective drivers. This process ensured a broad spectrum of projections and concentration on key developments to minimize participant dropout rates (Nowack et al., 2011; Hung et al., 2008). The time horizon of the study, by 2025, was based on relevant comparable Delphi studies that allow a foreseeable time period (von der Gracht & Darkow, 2010). A five-year projection is not seen as "looking too far into the future," which fosters expert discussion on changes that seem realistic in the near to mid-term.

## SELECTION OF EXPERTS

By definition, Delphi panels are not statistically representative; therefore, an improper expert selection is one of the most serious validity threats to Delphi studies (Creswell, 2003). In our study, the expert selection was conducted in a multi-stage process similar to Okoli and Pawlowski (2004). First, categories were defined to ensure a balance between the expert groups: (i) athletes, resort managers, and winter sports representatives, (ii) consulting and sports management, (iii) media, agencies, and academics, and (iv) sporting goods industry. Balancing of Delphi panels is recommended because different views from different expert groups en-

hance the validity of Delphi studies (Yaniv, 2011). Next, we identified potential experts for each category based on several criteria (e.g. years of experience, age, mix of backgrounds). The 505 candidates received a written invitation including a (personalized) link to our online Delphi portal. Finally, 53 experts from 41 organisations (see Figure 6.4) participated in our Delphi survey. This equals a good participation rate of slightly more than ten percent and represents a panel size in line with comparable Delphi studies (Merkel et al., 2016).

## EXECUTION OF THE SURVEY AND ANALYSIS OF RESULTS

The Delphi survey was conducted over a four-week period and was administered via the internet using "Surveylet" by Calibrium (<http://calibrium.com/>), an online survey tool specifically designed to facilitate Delphi research studies. We analyzed the 5,777 quantitative comments provided by our 53 experts for six Delphi projections on three dimensions and 91 non-Delphi questions. Additionally, 318 written arguments were analyzed. Using both qualitative and quantitative survey data, we elaborate on different viewpoints and reasons for both consensus and dissent regarding the consequences of the pandemic in order to better understand (diverging) views within the industry (Warth et al., 2013).

While the future projections have a mean probability of occurrence between 35% and 78%, the impact of five of the six projections is rated as medium or high (i.e., a minimum score of four on a seven-point

Likert scale). This underscores their relevance and confirms the accuracy of the pre-formulation process. Only half of the projections display a coefficient of variance of more than 0.5, which denotes consensus according to the relevant literature (von der Gracht & Darkow, 2010). As intended, the balance of our expert panel triggered controversial discussion.

FIG. 6.4  
**DEMOGRAPHICS OVERVIEW N=53**

### COUNTRY OF ORIGIN OF EXPERTS



### AGE



### GENDER



### BACKGROUND



FIG. 6.3  
**WITH 53 EXPERTS THE DELPHI-STUDY HAS A SOLID OPINION BASE – ORIGIN, AGE AND BACKGROUND ARE WELL DISTRIBUTED – GENDER WITH HIGH PROPORTION OF MEN, REPRESENTING INDUSTRY AVERAGE**



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# ABOUT WHU AND CSM

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## **WHU – OTTO BEISHEIM SCHOOL OF MANAGEMENT**

WHU – Otto Beisheim School of Management is an internationally oriented, privately financed business school. Founded in 1984, the Business School is now the #1 German Business School for degree programs. Accredited by EQUIS, AACSB, and FIBAA, WHU offers academic programs as well as education for executives, following four core values with courage and commitment: community, cosmopolitanism, entrepreneurship, and excellence. In Düsseldorf, the university opened its second campus in October 2012.

## **CENTER FOR SPORTS AND MANAGEMENT (CSM)**

The Center for Sports and Management (CSM) and its chair have been located at the Düsseldorf campus and is active in teaching and research since 2014. Under the direction of Prof. Dr. Sascha L. Schmidt, the CSM is committed to create a positive impact on the future of sports. Strong partnerships are the basis for all of our activities. The CSM team works closely with, amongst others, the Laboratory of Innovation Science at Harvard, MIT Bootcamps, Emlyon Business School as well as leading sports clubs, leagues and federations.

CSM has focused its current research on the future of professional sports and the influence of new technologies on business models in sport. To ensure the greatest possible practical relevance, great care and focus is placed on translating current research results into teachable case studies and practice-oriented media.

[csm.whu.edu](http://csm.whu.edu)



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