



## Article

# Challenges and Scenarios for Organizations Offering Tennis Training Programs

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## Abstract

*The health emergency caused by the COVID-19 outbreak led to a global economic crisis that affected virtually all industries, including sports. However, this crisis also encouraged some organizations to be proactive and adapt to stay competitive and visualize a future that allows better competitive, economic, and organizational results. This study outlines possible challenges from the sports context caused by the Covid-19 pandemic and a narrative formulation of scenarios for sports organizations offering tennis training programs, for this, a case study of the Liga Antioqueña de Tenis de Campo (LAT) in Colombia is presented. A foresight methodology was implemented using scenario planning to create possible futures. Following the methodology suggested by Godet and Durance in 2007, we formed a prospective team and conducted a paradigmatic liberation exercise. The results show that (1) there is a high demand for sports services, (2) the fields of sports and technology should work together, and (3) different public and private organizations should establish new strategic alliances.*

## Keywords

Tennis Training Programs, Scenarios, COVID\_19, Colombia

## Introduction

Sport, in all its different activities, allows individuals to maintain good physical and mental health and contributes to the social, cultural, and economic development of a country. Besides being a fundamental right, it “has the power to change the world” and “has historically played an important role in all societies, be it in the form of competitive sport, physical activity or play” (United Nations, 2020). From the perspective of health, constant physical activity helps to significantly reduce the risk of developing cardiovascular diseases, diabetes, and cancer, among other conditions (World Health Organization, 2017).

In Colombia, the sports sector focuses primarily on soccer because it is the most popular sport in this country (GHER Sports, 2017). According to the Transfermarkt portal (2021), the league with the highest value in the Colombian sports market in 2021 was the Liga DIMAYOR I, a soccer league worth 240.05 million euros, which was also the fifth highest-value league in the market in North and South America. However, in 2020, the world faced a disruptive situation caused by the COVID-19 crisis. In March of that year, the World Health Organization (WHO) declared the pandemic caused by the disease due to the SARS-CoV-2 virus, which is known as COVID-19.

This announcement impacted various rules of sports dynamics and caused some existing models for the sustainability of sports organizations to be re-evaluated (Escamilla et al., 2020). This also meant that sports organizations were forced to develop dynamic and innovative capabilities to be able to adapt to the situation (Barrales et al., 2015). The Liga Antioqueña de Tenis de Campo (LAT) [Antioquia Tennis League] needs to establish different strategies and a route that can help them to be more innovative and stay competitive in the future among other sports organizations and sporting activities. Accordingly, using the LAT as the study case, this study aims to identify the challenges and future scenarios of sports organizations that offer tennis training programs in Colombia.

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To achieve this objective, this study implemented a research methodology that follows a strategic foresight according to Godet's (2000) framework recommendations.

First, a prospective team was formed; then, the system was defined using the Cross Hit Multiplication Matrix Applied to a Ranking (MICMAC from French *Matrice d' Impacts Croisés Multiplication Appliqués à un Classement*) and MACTOR (Method, Actors, Objectives, Results of Strength) methods, in which the actors and variables that are part of the system and their interaction between them are defined. Later, paradigmatic liberation and technology forecasting were carried out. Subsequently, the fragments of the future were built and finally, based on these fragments, the different possible scenarios were proposed. This paper is structured as follows. First, it presents a theoretical framework and describes the general context of sports organizations, especially those that offer tennis. Second, it outlines some challenges for tennis. Third, it describes the methodology adopted here and reports the results, describing possible scenarios. Finally, it discusses the results and draws conclusions.

## **General Context of Sport and Tennis Organizations**

There are many public and private sports organizations for multiple disciplines that conduct activities with different approaches. However, the pandemic generated by COVID-19 and emerging technologies have impacted them in different ways. Despite this, in the case of field tennis, a world-renowned sport, the economic situation is different. Every year, besides handing out from USD 325,000 to approximately USD 20 million in prizes, the ATP organizes around 90 events worldwide, with prizes ranging from USD 50,000 to USD 125,000 (Statista, 2020). In the case of Colombia, although field tennis is not a representative sport in the country, it does have some international representatives such as Robert Farah and Juan Sebastián Cabal (Federación Colombiana de Tenis, 2021) and Mariana Duque, a woman who has represented the country at the international level occupying the No. 112 position in the WTA ranking (Secretaría de Cultura, 2014).

The sports industry was hit hard by the COVID-19 outbreak, but it fostered innovation and encouraged the use of technology in sports practice because, due to social distancing, the sports industry was forced to further reinvent itself using digital tools. Sport consumers were reported spending more than 72% of their time (total weighted average) interacting with a wide range of sports contents on various digital platforms (Euromerics Sport Marketing, 2019).

## **Horizon scanning**

As the sports industry is changing, exacerbated by Covid-19 disruptions, a brief scan of the horizon is presented here to highlight some of technological, economic, and social challenges facing the tennis industry in Colombia. This exercise provides some background research for sports organizations especially those focused on offering field tennis training services, so that they can plan the desired future.

## **Technological challenges**

Due to the emergence of different live streaming platforms, pay television services, and live streaming on several social networks (e.g., Facebook and Twitter) and digital channels such as YouTube, companies providing sports streaming services have been forced to design new strategies to maintain their audience. As stated by López (2018, p. 7), Netflix is the world's most popular monthly subscription on-demand video service, offering premium content to around 109.2 million subscribers. In comparison, in 2017, the number of Movistar Plus subscribers (Digital Plus and Movistar TV), who can add sports subscriptions, grew from 2.8 to 3.8 million. According to Digital Sport (Digital Sport, 2018), there were over 20 million subscribers to sports streaming platforms in the United States in 2018.

As indicated by Valcarce (2019, p. 1), the practical application of a digital revolution in sports organizations involves different areas of development and management, e.g., management and analysis, marketing and

communications, customer management, and physical activity and training. These variables—which are some of the most relevant factors for the future of the LAT—were considered and analyzed by different experts in this study to construct future scenarios.

### **Economic challenges**

The economy of sports organizations has been greatly affected by the crisis caused by the COVID-19 pandemic. The consequences of the outbreak and the widely predicted economic crisis have further exposed some of the critical situations of sports governance systems, with stakeholders having conflicting interests and policy solutions (García et al., 2020). According to Statista (2020), the sports industry has experienced large monetary losses during the pandemic. For instance, the losses of the US Open were estimated at around 140 million dollars for tickets, skyboxes, and drinks (Marketing Registrado, 2020). Wimbledon had insurance and therefore managed to mitigate the losses (infobae, 2021).

However, as stated by Escamilla et al. (2020), situations of this kind can also become an opportunity for transformation and reinvention. Indeed, Laitinen (2000) points out that organizations that have a rapid, proactive, and user-oriented response under unfavorable economic conditions also have a greater chance of competitive success. For instance, according to data on sports consumption provided by Suning.com, Suning Sports, and PP Sports, the sports retail sales of these three important e-commerce platforms increased by 152% from January to May 2020 (Ling, 2020). Hence, sports organizations should be able to respond to changes and adapt to situations of crisis and economic recessions such as the one recently experienced due to the COVID-19 outbreak.

During this time, the main challenges for sports industries and organizations have been (1) recovering the money they lost in different events and (2) the response capacity of telecommunications companies because, due to the pandemic, different sports industries and organizations have seen in online services and television broadcasting an opportunity to continue offering their services.

### **Social challenges**

The sports industry, like any other, faces several challenges, not only technological, human talent-related, or political, but also social because it is people who make up all its ecosystems and, at the same time, who impact them. As a result of the COVID-19 pandemic, some of the social challenges for sports around the world have grown.

In this regard, Murua (2017) compiled a list of 10 social challenges for sports. (1) Environmental sustainability is reflected in the territories, the impact of sports activities on natural environments (e.g., using renewable energy sources for facilities, equipment, and activities), and the amount of waste produced by sports equipment, services, and events. (2) Social sustainability in terms of health refers to promoting regular and recreational sports to combat sedentary lifestyles and diseases. (3) Offering services and spaces for the elderly means adapting sports scenarios to the service of the entire community. (4) Equality and (5) equity are mainly about eliminating gender, ethnic, religious, and political discrimination so that everyone is equally allowed to participate. Finally, there are challenges in terms of (6) economic sustainability, (7) economic globalization, (8) cultural globalization, (9) digitalization of sports practice, and (10) digitalization of the sports system. To respond to these challenges, sports organizations should generate new products, activities, and trends; use sports events and expressions to improve their image and enhance the sector; protect cultural expressions; and digitalize their spaces, e.g., smart stadiums, sports centers with digital assistance, sports services in open spaces with geolocation-based tracking, and smart cities.

The French Development Agency (AFD) (2020) has claimed that sport contributes to the development of more sustainable and inclusive companies, which is why sports can promote education and strengthen social cohesion from an early age. The AFD works together with the French civil society using sports to encourage young people in war-torn nations to attend school and create social ties to reconstruct their countries (AFD, 2020). In the same way, according to the public policies of the Colombian Ministry of Sports, sport should be considered an element of social transformation and personal satisfaction, which is essentially connected to well-being in general and comprehensive human development (Mindeporte, 2021). The literature shows that sport is a decisive factor to mitigate societal issues. Neenergia (2020), refers to the needs of sport in terms of sustainability, e.g., the implementation of different strategies that to reduce the tons of CO<sub>2</sub> emitted into the atmosphere in different events.

In this regard, tennis is one of the sports that generate the highest amounts of CO<sub>2</sub> emissions. For instance, the Roland Garros emits 156,000 tons of CO<sub>2</sub> Neenergia (2020).

## Methodology

The aim of this study is to outline challenges facing and present possible scenarios for sports organizations offering tennis training programs in an emerging country; in particular, the Liga Antioqueña de Tenis de Campo (LAT) in Colombia. As Spitz (2020) indicates, some technological factors such as machine learning and the rapid advance of artificial intelligence have had a positive effect on strategic decision-making, supporting human capacity for decision-making behind. For this purpose, it was used the strategic foresight according to Godet & Durance (2007) because it allows us to establish the variables and actors that should be analyzed in order to trace a possible future roadmap. In a strategic foresight, different stakeholders with common knowledge or interests seek to forecast build the future of a specific system (van der Laan, 2008). According to Armijos et al., (2016) and Cely (1999), there are different ways to study the future, but the strategic foresight methodology is one of those that addresses it as a multiple and indeterminate reality obtained because of the infinite possibilities of human action. Additionally, this methodology is followed for the construction of scenarios that, according to Barzman et al., (2021), require participation in a foresight exercise that would create a space for uncertainty, interdependencies, and controversy. This methodology is presented as a strategic tool in organizations to identify opportunities for constructing possible futures with the intent of carrying out an exploration that considers the aspects that best suit the organization or unwanted aspects in each system (Escorsa et al., 2017; Farrow, 2020).

Besides being participatory, the strategic foresight is aimed at creating a long-term vision for current decision-making and mobilizing joint actions to reach the desired future, based on Godet's (2000) framework. Following the stages outlined below, we built projective and exploratory scenarios. The former includes a narrative of the expected (plausible) events by interrelating each of the most relevant variables that significantly contribute to increasing or promoting an atmosphere of uncertainty in each environment (Álvarez, 2015). The latter are constructed based on the present, considering current trends and possible present and future events, and define plausible futures considering the predominance of certain trends (Álvarez, 2015). The following are the steps of the strategic foresight applied here:

1. Expert team: Prior to the analysis of the system, the stakeholders who will compose the prospective team are selected, and the team's identity map is constructed. In this study, the prospective team consisted of 13 tennis experts and 3 scholars who were part of the moderating team. Their affiliations and participation are listed in Table 1.
2. Strategic problem (system definition): The different variables and stakeholders involved in the internal and external system are identified via structural analysis (MICMAC method) and the stakeholders' game. In contrast to these methods, it is important to highlight that the MICMAC structural method (Crossed Impact Matrix Applied to a Classification) seeks to qualitatively analyze the relationships between the variables that make up a system within a company, organization, society, country, among others. This is based on the qualitative judgment of actors and/or experts who are part of the system, its objective is to identify the main, predominant, and dependent variables, as well as the essential variables for the evolution of the system. The different stages of the MICMAC method are as follows:

**Stage 1:** list of system variables,

**Stage 2:** description of relationships between system variables,

**Stage 3:** identification, categorization, and interpretation of the key variables

For its part, the MACTOR method (Method, Actors, Objectives, Results of Force) seeks to assess the relations of force between the actors and study their convergences and divergences with respect to the assessment of the actors involved and associated objectives. The MACTOR method considers the following stages:

**Stage 1:** Identify the actors that control or influence the key variables of the structural analysis: list of actors.

**Stage 2:** Identify the strategic objectives of the actors regarding the key variables: list of objectives.

**Stage 3:** Evaluate the direct influences between the actors: hierarchy of actors through an analysis of influences between actors.

**Stage 4:** Know the position of the actors with respect to the objectives. Describe the current attitude of each actor with respect to each objective (opposed, neutral, indifferent, or favorable).

Based on the previously defined stakeholders and variables, the subsystems that make up the general system are determined. In a workshop session held via Microsoft Teams, the expert team defined 35 stakeholders and 39 variables distributed among six subsystems: sports performance, administrative management aspects, marketing and technology, public and private resources, customers, and strategic allies. Each subsystem is identified by the team members based on their experience and contributions, allowing them to share their assessments of the level of importance and impact of each of them in the system studied here.

3. Paradigmatic liberation: In this qualitative approach, the expert team expresses its opinions about the meaning of the actors inside or outside the system to define the strategy that said actors could represent within the organization. The team also performs a retrospective analysis of each one of the stakeholders and variables that make up the system.
4. Technology forecasting: Different sources are consulted to find information about the current situation and trends of the variables and stakeholders that compose the previously defined system.
5. Fragments of the future: Different hypotheses are formulated considering the findings obtained from the technology forecasting and the retrospective analysis.
6. Scenario planning: Several scenarios and narratives are developed based on the hypothesis probability analysis conducted by the team of experts and 2×2 Matrix Schwartz (1996).

**Table 1:** List of Expert Team Members

<b>Expert Team</b>		
<b>No</b>	<b>Code Name</b>	<b>Profile</b>
1	Participant 1	Active professional tennis player at the LAT
2	Participant 2	Former president at the LAT
3	Participant 3	Professional tennis player retired from the LAT
4	Participant 4	Lawyer - Father of an athlete at the LAT
5	Participant 5	Manager at El Bosque Tennis Club
6	Participant 6	Instructor at the LAT
7	Participant 7	Coach of Antioquia Tennis Team
8	Participant 8	Coordinator at the LAT
9	Participant 9	Professor at the Instituto Tecnológico Metropolitano (ITM)
10	Participant 10	ITM Professor
11	Participant 11	Technical Coordinator at the LAT
12	Participant 12	Executive Director at the LAT
<b>Prospective Laboratory Coordinating Team</b>		
13	Coordinator 1	ITM Professor
14	Coordinator 2	ITM Professor
15	Coordinator 3	ITM Chair Professor
<b>Guest Observers</b>		
16	Observer 1	Master's degree student

## Results

### Construction of hypotheses

The strategic foresight workshop adopted 2x2 matrix according to Schwartz's axes (1991) for the scenario planning framework (Muzykina & Aljanova, 2022; Schultz & Richard, 2012; Schwartz, 1996). The scenarios were built based on the list of variables and actors presented below. The definition of actors and variables is a process generally called system definition in strategic foresight workshops like what it indicates Farrow (2020). A system, according to Cely (1999, p. 27), is "the set of elements whose interaction generates new qualities that its components do not have at the individual level and, therefore, must be studied as a whole." To define the configuration of the LAT's system, a workshop session was held with the expert team (as defined in item 2 in the Methodology section) to ask the expert team the two following questions:

- What actors could impact or be impacted by the LAT? (This question refers to those actors that have some cause-effect relationship with the LAT's system).
- What variables are considered factors of change in the LAT's system? (This question refers to those variables that generate some effect on the LAT's system).

The following are the 15 variables defined by the expert team:

1. Computer technology/hardware: Microsoft, Windows, PCs, cameras, digital scoreboards, and timers.
2. Technologies used for sports training: ball launcher, catcher, and feeder.

3. Nutrition: supplements and food for athletes.
4. Mental health.
5. Sportswear (clothing and shoes).
6. Common areas: sauna, bathroom, restaurant, and gym.
7. Store products: food, drinks, and fruit.
8. Products in the sporting goods store: sporting goods and clothing.
9. Parking.
10. Location (geo-reference).
11. Coaches' time and availability.
12. Age/Age range of coaches.
13. Salaries/Remuneration.
14. Expenses/Costs: maintenance of sports venues and travel expenses.
15. Customer habits.

The following are the 12 stakeholders defined by the prospective team:

1. Corporate stakeholders.
2. Tennis court equipment suppliers: nets, chairs, and brick dust, among others.
3. Training equipment suppliers: cones and ropes, among others.
4. Professionals in applied sciences: nutritionists, physiotherapists, and psychologists, among others.
5. Service providers: maintenance and store, among others.
6. Indirect competitors: cinemas, gyms, free-time activities, and other sports.
7. External control agencies: statutory auditors, the Colombian Superintendency of Industry and Commerce, and the Colombian Tax and Customs National Authority (DIAN in Spanish), among others.
8. Fans and followers.
9. Administrative employees: assistants and financial and accounting staff.
10. Referees.
11. Support staff: court monitors and ball persons.
12. Administrative staff: administrative assistants and maintenance and cleaning staff.

Among the initially defined actors, players, and family members (considered as clients) were part of the system's stakeholders. However, they were excluded by the expert team since they considered that the stakeholders presented here exert greater influence on the decisions of the LAT. The strategic foresight workshop started with the definition of actors and variables, followed by an analysis of sensitivity and dependency, which basically corresponds to the step prior to paradigmatic liberation, where the importance and impact of each variable and actor is defined according to the consideration of each one of the experts. The above in order to analyze the effects that exist between the different variables and organize them according to the importance of the actor and variable with respect to the future challenges (Cely, 1999; Farrow, 2020).

Next, the subsystems were defined taking into account the category and type of variable, as well as the sensitivity and dependency indices. This was done in another work session with the prospective team using Microsoft Teams, which resulted in six subsystems: sports performance, administrative management aspects, marketing and technology, public and private resources, customers, and strategic allies. Each one of them includes the variables with the highest sensitivity and dependency indices.

Subsequently, based on the prioritized variables and actors, the paradigmatic liberation was carried out. In the latter, the experts were prompted to make judgments or evaluate positions using questions about each element: What is the position of the LAT regarding the element under evaluation? What future awaits the LAT? What are the key factors or strengths of the element? What are its weaknesses? Then, technology forecasting was performed to identify different trends in the entire tennis court system around the world. Finally, the hypotheses for each subsystem were formulated by establishing relationships between the results of the paradigmatic liberation (item 3 in the Methodology section) and those of the technology forecasting (item 4 in said section).

Thus, 35 hypotheses were obtained for the LAT's system. The following are some of the most relevant according

to the assessment made in the previous steps and the decisions made with the prospective team, taking into account the influence exerted on the LAT by each of the variables and actors:

- Suppliers of sports equipment (such as Wilson and Baiardo), different clubs, and the LAT will strengthen their relationships in order to generate new strategies and alliances that allow them to strengthen sports practice and improve athlete performance.
- The LAT will generate greater support and sponsorships for its competitive athletes using different social networks (such as Facebook, WhatsApp, and Instagram) and platforms such as Colectivo de Compras, Social Nets (created by the USTA), and Bigdatatennis.com, which promote multi-channel communication. Thanks to this, the LAT will not only reach all the possible stakeholders and players in tennis but also diversify the forms of interaction between sponsors and competitive athletes, thus improving the impact of LAT's image.
- Under the philosophy "We train you to win," the LAT will start to use new technologies for sports training (e.g., sensors; robots such as those by KUKA, AG Robotics, and Omron; 3D reconstruction; and big data) in order to monitor different physiological aspects of athletes, record training sessions, perform gesture recognition, monitor and predict the trajectory of objects, plan movements, and integrate systems. The objective is to provide coaches and teachers with tools that allow them to improve the movements and performance of athletes.
- The Board of Directors and the LAT will implement strategies to renew the sport and manage it more efficiently based on proposed changes in the rules to reduce the duration of the matches and the use of sports management software (such as TPC-MatchPoint and SportLogic). This will reduce their operating costs and increase customer satisfaction by adequately and timely identifying their needs, which will improve the management of reservations, times, spaces, and activities.
- The LAT will enter into agreements and establish alliances with major technology providers (such as LTE-M and Live Objects), which will be the perfect means for the LAT to incorporate technological resources in its sport processes. As a result, the use of new wearable tools and game analytics (such as Player Analysis Technology, PAT) will become an everyday thing at the LAT.
- The LAT will diversify its service offering by implementing strategies such as tennis in virtual reality (VR) and augmented reality (AR). On the one hand, broadcasting matches in VR and 360° allows fans to enjoy an immersive experience. On the other hand, AR enables users to access contextual information.

### Scenario development

The first step was consolidating the probabilities of occurrence of the previously formulated hypotheses. These probabilities were independently assessed by each expert using a Likert scale to establish the feasibility of each hypothesis. Finally, the total probability considers the probabilities assigned by all the experts.

In the consolidated probability thus generated, it is possible to identify five groups of hypotheses according to the strength of their probability or the desire for their occurrence. These groups are a key element because they allow an initial interpretation of the strength with which each of the hypotheses is projected into the future.

Subsequently, considering the strength identified in each of the hypotheses and the five tentative groups or scenarios formulated above, a hypothesis cross-impact matrix was constructed. The latter aimed to represent the joint strength of occurrence of a hypothesis seen as a consequence of the actual occurrence of another of the hypotheses of equal or similar strength. It is important to clarify that this type of analysis, which is part of the morphological analysis applied to the systems studied using foresight, is an analytical-combinatorial method created in 1969 by Fritz Zwicky, for which its study and perspective have been important in this type of exercise analysis and understanding of the interrelationships of the parts that compose it.

The analytical-combinatorial method was used to create the frames for scenario development, that is, to graphically and figuratively show and intuit the results of each hypothesis in the future, as can be seen in Figure 1. The x-axis includes elements that have greater affinity with institutional aspects: management development, public-private factors, and alliances. In turn, the y-axis features elements associated with actions and results: improving sports performance, marketing, technology, and customers.



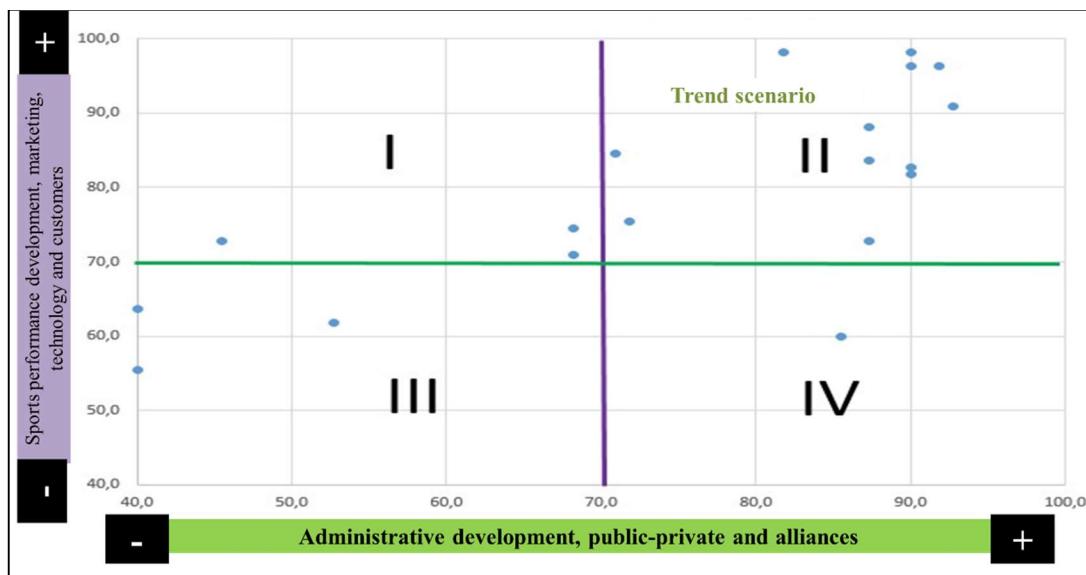


Fig. 1: 2x2 Matrix, frames for scenario development

This analysis resulted in four quadrants that classify the combinations of the hypotheses and their possible presence in future scenarios. It is worth noting that, in the case of the LAT, the trend scenario (determined by the presence of the highest number of hypotheses) is Quadrant II, which largely coincides with the ideal scenario, as will be seen below.

**Results: Formulation of scenarios**

To plan for the future, it is necessary to construct different scenarios (Mojica et al., 2010). A scenario is a set formed by the description of a future situation and the events that lead to that future situation. There are many classifications of scenarios, Godet & Durance’s (2007) typology focuses two types of scenarios: (a) exploratory scenarios, which are constructed based on previous and present trends that lead to viable and credible futures using MICMAC and MACTOR method, and (b) anticipatory or normative scenarios, which are designed retroprojectively based on alternative images of a desired or feared future.

The possible scenarios are alternatives which fulfill only the function of pointing out eventual situations that could happen years in the future; Thus, a reasonable number of possible scenarios is obtained, among which one or several “desirable” ones are chosen, which are called “bet” because they constitute the future for which the organization or company “bets” (Mojica et al., 2010). Now, all the possible scenarios are not equally likely or desirable, therefore, it is necessary to know how to distinguish between the scenarios of the general environment and the strategies of the actors and the prospective scenarios should not be confused with the strategic decisions. The time range of the scenarios was established in conjunction with LAT’s management and considering the times defined to develop a roadmap for the organization.

*Scenario 1: Winner tennis*

In the year 2027, the LAT is an example for all sports organizations to follow. Its technical staff is officially certified by the USTA; it is constantly up to date in terms knowledge and skills; and it has been successfully incorporating new methodologies to develop the technical-tactical skills of athletes using fitness training, sensory immersions, digital training, inclusive training, mental preparation, and yoga, which have allowed competitive athletes to substantially improve their results. Much of its management has been leveraged by a technological upgrade that has been taking place in recent years. For this purpose, all the staff has participated in constant research processes and focused on the adoption of advances in the sector and technology worldwide. As a result, the LAT has been able to

promote tennis more strongly, preserving the best traditional dynamics and adopting new ones oriented to digitality. Also, its staff members have become experts in digital tools, tournament coordination, and virtual sports.

On the other hand, in articulation with government agencies, public/private organizations, and educational institutions in the region, the LAT has become the main manager of projects related to the practice of tennis, positively influencing the allocation of public and private budgets to this sport. Thanks to this, the LAT has been able to implement a wide, inclusive, and decentralized offering for different sectors of society, and its work and support have influenced other sports schools, foundations, and organizations. The dynamic consists of new services and exponentially expands the market that is served by the league, due to a growing value offer, from which its national and international camps, its activities for audiences with special abilities, its new Touchtennis services, its offer of “outdoor training” experiences for companies and families, which keeps its different audiences with a high interest in all the activities that are promoted.

Also, multiple agreements and alliances with suppliers have allowed the LAT to implement strategies to strengthen the practice of tennis. At the same time, they have facilitated the incorporation of technological tools, such as Live Objects, wearables, accessories based on the Internet of Things, and game analytics tools (e.g., PAT), which have become an everyday thing for the entire sports community.

Regarding the strengthening of communication and relationships, it is important to highlight the great work carried out by the communications team and commercial managers, who have established themselves as ambassadors of the LAT, leading environmental processes and opening new markets. To achieve this purpose, they work hand in hand with event promoters, with whom they use hybrid strategies for sports activities, positioning online activities as a true and genuine possibility for living the tennis experience. They have also positioned the concept of “boutique” events, which are highly exclusive activities with a small attendance accompanied by multimedia coverage and short reports with interactive infographics. The LAT has managed to take full advantage of multichannel communications and platforms, such as Social Nets (created by the USTA) and Bigdatatennis.com, to improve its impact and positioning.

In addition, new technologies have found a space in the dynamics of the LAT, which is recognized as a pioneer in the country in the adoption and implementation of equipment such as Oculus Rift, HTC Vive, and Valve Index for deployment and participation in virtual gaming platforms, i.e., eSports. Moreover, the LAT has been a leader in the implementation of resources such as measurement sensors, predictive systems, robotic systems, and virtual and augmented reality, which have attracted new people interested in tennis and new sponsors for the sport.

Last but not least, continuously concerned about the health care of its athletes and the community in general, the LAT has implemented medical and physiotherapeutic support programs in which recovery-oriented processes are carried out long before player injuries show up on the court. In addition, as a result of the 2020 COVID-19 pandemic, contactless technologies, voice biometrics, and facial recognition are accompanied by the incorporation of closed spaces with controlled environments to avoid possible biological risks to which people could be exposed in the facilities. As a result, the LAT is positioned as one of the few safe environments for human interaction in the region.

### *Scenario 2: tennis break*

In 2027, the LAT goes through one of its worst moments. Its technical staff have difficulties in keeping up-to-date in their knowledge and skills; therefore, their methodologies are perceived as outdated and have a low impact on athletes’ development of technical-tactical skills, which is ultimately reflected in low player performance. In addition, the technological upgrade of most of the processes has lagged behind, which has created new barriers to promote the practice of an increasingly changing tennis. As a consequence, the LAT sees from a distance the growth of other leagues and centers for the practice of this sport, which timely welcomed new technological tools and types of tennis.

On the other hand, but not more encouraging, the links and articulations that were established with government agencies, public/private organizations, and educational institutions in the region have been lost. Hence, access to resources has been limited, and it has not been possible to implement projects to impact the region. The services offered by the LAT have remained static in recent years, which has led to a loss of interest in part of its public and created difficulties to make its permanence in the region something viable. Finally, a lack of attention to biological risks to which people have been exposed in sports venues since 2020 has led to constant closings of the venues and

a low perception of community safety, which has alienated them a bit from the relationship with the LAT.

#### *Scenario 3: game over*

In 2027, the LAT is recognized for its administrative management and strong alliances with government agencies, public/private organizations, and educational institutions in the region, positioning it as one of the main managers of projects associated with the practice of tennis. This has had a positive impact on the allocation of public and private budgets to this sport. As a result, the LAT has participated in outreach programs for different sectors of society, and its management and support have influenced other sports schools, foundations, and organizations in the region.

Despite its great administrative management and outreach, the sports achievements of the LAT have not been perceived. This is mainly due to a low incorporation of (1) new methodological strategies to develop athletes' technical-tactical skills and (2) new technological resources to monitor, track, and improve players' results. In addition, slow commercial dynamics to develop and offer new services have made it impossible to retain many of its athletes. As a result, player turnover has become a constant situation at the LAT, thus making it difficult to establish a solid competitive process. Finally, the LAT's sports processes have been impacted by constant injuries in athletes due to a lack of medical and physiotherapeutic support programs that prevent possible injuries, thus reducing the chances of success of its athletes in tournaments.

#### *Scenario 4: match point*

In the year 2027, the LAT shows a desire and impulse to adopt new technologies associated with the practice of tennis. However, a lack of support from government agencies and public/private organizations hinders its access to resources that enable greater technological development. Despite these limitations, the LAT has managed to hold the first sporting events based on eSports and digital tournaments. On the other hand, some good projects aimed at reaching new sectors of the population for the practice of tennis have been abandoned, mainly due to a decrease in sponsorships from main suppliers and former allies of the LAT.

In the competition context, some high-performance players have emerged as isolated and sporadic cases, obtaining good results mainly in national tournaments. But, when they go abroad, a lack of support and agreements that enable their proper development is evident. For this reason, many of them have changed their perspective and migrated to other opportunities, especially participating in tournaments through virtual and augmented reality technologies, which offer lower costs compared to their face-to-face counterparts.

Regarding the strengthening of communication and relationships, the work carried out by the communications team and commercial managers is remarkable. They strive every day to reach new markets and audiences for LAT services. However, a lack of agreements with event promoters and the difficulty in mobilizing sports leaders have meant that only a few of these efforts have yielded results and that LAT's growth in the market is positive but slow.

It is important to highlight the good work by the LAT to keep its services afloat amid the community's fear of exposing themselves to biological risks. To mitigate this risk, the LAT has implemented low-cost alternatives with a positive impact, positioning itself as one of the few safe environments for human interaction in the region. Finally, table 2 presents the summary and comparison of the possible scenarios.

**Table 2:** Comparison of scenarios

Scenario	Name	Future Valuation	Elements
1	Winner Tennis	Positive scenario	Certification of knowledge Physical and mental balance Elements of inclusion and equity Inclusion of emerging technologies Adoption of emerging technologies Articulation and generation of networks with public and private sector organizations Strengthening in social networks
2	Tennis Break	Negative scenario	Low training and updating of staff knowledge. Technological obsolescence
3	Game over	Scenario strong in administrative elements but low in technological acquisition and knowledge updating	There is no generation of cooperation networks Generation of business alliances and cooperation networks with public and private entities. Low training and updating of staff knowledge. technological obsolescence There is no accompaniment or monitoring of physical and mental experts
4	Match Point	Very positive scenario in the inclusion of technologies but low in the generation and support of other entities	Inclusion of emerging technologies Adoption of emerging technologies There is no generation of cooperation networks and there is no support from other entities. Accompaniment of experts in the physical and mental part.

It can then be observed that there is only a completely positive scenario if the different technological, knowledge and generation of support network elements are included, where the different relationships and generation elements of a strengthened sports space are established from the different economic fronts, technological and social.

**Discussion**

Sports organizations, especially those offering tennis training programs, should devise multiple strategies to obtain financial resources from several sources. For this reason, this study addresses different aspects and challenges that the post-COVID-19 sports world will face. And, according to Pollard and Hotho (2006), scenario planning could be used for this purpose. This is also taking into account that the work was carried out in the midst of a health crisis, where aspects such as; the capacity for leadership and planning in the midst of the context of a pandemic, as Inayatullah & Black, (2020) also stated. Two of the main ways for sports organizations to overcome the economic crisis caused by this pandemic are (1) to take full advantage of the online tools the latter has required and (2) to continue offering their services online, regardless of whether lockdowns continue or not. This is because, as indicated by Valcarce (2019, p. 1), implementing a digital revolution and its tools in sports organizations involves more than one of their areas. In addition, during the lockdowns, a growing demand and need for online sports services has been evident, as shown by data on traffic and connections provided by technology service operators (Antón, 2020; Digital Sport, 2018; López, 2018).

The can be observed in the different future scenarios that were built in this paper, especially Scenarios 1 (winner) and 4 (match point - sports performance, marketing, and technology). This is in line with another study made by Murua (2017) that forecasts three future aspects: (1) the incidence of technology in sports practices through different physical and digital experiences, (2) the arrival of new sports practices based on digital tools, and (3) the digitization of the entire sports ecosystem. Moreover, this unavoidable economic crisis is likely to increase the dependence of small and medium-sized sports organizations on public funding, especially from national government agencies (Garcia et al., 2020), as stated in Scenario 2 (break tennis). However, establishing different alliances will be necessary to overcome such crisis and materialize the desired future, as presented in Scenario 3 (game over - administrative management and alliances). Undoubtedly, this will depend on the dynamic capacity of sports

organizations, their ability to anticipate, the support they will find in technology, and the creativity that has always emerged from economic recessions Laitinen (2000). It should also be noted that one of the challenges that sports organizations must face has to do with environmental, social, and cultural responsibility, a challenge that different industries, with no exception, must respond to, particularly after the pandemic.

Similarly, to the results obtained in the study of Inayatullah et al., (2020), the participants in the futures building exercise found the work done interesting. However, they also highlighted the importance of implementing a work plan based on the results found, they indicated that it would be important to form a team that could continue with a route to capture the future of the LAT according to the resulting scenario. Additionally, the results of Inayatullah et al., (2020) indicate the need to include elements of Industry 4.0, which also turned out to be one of the elements that, although they were not prioritized in the context of this work, are part of the future recommendations and of the scenarios obtained as a result. Additionally, in the work of Marzban & Mohammadi, (2020).

## Conclusions

The scenarios built in this prospective exercise also reveal the different alternatives that can be materialized in the future of sports. In addition, they show the most desired scenario considering each of the variables, which, in a future study, could be used to design a roadmap that allows its materialization. Nevertheless, it should be noted that, although based on the experts' opinion, the chosen scenario excludes some variables and stakeholders related to technological tools, which does not mean that the future of sports will not be thoroughly permeated by technology and the virtual world. On the contrary, this permeation has been evident in the challenges identified above, the technology forecasting process, and the situation during the pandemic.

The scenarios were presented to the expert team, that was, the team of experts who took part in the scenario building exercise., who felt that their opinions and assessments were reflected in the former. They were scared of the future and playing behind closed doors; in general, they were afraid of change. However, they also felt motivated and hopeful to see that tennis in the future continues to be, despite technology, a sport lived in the real and not the virtual world. They could see that different technological elements will not be the enemies of the sport but rather its allies to improve its current conditions. The management of the LAT considered that (in addition to the technological elements) the administrative, social, political, and cultural aspects would be interesting contributions and variables to consider in an organizational change and could benefit the LAT on different fronts. Although some members of the team were a little reluctant to accept a technological future for the sport, they agreed with the results and the fact that such future is one of the might be the most likely option.

Also, experts must consider the importance of the technological variable in the construction of a political roadmap that allows them to anticipate the ideal future of a given sports organization and avoid a possible competitive disadvantage in the environment. Although tennis has traditionally been practiced in person on a court, the emergence of new sport experiences using digital platforms, which can also enter this market, is very possible. Therefore, roadmaps should be subject to changes, constant reviews, and adjustments so that organizations can always visualize the future ahead to anticipate and react to different events that could affect their search for the desired future. Consequently, the LAT and its management can conduct further studies based on these results and build a possible roadmap to materialize the best scenarios proposed here.

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## References

- AFD. (2020). Deporte y desarrollo. <https://www.afd.fr/es/page-thematique-axe/deporte-y-desarrollo>
- Álvarez, F. (2015). Escenarios normativos: tipos y clústeres prospectivos. XX Congreso Internacional de Contaduría, Administración e Informática.
- Antón, M. (2020, April). ¿Cómo afecta el Covid-19 al mundo del deporte y los eSports? | Palco23. EL DIARIO ECONÓMICO DEL NEGOCIO DEL DEPORTE, 1–2. <https://www.palco23.com/blogs/la-voz-del-experto/como-afecta-el-covid-19-al-mundo-del-deporte-y-los-esports.html>
- Armijos, L. A., Galarza, S. P., & Gancino, A. (2016). Estudio De Prospectiva Integral Para Evaluar Y Optimizar La Gestión Organizacional-Financiera De Fundación Pastaza. *Revista CIENCIA*, 18(2), 163–173.
- Barrales, V., Montes, F., & Gutierrez, L. J. (2015). Dynamic capabilities, human resources and operating routines A new product development approach. *Industrial Management and Data Systems*, 115(8), 1388–1411. <https://doi.org/10.1108/IMDS-02-2015-0058>
- Barzman, M., Gerphagnon, M., Aubin-Houzelstein, G., Baron, G. L., Bénart, A., Bouchet, F., Dibie, J., Gibrat, J. F., Hodson, S., Lhoste, E., Martin, C., Moulrier-Boutang, Y., Perrot, S., Phung, F., Pichot, C., Siné, M., Venin, T., & Mora, O. (2021). Exploring Digital Transformation in Higher Education and Research via Scenarios. *Journal of Futures Studies*, 25(3), 65–78. [https://doi.org/10.6531/JFS.202103\\_25\(3\).0006](https://doi.org/10.6531/JFS.202103_25(3).0006)
- Cely, A. (1999). Metodología de los Escenarios para Estudios Prospectivos. *Revista Ingeniería e Investigación*, 1(44), 26–35.
- Digital Sport. (2018). Latest News. <https://digitalsport.co/latest-news>
- Escamilla, P., Núñez, J. M., Calabuig, F., & Gómez, A. M. (2020). Effects of the COVID-19 pandemic on sports entrepreneurship. *Sustainability (Switzerland)*, 12(20), 1–12. <https://doi.org/10.3390/su12208493>
- Escorsa, P., Escorsa, E., Montes, J., Ayarza, G., Arango, B., Chaur, J., Hernández, R., & Moreno, J. (2017). Ejercicio prospectivo del sector de la educación para Panamá al año 2040. *Revista Espacios*, 38(43). <https://www.revistaespacios.com/a17v38n43/a17v38n43p05.pdf>
- Euromerica Sport Marketing. (2019). El deporte crece con la oleada digital. <https://euromerica.com/el-deporte-crece-con-la-oleada-digital/>
- Farrow, E. (2020). Organisational artificial intelligence future scenarios: Futurists insights and implications for the organisational adaptation approach, leader and team. *Journal of Futures Studies*, 24(3), 1–15. [https://doi.org/10.6531/JFS.202003\\_24\(3\).0001](https://doi.org/10.6531/JFS.202003_24(3).0001)
- Federación Colombiana de Tenis. (2021). Fedecoltenis :: Federación Colombiana de Tenis. <https://www.fedecoltenis.com/>
- García, B., James, M., Koller, D., Lindholm, J., Mavromati, D., Parrish, R., & Rodenberg, R. (2020). The impact of Covid-19 on sports: a mid-way assessment. *International Sports Law Journal*, 20(3–4), 115–119. <https://doi.org/10.1007/s40318-020-00174-8>
- GHER Sports. (2017). El potencial de la industria del deporte en Colombia. <https://ghersports.com/el-potencial-de-la-industria-del-deporte-en-colombia/>
- Godet, M. (2000). La caja de herramientas de la prospectiva estratégica (Laboratoire).
- Godet, M., & Durance, P. (2007). LA CAJA DE HERRAMIENTAS DE LA PROSPECTIVA ESTRATÉGICA: Problemas y métodos (PROSPEKTIKER, Ed.; 2nd ed.).
- infobae. (2021). El inédito seguro que reducirá las pérdidas millonarias en Wimbledon pese a su cancelación por el coronavirus. *Deportes*. <https://www.infobae.com/america/deportes/2020/04/01/el-inedito-seguro-que-reducira-las-perdidas-millonarias-en-wimbledon-pese-a-su-cancelacion-por-el-coronavirus/>
- Inayatullah, S., & Black, P. (2020). Neither A Black Swan Nor A Zombie Apocalypse: The Futures Of A World With The Covid-19 Coronavirus. *Journal of Futures Studies*. <https://jfsdigital.org/2020/03/18/neither-a-black-swan-nor-a-zombie-apocalypse-the-futures-of-a-world-with-the-covid-19-coronavirus/>
- Inayatullah, S., Jacob, A., & Rizk, R. (2020). Alibaba and the Golden Key: Scenarios of Manufacturing Futures in

- Egypt. Journal of Futures Studies. <https://jfsdigital.org/2020/11/03/alibaba-and-the-golden-key/#post-12016-footnote-3>
- Laitinen, E. K. (2000). Long-term success of adaptation strategies: Evidence from Finnish companies. *Long Range Planning*, 33(6), 805–830. [https://doi.org/10.1016/S0024-6301\(00\)00088-1](https://doi.org/10.1016/S0024-6301(00)00088-1)
- Ling, P. (2020). Interpretation of leisure sports in the pandemic situation of COVID 19. *World Leisure Journal*, 62(4), 319–321. <https://doi.org/10.1080/16078055.2020.1828786>
- López, D. (2018). Estudio de las plataformas de streaming. Universidad de Sevilla. Marketing Registrado. (2020). Las pérdidas millonarias y los nuevos patrocinios del US Open 2020. La Comunidad Del Marketing Deportivo. [https://www.marketingregistrado.com/us/tenis/2020/09/31413\\_las-perdidas-millonarias-y-los-nuevos-patrocinios-del-us-open-2020/](https://www.marketingregistrado.com/us/tenis/2020/09/31413_las-perdidas-millonarias-y-los-nuevos-patrocinios-del-us-open-2020/)
- Marzban, E., & Mohammadi, M. (2020). From solid government to self-governance: Future scenarios for electricity distribution in Iran. *Journal of Futures Studies*, 24(3), 17–35. [https://doi.org/10.6531/JFS.20200324\(3\).0002](https://doi.org/10.6531/JFS.20200324(3).0002)
- Mindeporte. (2021). Política Pública . <https://www.mindeporte.gov.co/normatividad/politica-publica>
- Mojica, C., Quintero, J., & Ortiz, L. (2010). Metodología de Evaluación Ex-Ante de Proyectos de Investigación. 1–18.
- Murua, J. (2017). El deporte ante los retos de la sociedad.
- Muzykina, Y. V., & Aljanova, N. K. (2022). Modeling Alternatives for Imams' Role and Islam Development in Post-Pandemic Kazakhstan. *Journal of Futures Studies*, 26(4). [https://10.6531/JFS.202206\\_26\(4\).0008](https://10.6531/JFS.202206_26(4).0008)
- Neoenergía. (2020). Fútbol sostenible: un desafío global e inmediato. <https://www.neoenergia.com/es-es/te-interessa/compromiso-social/Paginas/futbol-sostenible.aspx>
- Pollard, D., & Hotho, S. (2006). Crises, scenarios and the strategic management process. *Management Decision*, 44(6), 721–736. <https://doi.org/10.1108/00251740610673297>
- Schultz, C. C., & Richard, L. (2012). Scenarios: A Hero's Journey across Turbulent Systems. *Journal of Futures Studies*, 17(1). <https://jfsdigital.org/articles-and-essays/2012-2/vol-17-no-1-september-2012/symposium/scenarios-a-heros-journey-across-turbulent-systems/>
- Schwartz, P. (1996). *The art of the long view paths to strategic insight for yourself and your company*. Doubleday.
- Schwartz, P. (1991). *The Art of the Long View: Planning for the Future in an Uncertain World*. Doubleday Currency, New York.
- Secretaría de Cultura, R. y D. (2014). *Tenis de campo*. <https://www.culturarecreacionydeporte.gov.co/es/bogotanitos/recreacion/tenis-de-campo>
- Spitz, R. (2020). The Future of Strategic Decision-Making. *Journal of Futures Studies*. <https://jfsdigital.org/2020/07/26/the-future-of-strategic-decision-making/>
- Statista. (2020, October 1). El tenis profesional a nivel mundial- Datos estadísticos. <https://es.statista.com/temas/3716/el-tenis-profesional/>
- Transfermarkt. (2020). Ligas de Norte y Suramérica & competiciones de copa. <https://www.transfermarkt.co/wettbewerb/amerika>
- United Nations. (2020). International Day of Sport for Development and Peace 6 April. ONU; United Nations. <https://www.un.org/es/observances/sport-day>
- Valcarce, M. (2019). *La Revolución Digital: retos para el sector deportivo*. Deporcam.
- van der Laan, L. (2008). The imperative of strategic foresight to strategic thinking. *Journal of Futures Studies*, 13(1), 21–42.
- World Health Organization. (2017). 10 facts about physical activity. WHO; World Health Organization. [http://www.who.int/features/factfiles/physical\\_activity/es/](http://www.who.int/features/factfiles/physical_activity/es/)