Digital Sport Startups:
Global Trends and Determinants of Success

A Thesis submitted for the Master of Science degree in Management Engineering

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A Digital Sport Startup

is an organization aimed at searching for a repeatable and scalable business model in the sports industry, that is potentially producing and selling digital technologies in order to boost the enterprise value of clubs, broadening clubs' mission and scope.
Riassunto

Questo lavoro di Tesi si prefigge due principali obiettivi: il primo di indagare dettagliatamente il contributo che le Digital Sport Startup hanno apportato all’industria dello Sport attraverso l’uso delle tecnologie digitali e il secondo di identificare quali sono i determinanti principali che conducono al successo di una Digital Sport Startup.

Attraverso una dettagliata analisi bibliografica, sono stati individuati i principali trend e caratteristiche dell’industria dello sport che hanno permesso di costruire il “The Macro-Categories Model” con i 4 principali asset che sono maggiormente colpiti dall’innovazione digitale: Athlete/Team, nella parte sportiva, Fan, Brands e Facilities, nella parte di Business.

Grazie ad una metodica e rigorosa catalogazione delle Digital Sport Startup che hanno caratterizzato e rivoluzionato lo sport negli ultimi anni, 988 Digital Sport Startup sono state identificate e categorizzate in un database.

Una dettagliata descrizione del settore viene offerta, riguardo ad aspetti geografici, tecnologici ed economici, individuando quali fossero i trend più importanti e identificando i tratti distintivi e comuni delle Digital Sport Startup. Il Nord America si conferma essere l’ambiente perfetto per la proliferazione di queste imprese con l’Europa che si piazza subito dietro. Le soluzioni per l’atleta sono le più numerose seguite da quelle per il Fan. Le piattaforme rappresentano la tecnologia più diffusa, seguita dalle applicazioni e dai wearable.

L’unica misura di performance a nostra disposizione era il tasso di sopravvivenza di una Digital Sport Startup. Questo dato è stato utilizzato per verificare se le Digital Sport Startup fossero di successo o no. Due differenti analisi per determinare i principali fattori che caratterizzano il successo di una Startup nel settore dello sport per i due mercati principali di riferimento (Nord America e Europa) sono state condotte: Regressione Logistica e Qualitative Comparative Analysis. L’analisi per il Nord America mostra che una Digital Sport Startup di successo è posizionata nel quadrante business per i professionisti concentrandosi in particolare nella gestione del Fan.

Per quanto riguarda l’Europa, una Digital Sport Startup di successo è indirizzata anche essa alla gestione della fan base, ma anche alla gestione degli eventi per gli amatori e alla gestione delle prestazioni atletiche e sportive degli atleti professionistici.
Abstract

This Master Thesis work aims at two main objectives: the first to investigate in detail the contribution that Digital Sport Startups have provided to the Sport Industry through the use of Digital Technologies and the second to identify which are the main determinants that lead to the success of a Digital Sport Startup.

Through a detailed bibliographic analysis, the main trends and characteristics of the industry of sport have been detected that have allowed to build “The Macro-Categories Model” with the four main assets that are more affected by Digital Innovation: Athlete/Team, on the Sport Side, Fan, Brands and Facilities, on the Business side.

Thanks to a methodical and rigorous tabulation of Digital Sport Startups that have characterized and revolutionized the sport in the last years, 988 Digital Sport Startups have been identified and categorised in a database.

A detail description of the sector is depicted, as regards geographical, technological and economical aspects, detecting which were the trend more important and identifying distinctive and common features of Digital Sport Startups. North America is confirmed to be the perfect environment for the proliferation of these firms with Europe at the second place. The solutions for the Athlete are the largest followed by that for the Fan. Platform represent the technology most common, followed by applications and wearables.

The only one performance measure available to us was the survival rate of a Digital Sport Startup. This data was used to verify whether Digital Sport Startups were successful or not. Two different analyses to assess the main factors that describe the success of a Startup in the Sport Industry for the major markets of reference (North America and Europe) were run: Logistic Regression and Qualitative Comparative Analysis. The analysis for North America shows that a successful Digital Sport Startup is placed on the business quadrant for the professionals focusing in particular on the management of fans.

As regards Europe, a successful Digital Sport Startup is addressed to the management of the fan base as the American case, but also to the management of the events for the amateurs and the management of athletic performances of professionals.
0 Executive Summary

Thesis
Digital innovation is growing everywhere around the world, permeating in recent years a huge number of economic industries; among these, we discovered the sport industry, a growing market which wasn’t often subject of researches. The sport market is growing impressively and has become one of the largest industry in the world with a total value that varies between $500 to $1300 billion. One of the main actors involved in the evolution and growth of this sector are Digital Sport Startups which play an important role as the main source of innovation.

The aim of this work of Master Thesis is to investigate which is the contribution of Digital Sport Startups in the Sport Ecosystem and then, focusing on two different contexts, to extrapolate insights about potential factors which can lead a Digital Sport Startup to be successful in this huge market.

Why Digital Sport Startups
Startups are able to create products and services people need, provide employment opportunities, provide commerce and regional economic integration, promote efficiency through new technologies, address environmental challenges, impact socio-economic objectives and they are the main mean through which countries can create innovation.

As industry environments become more dynamic, interest in innovation, its process and management has increased. Organizations need to innovate because of customers changing needs, demands and lifestyles to capitalize on opportunities offered by the market and by new technologies. Innovation is the most important factor in the economic growth and performance in the globalized economy. It brings new technologies and products that help to solve global challenges, new ways of producing goods and delivering services by boosting productivity, it creates jobs and can improve citizens’ quality of life. Among different technologies, this work aims at studying the impact of the Digital ones, since the advent of digital technologies has fundamentally changed the world. Several observations of the shift to digital are seen in our day-to-day lives. The power of this disruptive force is transforming every single industry. In particular, it is changing the business landscape, where the main opportunities for businesses are related to an enhancement or transformation of traditional business models and processes.
or to the discovery of new ways through which things are made. Businesses can grow in revenues, cut costs and find out new sources of revenue streams by leveraging opportunities to develop digital products and using predictive data and analytics to better understand customers’ behaviour and internal performances. Digital disruption has the potential to reshape marketplaces, upset incumbents and lead to large scale changes more rapidly than any other business trend.

**Research Design**

We structured our work according to the following Flowchart (Figure 0:1).

![Thesis Flowchart](image)

We started from the works that professor and Osservatorio Digital Innovation gave us. Papers and web research helped us in discovering new trends and models related to the sport industry leading to the development of our own model which describes how different actors involved in sports industry interact with Digital Sports Startups and in which Areas they can bring
innovation to the Sport Ecosystem. Additionally, the Literature Review aimed at finding relevant determinants for the success of a Digital Sport Startups. To answer every question emerged from the Literature review, enough data must be provided to our cause. A Database was built with the aim of categorizing as many Digital Sport Startups as possible. We built through the use of an excel sheet a well-descriptive Database with 988 startups from 2011 to 2016 categorized in 66 horizontal columns. Once the database was filled completely, we analysed it through the interaction of different voices. On one hand, a more descriptive statistical analysis was performed in Excel, in which different dimensions of the database were intertwined trying to understand the relation between each factor and how Startups’ peculiarities influence each other. On the other part, we decided to implement statistical inference and QCA, to deep investigate which might be potential relevant determinants and causality related to Startups’ success in the sport industry.

Lastly results of the analyses are the inputs for the final conclusions.

**Literature Review**

The aim of the Literature Review was to create awareness about the topic of analysis and thus, we conducted research steps throughout the utilization of search engine Google to reach this goal. Additionally, we could rely on initial materials given by Osservatorio DigitalSport of Politecnico di Milano, which resulted the main “pushing” element of our thesis. The literature review was divided into two main sections according to the research’s purposes:

- The first purpose identified was to deep investigate the role of digital sports startups in sport industry, that lead us to develop our own model, able to describe how different actors involved in sports industry interact with Digital Sports Startups. The Macro Categories model identified four broad Assets (Athlete/Team, Fan, Facilities, Brands), distributed in 4 main domains (The quadrants of the model) where digital innovation acts in the sport world, creating a sort of order in the sport environment concerning startups and innovation’s field. It identifies where the ecosystem finds benefits, which actors interact (Sport Clubs and Amateurs) and in which areas (Sport side or Business side), through startups’ offer. The model has been built through a deep analysis of the Literature, which describes the main application of digital technologies, the main trends adopted in the market and the Digital Sport Startups’ role in the sport industry. The
construction of the model was the fundamental input for the construction of the database and each further analysis.

- The second part of our literature review was based on the research of materials and papers about the critical factors that lead a startup to be successful. Several studies were conducted to identify Relevant Determinants used by the venture capitalists to evaluate whether a firm offer is good or not. Among these ones, we decided to follow the methodology of M. Kakati (Kakati, 2003) which studied five broad areas of interests that can lead to the identification of relevant determinants for High Tech new ventures:
  - Characteristics of the Entrepreneur: inside this category, “the New venture team composition” and “the Founder’s Background” are taken into consideration as potential relevant determinants.
  - Competitive Strategy: among four strategies that Kakati had identified, just a customization strategy resulted to be effectively important for the study of analysis.
  - Product Characteristics: the product characteristics did not appear to be important for the Author research, especially product uniqueness cannot be taken into consideration as significant factor, even though high-tech firms are used to boost their R&D department and their technological excellence.
  - Market Characteristics: As it happened with the Product Characteristics, even this category did not show a significant correlation with the initial success of a new venture. Out of seven criteria listed above, just two can be selected for their minimum contribution to the outcome of analysis: market growth rate and stimulating existing market.
  - Financial Considerations: financial aspects were not considered as critical success factors but the Author suggested to capture potential returns through the other criteria taken into consideration.

**Methods and Materials**

Methods and materials chapter was divided into two main parts:

- DATABASE: it describes the process of data gathering and it is the starting point for every analysis we relied on. We decided to collect data about Digital Sport Startups which followed 3 specific characteristics:
Date of foundation between 2011 and 2016.
- Last funding date after 2013.
- Startups related both to the Sport and Digital Area.

The whole process of identification was divided into three main parts according to different periods in which data were collected:
- From June to July 2017, 400 Digital Sport Startups were classified.
- From September to November 2017, we added to the original sample 326 Digital Sport Startups.
- From December to January 2017, we reached a total number of 988 Startups.

Several sources helped us in reaching our objective, whose information were intertwined to carry out a complete and representative analysis of the entire population. Among these one the most relevant were Universities/Osservatorio DigitalSport, Scientific Journals and Specialist and Operators Opinion. Data were collected from one main source which is represented by the Web Page “CrunchBase”.

- ANALYSIS: the aim of this section is to answer the questions that are at the basis of our work. We decided to split the analysis part into 3 main sections to reach a more complete and fully understandable view of the outcome of analysis:
  - Descriptive Analysis: it gives a general overview of how Digital Sport Startups bring innovation in the sport ecosystem. We concentrated firstly with on a Global Focus, introducing a general overview of Digital Sport Startups’ distribution in the World and then focusing the attention on North America, Europe and Italy. The main purpose is to highlight, when possible, whether there are differences between the place in which we live and the world in general. Then we developed a bipartite analysis focusing on the Club/Federation and the Amateur World, since from the analysis of the Literature Review we understood how they are two complete different contexts where Digital Sport Startups offer their product or service.
  - Statistical Inference: Logistic Regression is used to describe data and to explain the relationship between one dependent binary variable and one or more categorical, ordinal, interval or ratio-level independent variables. Regression coefficients provide information on how many units the dependent variable varies whether the independent one associated to that coefficient varies of 1 unit. First step we made was to split the analysis in two main parts: one sample related to 112 Digital Sport
Startups born in Europe and another one with 234 born in North America. The dependent variable must be dichotomous for both the models, thus the survival of Digital Sport Startup was used. To choose independent variables to use as input of the model we referred to the Literature review and thus we identified Founder’s background, Team composition, Competitive Strategy, Product Characteristics as potential relevant determinants for Digital Sport Startups’ Success.

- **Comparative Analysis:** QCA seeks for causality, necessary and sufficient conditions that can lead to the outcome. QCA makes possible analysing casual complexity through a deep study of INUS (Insufficient but Necessary parts of casual recipes which are themselves unnecessary but sufficient) conditions. What is important to remember is that there are likely several different combinations of factors that may result in an outcome. As it happened for the Logistic Regression Analysis, we decided to analyse two different samples to make our study more complete and precise: American and European Digital Sport Startups. The aim is to discover the similarities and differences regarding the geographical areas in which the startups were funded. After having analysed the QCA Literature review to better understand how to accomplish this analysis, we chose for both samples (European and American) 16 different Digital Sport Startups (8 opened and 8 closed) and 4 relevant determinants imported from the Logistic Regression Analysis (Economic Competences, Single/Multi Founder, Sport/Business side, Amateur/Professional).

**Main Results**

The main objectives of our Master Thesis’s work were the investigation of the contribution of Digital Sport Startups to Sport Industry through digital innovation, describing first of all, which are their characteristics, common traits and trends, and secondly, identifying the Relevant Determinants that lead to the success of a Digital Sport Startup.

The elaborate started with a meticulous review of the Literature that allowed us to understand the field of actions of Digital Sport Startups, detected as the major source of innovation of the industry. After having deeply analysed the main stakeholders as the main “players” involved and trends and digital technologies adopted in Sport Industry, we developed the Macro-Categories model. Then, we gathered the information needed to define the dimensions of
analysis and to structure a database for empirical evaluations. The final version of the database counts 988 Digital Sport Startups born between 2011 and 2016, each one catalogued along eight dimensions: Descriptive Characteristics, Beneficiaries, Technology, Incubators/Accelerators, Economic Dimension, Founders’ Background, The New Venture Team Compositions and Measure of Performance.

Based on the available data on the database, two different analyses were conducted whose results are the input for final conclusion:

- Descriptive Statistics: aimed at providing a general overview of the Startups’ contribution to the industry activities.
- Statistical Inference and Comparative Analysis: aimed at highlighting the relevant determinants that lead to the success of Digital Sport Startups.

It follows the report of the main findings of our work:

**Findings**

*Sport Industry Overview: The Leading Role of Athletic Performance and the Progress of Fan Experience*

According to Macro-Categories Model, four main assets involved in the implementation of digital innovation have been identified: Athlete/Team (on the Sport Side of the model), Fan, Facilities and Brands (on the Business Side of the model). Each one of these assets has been further divided in different categories according to the different segments within each field. Athlete/Team is the broader area, followed by Fan, Facilities and Brands. This data provides a specific information about the direction in which the entire industry is going. The leading position, characterized by solutions for the sport side, has been guided by 2 growing trends:

- The explosion of **wearable technologies** applied to the sport world and **applications** like Runtastic that are useful for users to monitor their performances during the physical activity.
- The powerful impact of **Fitness** (Figure 0:2), market with revenues for 24 billion of US dollars in North America and 26.3 billion of US dollars in Europe. **Platforms** in particular, help individual to practice sport even from home with tens of Digital Sport
Startups providing explanatory videos about how to make motions and different activities.

These two trends lead to an increase of active sportsmen of the potential market, resulting in an increase of revenues and interest of entrepreneurs and venture capitalists.

On the other side on the Macro-Categories Model we can find Fan Engagement as one of the main field of application for Digital Sport Startups: Fan Engagement is acquiring more and more importance and it is increasing the awareness of companies about that. The main reason that lies behind this increasing trend might rely on the explosions of the “Always connected” trend. This kind of sport customers rapidly adopt mobile technologies and platforms to keep them always connected with their preferred Teams and sports idols. Live news and contents to share, social media and communities, streaming platform used to watch matches when there is not the possibility to go to the Stadium, are examples of solutions that make Fans’ world easier and more interesting.
**North America: the driving region of innovation, and the positive influence of Fans**

North America has been demonstrated to be the driving region of digital innovation in the sport industry with 543 on 988 Digital Sport Startup born in this Context (Figure 0:3). This data does not surprise us since it is the leading region in funding applications per Startups.

![Figure 0:3 Startup per Continent](image)

A sufficient condition to be successful in the North American market was that more Entrepreneurs, where at least one possesses an Economic Background, decided to build a Digital Sport Startup that provides products and services for the Professional World on areas such as Fan Engagement, Brands and Facilities (Figure 0:4).
Between these categories the Fan Engagement is surely the most relevant one, since 206 on a total of 222 Digital Sport Startups born in the North American context and built for the Professional World on the Business side, are focused on it. This result was expected, since in the American Culture, Fans are more important than Athletes and Teams. In North America, Sport is considered as pure entertainment, where millions of Fans watch different sports on TV, go to the games hours beforehand to celebrate, eat at sports bars where they meet their friend to watch the game and bet on everything, from the Super Bowl to tennis matches. Sports managers pay attention not only on the match but also on the entertainment pre- and post-match. It is very common to organize concerts during halftime, recreational activities for fans and areas equipped just for families.

Sport, in this context, is seen as a Business, since North American Leagues are more likely to attract owners who think about Sport as a business investment and who rely on Fans as the perfect customers to attract with innovative experiences and technologies.

Europe: The Business of Sport and The Importance of Being Competitive in Championships

Europe is the second continent in terms of number of Digital Sport Startups (303), in particular in countries as like as France, Italy, Spain and United Kingdom. Results show a growing attention of Digital Sport Startups to the Business Side of Sports (Figure 0:5).
Fan Engagement in a region where Fans are passionate and follow their idols wherever they go, they usually take pride supporting their preferred club and are not afraid to show it. Now the match is played online through new digital touchpoint and new media, inside and outside of Smart Stadium, with new innovative solutions that better engage Fans and increase profits of Clubs/Federation and related Brands.

Next considering the Sport Assets, results lead us to give great relevance to solutions created for professional Athletes and Teams (Figure 0:6).
Clubs and Federations in Europe take good care of their Athletes since they were child. Talent Scouting starts from children from wherever, who, once discovered and selected, are then entered in the Top Club. In the European Context, Sport represents a mean to win at any cost. Most of the European Leagues are “Open Leagues” characterized by a promotion/relegation system. The worst teams in the League are relegated to a lower division at the end of the tournament, while the top Team in that lower division are promoted in order to replace the aforementioned teams in the higher division. Every team is pushed and motivated to do their best, even those one playing in the lower divisions. Thus, Digital Sport Startups which allow Clubs and Federations to improve the performances of their Athletes and Team can survive in the European Sport Ecosystem since Clubs are always looking for new ways that allow them to reach the Top.
**Italy: The Industrial Area and Growing Trends**

Italy shows an increasing willingness in developing Digital Innovation in the Sport Ecosystem through Startups, that reach his peak in 2015 with 15 Digital Sport Startups created on the Italian ground. Lombardy (Milan in Particular) is the region that invest more in the digital innovation in sport industry, followed by Lazio, Liguria and Trentino-Alto Adige. The north of Italy is the main Industrial Centre of the country and thus it might be reasonable this attendance of Startups in this part of the country (Figure 0:7).

Athlete/Team is the broader area with almost the 60% of Digital Sport Startups focused on it. This data provides a specific information about the direction in which the entire industry is going. It was highlighted how Italian Entrepreneurs prefer to develop innovative solutions to enhance Athletes performances in Football, the most important and viewed sport in this context, rather than creating customized products and services addressed to Fans. A result that is confirmed even by the Technologies’ utilizations since IoT Wearable (12) are more adopted than applications (6).
Founders’ Background and Team Composition

Logistic Regression and QCA confirmed what was discovered in the literature review about the importance of Founders’ background and Team composition in building a successful Startups. First of all, we have to say that just the Relevance of Economic Competences were searched and demonstrated in this research, since it was impossible for us collecting data about Technical skills developed by Entrepreneurs in the industry of reference, and thus ascertain whether a Digital Sport Startup’s Founder was a Professional Sportsman or not. Digital Sport Startups, born in Europe and which work on the Business side of Sport, show a higher probability to win in the Sport Ecosystem whether they are composed by teams and not by lone entrepreneur and whether among these individuals, it is present at least one with an economic background since it tends to enlarge the number of potential opportunities given by other markets. In North America the situation is more or less the same, but these variables are considered relevant just whether we are talking about the Business side of Sport and products and services are developed for the Professional World.

Explosion of Iot and the Importance of “Being always connected”

Information about technologies adopted in Sport Industry, which were discovered through the Literature Review, was confirmed through database’s descriptive statistics (Figure 0:8):

![Figure 0:8 Technology Distribution of Startups](image)
Platform is the technology more used, followed by Applications and IoT – Wearables. As regards Platforms and Applications, this data is might be linked to the “being always connected” trend that has shaped the Digital Innovation Revolution. This trend covers all areas of Sport Industry: from the interaction of fan with athletes considered as idols, to sportsmen passionate about fitness that prefer to watch workout videos from their home rather than going to the gym. The user wants always to be connected for not missing any update and entrepreneurs and innovators through these technologies can satisfy effectively this need.

Another important fact that has not to be unnoticed is the explosion of IoT – Wearables. This technology shows an increasing trend and confirms the very important role that plays in Sport Industry, where always more Amateur and Professional Athletes use these products to better monitor and enhance the Athletic Performances.

*Amateur and Professional*

Amateurs and Professionals are the major players in the sport ecosystem. They represent the two polarities of the first attribute used to build “The Macro-Categories Model”.

As regards the Professional world (Figure 0:9), the main assets to which Digital Sports Startups are addressed can be compared to the elements of the Porter’s Value Chain Model: the management of Athlete/Team, Fans and Brands represents the primary activities that lead to the generation of value for Clubs/Federation, whereas the management of the facilities can be considered as a Support Activity, that is secondary in the creation of value.
Regarding the Amateur World (Figure 0:10), two main actors are involved through the solutions offered to the Digital Sport Startups: The Amateur Athlete and the Amateur Club. On the sport side of “The Macro-Categories Model”, the Amateur Athlete is the only one to which products are offered, creating two sources of revenues for the Digital Sport Startups: through a freemium business model, relying on advertising and selling of data to external brands, and a premium version of the solution, which can include the purchasing of the application or the physical products (such as the wearable). On the business side, the amateur athlete is not the only one actor that can benefit from these products, since Amateur Clubs such as Gyms can increase revenues through products and services of Digital Sport Startups.
Looking at the geographical distribution, it was observed from data extracted from database that almost in every region, the percentage of Digital Sport Startups for the Professional World is higher than solutions directed to the Amateur World. The only one exception is Asia.

Concerning the Macro-Category distribution, it was observed that the products for the Amateurs are more focused on the Sport side rather than on the Business side, whereas on the Professional side the offers the fans exceed that one for the Athlete/Team.

About technologies, in the professional world the majority of Digital Sport Startups work with Platform as main technology. A result that might be explained by the fact that many platforms have been developed for improving the fan engagement (such as streaming platform). The same result for the Amateur side is justified since more solutions have been created for satisfying the need of events arrangements and training.

As regards the sport Distribution, for amateurs the solutions of Digital Sport Startups are more specialized on one sport with data highly affected by the fitness products. On the Professional Side Multi-Sport offers have a predominance to Single-Sport, since solutions addressed to Fan Engagement are aimed at reaching more people as possible, without differences in terms of sport.
1 Introduction

In the chapter, we are going to present a general overview about the sport industry and some preliminary information about the work of the Thesis. We will describe the reasons which conducted us to study Digital Sport Startup, the main objectives of our researches and the way through which we worked on the topic of analysis.

1.1 Background

We decided to divide the Background section into 3 main different parts:

- Sport Industry Overview: this section will show a description of the industry, the main Trends, Actors involved and a deep focus on the European Sport Ecosystem compared to the American one.
- Innovation: It will describe how Innovation will change the business world and affects society with a deep focus on the Digital side which will be one of the main Topic of the analysis.
- Startup: why Startups are needed? The section will demonstrate why a study about Startups could be relevant.

1.1.1 Sport Industry Overview

Sport industry is defined as the market in which the businesses and products offered to its buyers are sport related and may be goods, services, people, places or ideas. (West, 1999). The sport business industry consists of several different segments that includes sport tourism, sporting goods (manufacturing and retail), sports apparel, amateur participants sports, professional sports, recreation, high school and college athletics, outdoor sports, sport businesses such as sport marketing firms, the sport sponsorship industry, and sport government bodies.

It is one of the largest industries. The estimates on how big is this sector varies between $500 to $1300 billion (Sportyco, 2017).
The sports market is growing impressively (Figure 1:1). It contributes about 1 percent to the GDP of various countries and has been assessed that the sports market’s next five-year cycle will continue to grow (ATKearney, 2014).

![Figure 1:1 Sport Market Size](image)

The industry’s huge increases in the last years can mostly be attributed to the rise of televised broadcasting of sporting events over the last two decades. This has led to a rise in advertising and merchandising sales and brand sponsorship deals.

An important role in the sport sector, is played by different emerging markets. Asia, which has a relevant role in holding the last Olympic Game (Pyeongchang 2018) and even will organize the next two (Tokio 2020 and Beijing 2022), while Russia and Qatar will host the forthcoming FIFA World Cup (Lexology, 2017) South America is another region very important to the brand owners, since the area is still rife with opportunities. It continues to be a substantial and growing market for several sports-related goods and events. Lastly in Europe, even though many countries have already a mature sports market, the majority of countries on the continent still show demonstrable growth in sporting goods. Impressive is the growth of Central and Eastern European countries: they were the only countries to record annual growth rates for exports (above 10%). It can be stated that the total monetary value of trade of sporting goods has continued to grow.

Once defined the dimensions of the industry, we are going to describe the main actors that have a role in sport sector. Several stakeholders are present, characterized by heterogeneity and with
different objectives. A stakeholder in sport industry is defined as an individual or an organization whose attitudes and actions influence the success of a sports team, sports participant or an entire sport.

The main actors involved are (Linton, 2012):

- **Participants (Amateurs and Professionals):** represent the fundamental stakeholders in sports. They have a stake in the ability of clubs, teams and coaches to help them achieve their goals. The main aim of Sports organizations and governing bodies is to attract a great number of participants to their sport. Moreover, governments and health organizations recognize the social benefits of sport and also encourage participation.

- **Spectators (Fans):** the main objective of teams is to attract spectators to their games. Through them, teams are able to raise revenues in different ways (ticketing, program sales, merchandise…), influencing the financial success of sports teams.

- **Governing Bodies:** they are the subjects that regulate the activities of sports teams, participants and other stakeholders. They set and review rules of the championship, provide a regulatory framework through which teams and other organizations have to manage their organizations and also act as financial intermediary supporting the sport negotiating the media rights and attracting new sponsors and investors.

- **Financial Stakeholders:** it is fundamental for sports teams, governing bodies and participants to build relationships with financial stakeholders to attract revenues and funding.

- **Community:** it is fundamental for all the subjects involved in sports industry to build a strong relationship with the community. These relationships are enforced through news to media, events to attract families, schools and participants and community projects.

But Sport is not the same in every Continent. There could be huge difference in Culture, types of Sports, Rules and Leagues organization among different Continents which are useful to be known. We decided to provide with the following section, a parallel between two Continents that showed the main number of differences among the ones we checked.
NORTH AMERICA VS EUROPE

There are several differences between the North American Sport System and the European one. It is not as simple as North American Sports clubs representing franchises which are “all about money” and which sell out their fans, nor that European clubs have a tribal following. It is more than that (Kralyevic, 2017):

1. Open Vs Closed Leagues: Open Leagues refers to many Europeans tournaments have a promotion/relegation system. The worst teams in the League are relegated to a lower division while the top teams in such lower division are promoted in the higher division. Thus, Clubs want to acquire the best players to reach sports success. Closed Leagues, the American ones, on the other hand, provide the clubs and investors with the certainty to be part of the league. Additionally, it also ensures clubs more stability as it is easier for them estimate revenues and expenses.

2. Competitive Balance Rules: North American Sports leagues place several rules on clubs, creating a better competitive balance where many different teams have a realistic opportunity to win the championship. One of the main important rule is related with the Salary Cap, which limits the amount of money clubs can spend on wages. Here the level of competitiveness is definitely higher than the European one and Leagues are the primary actors that can benefit from this, since the uncertainty of the Tournament contribute to create a better product, more and more attractive and saleable.

3. Ownership/Governance: In the European Leagues, clubs are just members of the Leagues and had no ownership rights over the League. In the North American context instead, the owner of the club is also the owner of the League.

4. Team Valuation: an investor looking at a north American club shows less risk of the club collapsing financially since for instance the club is unlikely to be relegated and so sporting results will have less impact on his finances. Additionally, Salary cap ensures that an unexpected wage cost inflation will be minimal. Looking at the European Club, the situation is the opposite.

5. Owner Objective: North American Leagues are more likely to attract owners who think about sport as a business investment while in Europe, Clubs have the fans and the community as the main stakeholders and so their main goal is to win on sporting results.
Thus, Owners wants to reach the top of the championships and need to be personally motivated to achieve sporting success rather than financial one.

6. Education System: Another peculiarity that we can notice in the American Sport System is related with the Educational Role of the universities. University represents the starting point for Athletes, an environment that can train and educate about the sport they prefer. In Europe, Universities don’t surely have a primary role in the education of future Athletes but Clubs and Federations take good care of their Athletes since they were child (Ongaro, 2014).

7. Many Sport Vs Football: In Europe everybody knows that Football is the king, while in America many other sports are watched by thousands of fans as well, such as Golf, Hockey, American Football (Bermudez, 2015).

8. Fans: in America, Millions of Fans watch different sports on TV, go to the games hours beforehand to celebrate, eat at sports bars where they meet their friend to watch the game and bet on everything, from the Super Bowl to tennis matches. Sports managers pay attention not only on the match but also on the entertainment pre- and post-match. It is very common to organize concerts during halftime, recreational activities for fans and areas just for families (Sottile, 2016). On the hand, In Europe Fans are passionate and would follow their team wherever just to support it. They usually take pride supporting their club and are not afraid to show it. In America people get exited whether their team win and get upset when it loses a game, but not with the same passion and intensity that is present in Europe (Fynbo, 2015).

Summarizing, we can say that in the American Culture, Sport represents an investment to reach new revenue stream and good profits, while in the European Culture, it is considered as a mean to win at any cost where Fans and communities bring more profits just whether the Club will succeed.

1.1.2 Innovation

We hear the word “Innovation” everywhere and we have been all convinced of how much it is important. But what does Innovation mean? Many of us associate this concept to the creation of ideas out of the box, leading to disruptive products and discoveries. However, it is more than
that. Thus, before trying to evaluate why Innovation is so important for every industry, we need to decide on a definition. Damanpour (1996) provides a detailed definition of innovation (Baregheh, Rowley, & Sambrook, 2009):

“Innovation is conceived as a means of changing an organization, either as a response to changes in the external environment or as a pre-emptive action to influence the environment. Hence, innovation is here broadly defined to encompass a range of types, including new product or service, new process technology, new organization structure or administrative systems, or new plans or program pertaining to organization members.”

From this definition we can understand that innovation is not only about new ideas transforming into new product, but also about new processes and ways to do things that can be referred to products, services, strategies, processes and people.

As industry environments become more dynamic, interest in innovation, its process and management has increased. Organizations need to innovate because of customers changing needs, demands and lifestyles to capitalize on opportunities offered by the market and by new technologies (Baregheh, Rowley, & Sambrook, 2009). In the business world, an innovative idea could be useful whether it is replicable without being too much expensive and it solves a particular need. Innovation is created through something original to produce efficiency or effectiveness with an idea that will affect the general industry (Forbes, 2017).

Innovation is a the most important factor in the economic growth and performance in the globalized economy. It brings new technologies and products that help to solve global challenges, new ways of producing goods and delivering services by boosting productivity, it creates jobs and can improves citizens’ quality of life. Innovation is the beating heart of the twenty-first century economy. Competitive advantage, growth for firms, industries and countries are generated by the capacity and ability of a firm to create economic added value. The question now is about how to diffuse and sustain innovation to achieve an increased society wealth and standards of living (Gerguri & Ramadani, 2010).

Innovations importance can be explained from several reasons:

- From customer perspective, innovation is products with better quality and better services, which means a better way of life.
➢ From the business perspective, innovation means sustainable growth and development, realization of great profit.

➢ From the employees’ perspective, innovation means new and more interesting job, which requires more skills and knowledge, resulting in higher salaries.

➢ From the whole Economy perspective, innovation represents a bigger productivity and prosperity for all.

What is to remember is that innovation doesn’t have to be the next Facebook or Google. CIO Magazine in one of its articles called “What really makes something innovative?” states that sometimes are the quite achievers that can disrupt an industry and can have more impact than big companies that usually makes front-page news. (Forbes, 2017).

**DIGITAL**

Digital innovation can be defined as the application of new technologies to existing business problems or practices (Hargan, 2016).

The advent of digital technologies has fundamentally changed the world. Several observations of the shift to digital are seen in our day-to-day lives. The power of this disruptive force is transforming every single industry.

First of all, it is changing the business landscape at high speed. The main opportunities for business are: to enhance traditional business models and processes with digital technologies, to transform existing business models and process or to invent new ways of engagement models or business models.

To remain competitive in the digital age, organizations have to consider themselves as technology business. Leveraging opportunities to develop digital products and using predictive data and analytics to better understand customers’ behaviour and internal performance, businesses can grow revenues, cut costs and find out new sources of revenue streams with new digital capabilities.

According to PwC (Figure 1:2), mobile technologies, data capabilities and cybersecurity are the most important digital technologies for CEOs (PricewaterhouseCoopers, 2015).
Digital disruption has the potential to reshape marketplaces, upset incumbents and lead to large scale changes more rapidly than any other business trend (Cisco, 2015).

Also sport industry has been transformed by Digital Revolution in the recent years. For instance, practical examples regard the stadium fan experience. In the past, fans used to buy tickets just in the point of sales and to watch matches without connections with the rest of the world. Now things are different, since according to Modis’s study, 68% of fans buy tickets through online channels and more than 70% of spectators bring smartphone to the arena to use it for sport-related apps or to share the moments and emotions with their followers on social networks.

Big clubs and players of sports world use digital solutions to better manage their business and to improve the performances of the athletes (e.g. Wyscout and Skillgo).

An important subject that can bring innovation in Sport Industry through the use of digital technologies are Startups: differently to established companies, they do not have to face with an existing value chain, but they can create their own value from the very beginning. Thanks to their nature, they can focus their attention on creating more value for the customer based on digital technology.

Figure 1.2 Digital Technologies Trends
1.1.3 Startups

Steve Blank, a Startup guru, defined a Startup as a temporary organization designed to search for a repeatable and scalable business model and differ from a small business since it runs according to fixed business model. Startups are focused on an idea. They navigate through so many difficulties to find a way for success, overcoming every impossible barrier they find in their way. (Renderforest, 2017). Startups and thus new entrepreneurs are the fuel of the economic growth, since they create businesses, new businesses create jobs, strengthen market competition and increase productivity. (Sappin, 2016). But creating a new Startup is more than that, since an entrepreneur is able to:

- Creates products and service people need: according to traditional model entrepreneur develop new businesses in response to unsatisfied needs and demands in a certain market, which will be an opportunity to provide something that is not currently in existence.
- Provides employment opportunities: new businesses need to create jobs opportunity, which support communities through increasing the quality of life and the whole standards of living.
- Provides Commerce and regional economic integration: new businesses can export goods and services to nearby regions, contributing directly to a region’s productivity and earnings, with a related increase of the overall welfare of a population
- Promotes efficiency through New technologies: economic growth is driven by new technologies and by their applications to products or services.
- Addresses environmental challenges: innovation is really important when it addresses the huge environmental challenges we face today. We cannot live without water, thus irrigation technologies for instance increase productivity and economic development
- Impacts socio-economic objectives: new startups create efficiency and conserve resources. For instance, innovation in agriculture is relevant for addressing socioeconomic challenges.
- Creates innovation where there is competition: innovation creates a positive feedback loop.
But building a new startup and starting from scratch with a new business is not so easy. According to Forbes 9 out of ten startups fail (Forbes, 2015). A first reason could be that entrepreneurs have the tendency to drastically underestimate what actually means building a successful Startup. Entrepreneurs creates a product or a service form nothing, and this will take work and a lot of time. Culture and environment might influence the whole process since not everyone is Silicon Valley. Lot of startups do the right things but maybe the environment stifles the its growth. There might be thousands of reasons why startups fail, it will be difficult for entrepreneurs in every case. Create a startup is hard even if it is successful. The only way to ensure its success is to care more about the Startup than anyone else in order to take the right decision from the beginning (Shikati, 2017).

But even if lots of Startups fail, the trend worldwide is continuously increasing. Nothing will stop them to open and try to reach success. Innmind selected relevant information (2016) from The Global Entrepreneurship Monitor (GEM) consortium and showed how Startups Trend is increasing. There are 472ML entrepreneurs worldwide, 1.35ML of tech Startups and 100ML Startups Opening each year (Innmind, 2016). Forbes, (2017), reported that in 2015 number of funding applications submitted by startups has doubled and in the first half of 2016 more than 21% applications were submitted than in the second half of 2015: it can be observed an increasing trend in growth of startups worldwide.

In particular, if we want to search the most fertile environment where Startups can grow, we can refer to data analyzed by Gust platform (Gust, 2016), which showed how USA remains the leader in total funding applications with more than 50% of solutions that received funding: this means that is the ground more fertile for startups to develop. Also, other countries continue to show strong growth: France (4.3%), India (8.2%), Canada (4.6%) and the United Kingdom (5.1%) continue to generate higher volumes of funding applications.

1.2 Objective of The Research

Once understood why this topic could be relevant to pursue and which are the main possibilities and opportunities given by Innovation, the objective of the research has been defined. In light of what has been mentioned above, we decided to divide the whole research in two main section respectively involving two different but correlated fields of the topic of analysis. First of all, it might be interesting to describe, show and summarize relevant insights about Digital Sport
Startups, such as where they find the best environment to innovate, which field of application is chosen, which product or service is offered, who is it for and which digital technologies it relies on. The main aim was to evaluate how Digital Sport Startups support and create opportunities for the entire Sport Ecosystem, where they lie respectively compared to Big Players already present in this broad market and how they help them in achieving better results and performances in different areas. Given these areas of interest the first Research Question we generated is the following:

**RQ1: Which is the contribution of Digital Sport Startups in the Sport Ecosystem?**

Thereafter, since from the Introduction part we understood that building a Startup and succeed in a consolidated market full of sharks is not so easy. Media usually enhance entrepreneurship, showing it like a walk in the park. This has resulted in making entrepreneurs too much shallow underestimating what actually means building a successful startup. Forbes in 2015 reported that 9 out of ten Startups will fail (Forbes, 2015). What might be interesting is to understand why it happens, why so many startups fail in achieving their objectives and why some of them are instead able to succeed. It might be useful find some key traits of a winning startups to provide relevant information to new entrepreneurs that are going to make a run into this particular world and share insights with them on how to face it. Customers segment identified, Business Strategy adopted, product or service offered, different contexts, individual characteristics of the Entrepreneur, are all variables that might interfere with the creation of a successful Startup. What could be important is even the industry where new entrepreneurs are going to work. A new successful Automotive venture for instance can rely on some factors, considered more important than others, which might differ completely to what is considered relevant for the Food Industry. Thus, according to what we have just mentioned, the Second Research Question we decided to create is the following:

**QR2: Which are the Relevant Determinant that lead a Digital Sport Startup to be successful?**
1.3 Research Design

We structured our work according to the following Flowchart (Figure 1:3).

Our logical process started with the chapter of Introduction where we explained to the readers the importance of the Sport Industry compared to others and why Digital Sport Startups are the main mean for providing innovation. We identified the objectives of our work and the questions we want to answer at the end of our path.

The aim of our Literature Review was to deeply analyse the innovation that Digital Sports Startups led in Sports world, focusing in detail on different aspects related to their world:

- Geographical Dispersion.
- Year Trend.
- Product offered.
➢ Sport subdivision.
➢ Category distribution.

We started from the works that professor and Osservatorio Digital Innovation gave us. Papers and web research helped us in discovering new trends and models related to the sport industry leading to develop our own model. A positioning map was built, after having identified two main distinction characterizing the Sport Ecosystem: one polarity which considers Digital Sport Startups’ Users, professional and amateur world, and the other related to their main application field, the sport and business side. To fill every quadrant of the Map, we merged the knowledge acquired during months about the sport industry and its relationship with Digital Sport Startups. For sake of simplicity, we decided to split the model and analyse Professional and Amateur World into two different parts, since it is of the opinion that they are so different contexts. Additionally, the Literature Review aimed at finding relevant determinants for the success of a Digital Sport Startups. Several studies were conducted about this topic but generally referred to high-tech new venture. Our main purpose was to check and discover which relevant determinants might be also applicable to our topic of analysis, focusing on causality, sufficient and necessary conditions.

To answer every question emerged from the Literature review, enough data must be provided to our cause. A Database was built with the aim of categorizing as many Digital Sport Startups as possible. First of all, several variables were selected according on one hand to findings from the Literature review such as new technologies, trends, the importance of the founder, social media, funding and on the other from logical mental processes such as geographical area, date of foundation, description of their mission. We built through the use of an excel sheet a well-descriptive Database with 988 startups from 2011 to 2016 categorized in 66 horizontal columns. Great effort was spent on working on a database, since the number of Startups analysed were more than 2000 taken by different specialized websites (Crunchbase, Techrunch, Angel, Starters) and searched thanks to relevant keywords. Importing right startups in the final Database was fundamental in our analysis since just Digital Sport Startups were to be selected. High tech Sport new ventures, non-sport new digital ventures and every Startups born and which presented the last funding date before 2013, were eliminated.

Once the database was filled completely, we analysed it through the interaction of different voices. On one hand, a more descriptive statistical analysis was performed in Excel, in which
different dimensions of the database were intertwined trying to understand the relation between each factor and how Startups’ peculiarities influence each other. On the other part we decided to implement statistical inference and QCA, to deep investigate which might be potential relevant determinants and causality related to Startups’ success in the sport industry.

The first step made during this phase was to identify the key performance (Y axis) to use for the model. Since Economic Dimensions were difficult to be provided for every single Startup, we decided to rely on a dichotomous variable such as the survival of a Digital Sport Startup:

- \( Y = 1 \): the Startup is still alive.
- \( Y = 0 \): the Startup is already dead.

Once understood which were the potential relevant determinants from the Literature review and selected from the 66 columns, selected the key performance to be used, we were ready to perform a logistic regression through SPSS Software. Moreover, a Qualitative Comparative Analysis was conducted to better understand necessary and sufficient condition that might lead a firm to be successful or not in the sport industry. Each of these analyses were performed by taking into account two different contexts: American and European Startups.

Lastly results of the analyses are the inputs for the final conclusions.


2 Literature Review: Digital Sports Startups

Our Literature Review work started understanding the general Sports Ecosystem and how the innovation created by Digital Sport Startups can influence it. The first input was given by Osservatorio DigitalSport of Politecnico di Milano that provided us past materials and papers about digital innovation in sport industry. These first materials were the fundamental input for our thesis as researches of information on web sites. The first purpose identified was to develop our own model, able to describe how different actors involved in sports industry interact with Digital Sports Startups.

We identified how the general sports ecosystem works and which are the main stakeholders proactively involved in this world through a model proposed by Deloitte consulting company, highlighting only players having a major role in the Sport Ecosystem. We discovered the first polarity that represents the first axis of our model: professional world and amateur world. On the other hand, after studying all trends and technologies adopted by sports industry and startups, we recognised the second attribute of our model: sports side and business side.

Once developed our model, we fulfilled its quadrants with the main Macro-categories interested by the Startups’ innovation.

The second part of our literature review was based on the research of materials and papers about the critical factors that lead a Startup to be successful. We examined scientific literature contents published through the use of Scopus and Google Scholar, focusing our attention on the following filters:

- High Tech Venture Firms.
- Founders Background.
- Key Success Factors Startups

The aim was to create a cluster of articles coherent with the purpose of our study. Thus, we eliminated from the initial group of papers articles too generic or not related to startups and we saved only those one concerning critical factors describing Startups’ success, paying attention on going in the right direction of the analysis.

At the end we have collected sufficient materials to organise the Literature Review analysis in its 2 main parts:
2.1 Construction of The Model

The aim of the chapter is to deeply investigate the role of Digital Sports Startups in the Sport Industry. The purpose was to identify a new ecosystem of analysis created by the interaction of startups with consumers and companies, specifying how new sources of revenue are generated in that ecosystem are built. To achieve this goal, we decided to implement a deductive approach, the Positioning Map (Figure 2:1), which is a tool for positioning analysis. Kotler (Achrol & Kotler, 1999) defined Positioning as the act of “drawing” the firm’s offer and image in a way to be set in a precise position in the target consumers’ mind.

The main purposes of the analysis are to generate positioning options, assessing current positioning, to understand consumers’ preferences and perceptions among the factors taken into account, and lastly to find “free space” in the market (Wind, 1988). The matrix helped us in

![Positioning Map](image-url)
understating Digital Sport Startups landscape on the basis of their positioning, developing four main different Domains where they compete through the use of an innovative digital service or product. The most critical part of the process was to generate the positioning criteria defined by us as polarities, which are represented on the x and y axis. They should measure the bundle of current and expected benefits sought by the target segment and on which the given product is likely to be differentiated from its competition (Wind, 1988).

To figure out criteria and build the Map, we decided to follow this scheme:

2.1.1. How: we investigated a general model of how the sport ecosystem is built in terms of stakeholders linked through common interests and needs. This model is based on a centric functional Fan based vision.

2.1.2. Who: the first step to build the positioning map and to acquire a clear understanding of the Ecosystem, was to determine who were the real customer of our topic of analysis. In this direction we decided to adopt a change of perspective going from a centric Fan perspective to a Club/Federation focused one, since we considered it the main beneficiaries of the Sport Ecosystem. We considered this dimension as critical for startups ‘offer and so it could be defined as the first Attribute of the Perception Map concerning the sport ecosystem. It is related to a huge division in the sport world: The Professional and the Amateur side. The aim was to describe how Digital Sports Startups linked together the main stakeholders identified in the “How” section with the Professional Clubs/Federations and the Amateur world to which startups ‘idea was directed and which are the main beneficiaries of the startups ‘work.

2.1.3. What: The second step aims at identifying which characteristics of the product are determinants for customers. Startup’s offer includes several number of innovative digital technologies developed for the purpose to serve the sport industry. Once understood which are the key technology trends in the sports market, we noticed that Digital Sport Startups ‘offer is focused mainly either on the Sport Side or on the Business side of their main beneficiaries. We shifted here from a stakeholder-based view to an Asset related one, since we noticed from literature that Digital Sport Startups provided services not only for Club/Federation’s Stakeholder, but also for its facilities. We determined here the second Attribute that we need to take into account in our matrix.

Once identified startups as one of the main actors involved in the process of innovation for the sport industry, we investigated the main critical factors that influence their performance.
2.1.1 How

According to Conserve Energy Future, an Ecosystem is related to the way through which all different organisms live in close proximity to each other and how they interact with each other. We can represent it as a broad sector in which many companies serve different part of the value chain. Our aim is to determine how startups became the beating heart of this interactive system, showing how they can produce benefits like no one else has ever done.

It has already been described how sports industry is growing at a remarkable pace. New players want to have a major role in the sport ecosystem driving this growth and enlarging the potential offer of the entire market. The aim of an increased number of actors is to create the next innovation solution to beat competitors, acquire new customers and generate more fun (Deloitte, 2017).

It was essential to conduct an investigation about how different players in the sport ecosystem interact and compete, analyzing how startups place themselves to create new needs and opportunities for both companies and customers through innovation usage and unthinkable opportunities discovery.

Deloitte (2017), a sport business consulting company, studied the topic of analysis, building a framework explaining how sport ecosystem works and which are the main stakeholders involved: “when reviewing the sports market ecosystem five primary stakeholders can be identified” (Figure 2:2).
Fans
Fans are the center of the world, “citizens” of the sport ecosystem, devoted to a particular athlete or team. They have the most important role by creating new opportunities with their growing needs and interest in the field, often attending sports events in stadiums, watching them on television and following news on social media and newspapers. They are the primary source of revenues for all the other stakeholders around which the entire world turns (Deloitte, 2017). Dedicated fans of football, volleyball, golf, basketball, and other games are waiting for innovative technologies and easier ways to follow their “heroes” to better satisfy their sports wishes. What is essential for the ecosystem is to know how to reach them.

Team/Athlete
Athletes need to possess the required strength and ability for success in sports, which can be achieved just spending hours, days, years working on techniques and tactics. They can be grouped or not in a team according to the sport take into consideration and face challenges every day. Team sports, such as football, volleyball and hockey require that energy has to be focused on 3 main aspects:
➢ Training of the individual athlete.
➢ A better management of the team (e.g. schedule of activities).
➢ Performance measurement after matches.

To support these activities athletes must have a clear understand of how their body works and how it can be influenced by the usage and help of new technology.

The Club, League
Clubs are formed by a sport side controlling professional players which compete in a competitive environment against other teams and by a business side mainly focused on large crowds of paying spectators, sponsoring contracts, team merchandising, media rights and management of club ‘s facilities which are their primary sources of revenues. Athletes, having the same technical level, compete in the same League individually or in team representing the sports club and sharing the same club fan base and facilities.

The Sponsor
Sponsors often relate with SME or large enterprise to set up successful and smart partnership and to create an emotional link between fans and their “heroes” (Deloitte,2017). Through social brand messages, client relationship management, advertising campaigns and platforms built for fan engagement, sponsor acquire higher visibility in the sport world. Sponsorship is one of the most efficient method to promote brands and products thanks to a strong passion inspired by sport (Infront Sports & Media AG, 2017).

Media
Media are used to promote sport content and attract thousands of viewers when an event occurred. In this era of industry revolution Media company can leverage also on alternative platforms (websites and apps) to stream sports events, enlarging their customer base and allowing to broadcast, host, monetize and analyze video content (Decast, 2017).
2.1.2 Who

Given the model described in the previous phase, we decided to adopt a change of perspective in terms of players having a major role in the sport ecosystem. Which actors can reach mainly benefits from startups ‘new disruptive ideas? To answer this question and move forward we have firstly to take a step back, introducing two different worlds involved in the topic of analysis:

**Professional world**

Professional athletes are typically paid for their performance and take seriously their obligations considering their activities as a full-time job (Foster, O'Reilly, & Dávila, 2016). They never stop compete on weekends and even on holidays. Intense competition, a life on the road and grueling practice are the main differences between a professional and amateur standpoint (Morgan Rush, 2017). In this category we can include athletes playing in teams (such as football, volleyball, basketball) and individual athletes (such as golf, running, swimming).

**Amateur World**

Amateur athletes might play football, basketball or run just for fun, combining teams with friends, whenever they want and not mandatory repeated in a precise timely manner. They refer to context where athletes do not receive a financial compensation, focus on personal health and enjoyment rather than winning the game (Foster et al., 2016). In the amateur world, participation is enough, they choose to play and think about sport just as an activity (Morgan Rush, 2017).

Between these two polarities there could be a middle ground where many players of the sport ecosystem are paid while athletes play just for fun. A clear example of this category is represented by several US college, characterized on one hand by many aspects for which they can be considered as professional contests (such as paid coaches, media contracts, stadium facilities), and on the other by Amateur Athletes not paid for their activities (Foster et al., 2016). In the process of analysis, we decided to bundle this last category with the Amateur Category. It was identified the first Attribute used to build the first axis of the Positioning Map concerning the sport ecosystem. Professional and amateur world are two sides of the same coin and startups
use that coin to reach success in the market. Given this distinction, we can now determine how startups support the sport industry in terms of benefits and added values. Thanks to the growing number of Digital Sport Startups, **Sport Clubs and Federations**, the main subjects in the professional world, can achieve new sources of revenue stream. Startups help them to facilitate and optimize relations with several number of stakeholders (Fans, Athletes, Sponsors) As regards Amateur world, the respective of Sports Club is an Amateur Club which can be represented by fitness centers (gyms), amateur football, tennis or volleyball clubs. But they are not the main beneficiaries of that side of the Map. If we consider startups offering wearable for amateurs’ training or app designed to track running activities, we can safely say that they are completely unrelated with Amateur clubs. Digital Sport Startups provide services for **Amateur Athletes**, providing them benefits in terms of performance enhancement, higher healthy lifestyle and facilitation of the workout activities. They are those who can gain added value from Startups’ work more than others.

The positioning approach underlined the user as target customer and suggests that a startup is the perfect solution for that kind of “world”.

### 2.1.3 What

Digital sport startups born through the development of a wide range of technologies. They work as enablers allowing a complete revolution of the sector in every aspect and area. Six different technologies are the most critical to take into account, since they show the most relevant increasing trends:

- **Internet of things** is global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies (Global Standards initiative, 2012). The number of connected wearable devices is suspected to grow from 325 million of 2016 to 929 million in 2021 (Statista, 2016).

- **Cameras** allow to observe the identity of an object with an IoT device through different positions while gathering relevant information (Bridgewater, 2016). It is expected that wearable camera unit shipments worldwide will increase from 13.57 million of 2016 to 23.13 million of 2022 (Statista, 2016).
- Virtual Reality technology facilitate the creation of real-life simulation creating an immersive experience for any customers. Users feel as they are actually interacting with their digital environment (Augment, 2016). The market will increase from 6.1 billion of US dollars of 2016 to 215 billion of US dollars in 202 (Statista, 2016).
- Augmented Reality is a related technology for enhancing visualization. AR provides a live direct or indirect view of a physical real-world environment whose elements are augmented by virtual computer-generated imagery. The user is grounded in the real physical world, and the virtual images are merged with the real view to create the augmented display. (Grier et al., 2012) This technology is expected to have more than 1 billion users by 2020. Right now, more than 542 start-ups are listed under this category on Angelist (Seaberbat, 2018).
- Platforms and Apps are mainly used to gather the huge amount of data provided by IoT devices or Cameras, but also to facilitate companies’ management of facilities and stakeholders. This technology will continue to grow as the number of smartphone: from the 1.57 billion users in 2014 to 2.87 billion in 2020 (Statista, 2016).

New Technologies arise several trends in the sport industry (Deloitte, 2017). We decided to show how these trends work with a brief description and then some statistics are displayed to ensure their importance globally:

- **Data and Analytics**
  Data analytics is the process of examine large sets of structured and unstructured data in order to get insights about a certain topic and enabling companies to answer complex business questions. Data and analytics are typically focused on the sport side of a Club, helping them in facilitate activities as talent scouting and players development, but this conversation omits the all business side of a team or Federation. One of the most significant trend in sports is the proliferation of the usage of big data on Clubs ’business operations. Having the best football team is critically important, but that’s not all, since a Sport Club must also have a good understand of who are its Fans and how to better reach them. Business functions, such as marketing, sales or even the R&D department are looking for new ways to use this large set of data to improve their performance and
operations. The total global market for sports analytics is expected to grow from 120 million of US dollars of 2016 to the 615 million of dollars by 2021.

➢ **The evolution of Sport Media**

The sport media world is growing rapidly and offers new opportunities for several market players in terms of who creates contents. The market is characterized by the evolution of over the top platforms (OTT), delivering sport tv content via the internet, without requiring users to subscribe to satellite pay-tv service. Fans shift from cable to digital media, using those platforms to follow their favorite team each weekend. The ownership of unique content is a key differentiator between companies. According to PwC report of 2017, Sport Media rights are expected to grow from 19.1 billion of US dollars of 2017 to 22.7 billion of US dollars of 2022 (Crupi, 2017).

➢ **Wearables and Performance Enhancement**

Wearables are small electronic devices incorporated in items that the athlete can worn or attached to different parts of his body (An et al., 2017; Ramsborg, 2008). They allow athletes’ and amateur enthusiasts to track and capture data about various performances, providing detailed insights about how their body is working under pressure, including movement, heart rate and respiration. In the professional world wearable technologies not only enable coaches and trainers to analyze previously unquantifiable aspects of athletic performance in detail but also, they can be used to track Athletes’ diet, sleeping hours and their life out of the filed. The market of wearables is expected to grow from 14 billion of US dollars to 34.2 billion by 2020 (Delta2020, 2016). This data is surely made possible even by the increasing trend of Fitness. Euroactive and Deloitte (FitnessTrend, 2017) touched this point and showed how Europe confirmed and enhance its dominant position worldwide in terms of participants in a Club (56.4M at the end of 2016). Europe continues to be the World’s largest fitness and health market, with €26.3bn in 2016, compared to the €23.3bn of the USA in 2015. A first reasoning is the impact of the low-cost fitness sector which is one of the fastest growing sector, sign that in Europe there is the tendency to be fit and healthy but training in gyms at relatively Low Costs. But premium and upper mid-market operators such as Migros Group and Nuffield Health continues to work to better engage their customers with acquisitions. This shows a growing polarisation between the low-cost segment and premium operators (Hollasch, 2017).
The Stadium of the Future

The stadium of the future will be innovative and technologically advanced. Stadium competes for the engagement and enlargement of the fan perspective and must reinvent itself through new experiences, challenging fans to get off from their comfort zone sitting on their couch at home. Smart stadiums increase profitability, enhance the fan experience and improve stadium security (Intel, 2014). Companies need to find new way to fill the stadium and push customers to spend more, since they need to compete also against an innovative home experience. In addition, Teams continue to search for new ways to create new fan experience also beyond the stadium wall, forming partnership with already popular services as Uber and Amazon Prime, seeking for new sources of revenue stream. The smart arena market is expected to grow from 4.62 billion of US dollars in 2016 to 17.32 billion of dollars by 2021 and Europe will be the driving force in this field (Securityworldmarket, 2016).

Fan Engagement

Fan engagement is the heart of the sport industry, which has been revolutionized by the usage of social media and new technology used to approach fans in several different ways. It is about giving customers what they want, when they want in the most personalized way as possible. European Fans, as we have already said are really passionate about Sport and demonstrate it with huge numbers: IQUII Sport (2018) through a recent report called “The European Football Club” talked about Sport industry 4.0, where Football is the driving force of the context. Through data driven strategies, more and more customized, Clubs and Brands are aimed at improving sport results and increasing profits. Analysing the first 5 major Leagues in European Football, we can count 204 Clubs, 34 tech Brands and 1.2 Billion of Fans, increased by +0.98% compared to the first of February 2018 (Data entry: 01/03/2018). Premier League counts 387.8M of supporters (Southampton +8.55% and Tottenham +6.96%) where a Brand such as Nike is able to attract 129.4M of them. On the other side of the Ocean, more than 100 million American Fans tune to watch the Super Bowl each year (Demographicpartitions, 2017). Two disruptive technologies help company in fan engagement:

- Social media enables fans to create communities where they can share opinions, positive and negative comments about their favorite Team and in some case even interact with their favorite athletes. Now the match is played online through new
digital touchpoint and new media to better engage Fans. Facebook is used to entertain, Twitter to inform Fans with relevant information about events and matches (The NBA finals produces more than 26 Million of tweets each year), Instagram for exclusive contents. And what about You Tube? Sampdoria in Italy is collaborating with an Italian E-gamer (Mattia Guarracino) with the aim of increasing their views on You Tube and thus to enlarge their Fan Base.

- Fantasy sports are games in which Fans enthusiasts manage virtually their own “fantasy” team built with profiles of real sports athletes. Participants compete against other teams each weekend following the real season of the League. They earn points based on athletes’ performances in professional matches.

➤ **New Sponsorship Assets**

Sponsors seek for new technological ways for reaching customers through more direct means, which allow them to really comprehend their customers and create personalized campaigns to communicate with customer at an emotional level, with new content driven engagement opportunities. Trends like the growing social media usage and fans’ obsession for sport personalities (like Lionel Messi and Alessandro Del Piero), which today act as social influencers to arise their popularity, are key vehicles for Sponsors to achieve higher level of popularity and create new commercial opportunities. Sponsorship trend is increasing. Nike, ESPN and Adidas are the most valuable Sport Business Brand Worldwide in 2017 (Nike reached a brand value of 29.6 Billion Dollar in 2017) (Statista, 2017).

➤ **E-Gaming**

E-Gaming was born just as playing videogames became so important to be considered as a Sport. As in football, volleyball or tennis, participants play individually or in team, training together and competing during professional tournaments. There are also Fans of gamers, who watch matches of their favorite teams and attend huge events. As eSports continues to grow, new commercial opportunities will emerge and scale for top gamers and companies. The market of E-Gaming is expected to generate revenues of about 325 million of US dollars this year and are forecasted to 1 billion of dollars by 2019.
Once identified the technology trends, which continue to evolve and expand the sport landscape, and after having understood clearly how the sport ecosystem works, we can safely say that the sport industry is not just about Athletes and Teams competing in major Leagues, but also about **Business:**

- It has a product to be sold like game tickets, merchandise, broadcast rights and online and media content.
- It has customers, enthusiastic and casual fans which follow the Team not only during events on weekend, but also during the week with newspapers, social media and teams’ websites.
- It has sponsors which leverage on the fans’ obsession to the favorite Club.

Working in the sport industry means develop knowledge and skills in area such as marketing, sales, management.

We determined here the second Attribute of the Positioning Map, since a new high-tech digital sport venture could direct its resources towards producing a service for the sport industry concerning to two different aspects:

**The Sport Side**

Sport side includes all the startups offering disruptive digital services and products to enhance the performance of professional and amateur athletes or teams in general.

**The Business Side**

Business side refers instead to startups proving digital services referring to Sport Clubs’ business Assets with a focus on three main elements: reaching a better engagement with fan, increasing relationships with brands with the aim of new stream of sponsorship, and optimization and management of Club’s facilities. On the other side, new advanced technologies could be adopted even for a better engagement of the Amateur Athlete with gyms or other type of Amateur Clubs, facilitating their interaction.

Through this method the product is positioned referring to **purpose of use.**
Deductive Domains can be now constructed thanks to the dimensions identified above, which enable firms to better operate in several Areas (Figure 2:3):
To fulfil the quadrants of the Positioning Map, we merged the knowledge acquired during the steps described above defining the different Macro-Categories of the Sports Industry covered by Digital Sports Startups.

![Diagram of Macro-Categories Model](image)

*Figure 2:3 The Macro-Categories Model*

2.2 The Model

The Macro Categories model gave us the last relevant information about how Startups works nowadays in the sport industry. It identified four broad domains where digital innovation acts in the sport world, creating a sort of order in the sport environment concerning startups and innovation’s field. It identifies **where** the ecosystem finds benefits, **which actors** interact (Sport Clubs and Amateurs) and **in which areas** (Sport side or Business side), through startups’ offer.

The model has been built through a deep analysis of the Literature, which describes the main application of digital technologies, the main trends adopted in the market and the Digital Sport Startups’ role in the sport industry. The aim was to draw the impact startups have on the sport ecosystems and where they concentrated their efforts (Figure 2:4).
We created a visual representation of how Digital Sport Startups landscape varies according to defined determinant attribute: one concerning the use/application field, presenting a division between Sport Side and Business Side, and the other instead focused on the type of user which includes Clubs/ Federations and Amateurs.

For the sake of simplicity and a better understanding of the model we decided to analyze first the upper side the Map and then its lower one.

2.2.1 The Club/Federation Ecosystem

Chelsea, Internazionale (Football), Armani Milano (Basketball), Boston red Sox (Baseball), Volley Bergamo (Volleyball) are clear examples of Professional Clubs working in different sports. They pay professional Athletes to compete and win matches performing at highest level, coaches to lead the team or the individual to highest result and engage large crowds of paying spectator with new more powerful experiences both inside and outside of the stadium.

At the professional level, the distinction between the sport side the business side of a Club, leads to four main different areas where Sport Digital Startups concentrate their effort and which represents the most critical assets a Sport Club needs to take into account. A general Federation such as FIGC (Italy) or FA (England) will present the same ecosystem (Figure 2:5):
On the sport side, the main Club’s key Asset is the individual Athlete or the Team as a whole, which leads the Club to highest profits through their performance and sports results. On the other hand, the business side can be split into Primary Activities related to the management of Fans and Brands which can be considered Club’s core business, and into Support Activities concerning the management of its Facilities (Stadium). Now we are going to describe these areas of interest:

2.2.1.1 Athletes/Team

The professional sport side attention is focused on key players and coaches which work together and give their contributions to win championships. A team’s success is measured by its ability to defeat other team and by the numbers of winning game it has obtained in a season. Digital Sport Startups rely on new technology trends to improve the Club’s probability to win. To do this a club can act on the athlete’s performances and on his training.

The U.S. National Library of Medicine defined Athletic Performance as the carrying out of specific physical routines or procedures by one who is trained or skilled in physical activity.
Performance is influenced by a combination of physiological, psychological, and socio-cultural factors. Startups, in this section, are focused on the sport side of the ecosystem allowing athletes to increase their level of knowledge and skills on what they currently perform. The athlete’s body is considered as a temple, since it is the primary cause of team success, so its performance, in terms of health and strength, is an important opportunity for startups that want to enter in this sector. Lifestyle choices create the Athlete, who knows that a healthy and controlled way of life leads him to grow, increase and reach the top of his career. Nutrition, rehabilitation, training and post-match analysis are the main areas of interest for new players in the industry, which use technology trends to push their customer on higher and more satisfying level of performance.

In our model we identified 5 main categories covered by Digital Sports Startups:

**Training**
Training is a component of performance and athletes must prepare themselves in order to improve skills and body functions. Thus, the aim of training is to increase the capability to sustain high repetition of exercises and develop structural and metabolic functions to increase physical performance (Smith, 2003). The great impact of innovation in the training area is given by wearable motion sensors which tracks data and information, giving the possibility to capture and classify complex body motions (such as how a football player kick the ball) for real-time feedback and post-work correction.

**Health and Rehabilitation**
Health and Rehabilitation represents all the forms of intervention that help the athletes to effectively treat pain and injuries and to return to the normal function. Moreover, it is put a lot of emphasis on the importance of early recognition and treatment (Lynch & Renström, 1999). Thanks to innovative systems, athletes in any sports can greatly benefit from feedback to improve the quality of their training and to accelerate the rehabilitation. Advances in wireless technology (with connected sensors placed in or around the body) and supporting infrastructure provide opportunity for real-time healthcare and fitness monitoring without constraining the activities of the user. The athletes represent the main asset and the key resource for sport success of the clubs, for this reason the club put a lot of effort to maintain the optimal conditions of the athletes and to prevent the risk of serious injuries that can conduct to long forced stops.
**Talent Scouting**

Talent Scouting represents the process of early identification of talented individuals that can improve the results of the team and of the whole club. It is a process that is not limited just to sport, but it is also used by art, business and education, all branches devoted to continuous search of the best performers for the future (Rogulj, Papić, & Čavala, 2009). The startups can help and facilitate the identification and selection of new talents simplifying the analysis of the key performance determinants such as psychological behaviors, motor abilities and physical characteristics. The research of young athletes potentially performing at high level is strategically fundamental in the sports world. In fact, the capability of taking on athletes since youth, or in general when their value is not dramatically high, is considered an important competitive advantage allowing the achievement of important sports results. Thanks to the startups’ offer, the clubs can exploit platforms full of any kind of data and statistics about players, supporting their activities of scouting, that allows the professional clubs to enhance their performance both on sport side and business, increasing its whole value.

**Performance Measurement**

We defined Performance Measurement as a detailed post-analysis of the athlete and of the team performance during the sports match. This type of analysis provides a fundamental support to coaches for understanding what did not go right during the sports competition and on what to work during the week in order to prepare the training and the next matches. In modern professional sport, an in-depth analysis and the attention to every detail, regarding any perspective of the team performance and of the individual performance, are become essential elements for a successful coach that wants to reach the higher levels. Thanks to sensors, wearables, drones and cloud analytics platforms, startups help to understand the bigger picture of team and individual performance. The aim is to facilitate the usage of the information processed, the planning of possible countermeasure and the modification of the existing strategy, providing both a quantitative and qualitative analysis.
Team Management

Team Management gather all the offers that help coaches and managers to save time organizing their team and groups. Web platforms and the suitability of digital devices that allow the installation of apps, permit clubs innovative procedures for managing people. These startups provide easy tools to manage the team members, organize games and practices, invite the players to team’s events, prepare formation and lineup, store and analyze statistics. Moreover, they allow team members to have a place where to share their passion and to communicate with their teammates.

2.2.1.2 Facilities

The first element we want to analyze on the business side are the sport facilities. The management of the stadium and of the whole venue has become during these years a key activity for a sustainable and profitable club business model. The goal of Digital Sport Startups is to offer clubs, a product that can guarantee them to organize and supervise the safe and secure maintenance and operations of the facility in a financially and environmentally sound manner (Schwarz, Hall, & Shibli, 2015). The startups focus their attention to provide management solutions of the venues principally on two main categories:

Events Management

Events Management is defined as the application of project management to the creation and development of large scale events, involving the study of the brand, the identification of the target audience, the conception of the event and the coordination of the technical aspects before actually launching the event (Ramsborg, 2008). The startups can help clubs to manage simply these events thanks to their innovative ideas. They provide elements and platforms that facilitate the optimization of the management of resources through rigorous planning and the response to unforeseen circumstances. In this way, clubs can save huge amount of time and money that can be invested in other activities.

Stadium & Facilities Management

Stadium and Facilities Management gather all the elements that help clubs to guarantee a safe and secure environment to the large crowd of paying spectators, working on soft and technical
services. Thanks to platforms, the process of management has become more efficient and customer friendly, providing many advantages: they allow to compare year to year historical data, view real time reporting from any device anytime and anywhere and to have the possibility to send, export and print reports. Moreover, startups provide clear solutions to adopt in case of evacuation plans and crisis situations. To ensure these services, smart stadiums require a sophisticated mix of hardware, software and wireless connectivity that permit stadium operators to make data-driven decisions in terms of security, quickly identifying sources of problem and promptly intervening. The services offered by digital sport startups can be clearly beneficial for improving the efficiency of sports venue operations, ensuring efficiency and cost saving.

2.2.1.3 Fan

Fan can be defined as the primary client of the club. He is usually a subject that is enthusiast for a particular athlete, team or sport. Sports fans often attend sporting events in stadiums, in sports bars, or watch them at home on television, and follow news through newspapers, websites, and social media (Haridakis & Earnheardt, 2011). The main aim of a club is to improve fan engagement of people to make them more willing to spend their money in products and in experiences that can increase the profits of the professional club. Fans are the most important source of revenues for Sport Clubs since their experience goes beyond the simple watching of a live game. The main aim of a club is to improve fan engagement of people to make them more willing to spend their money in products and in experiences that can increase the profits of the professional club. Companies can find several ways to acquire new customers and enlarge the base of the existing one through innovative technologies and disruptive concepts ideated by Digital Sport Startups. Nowadays, the new breed of customer has grown up with digital (PricewaterhouseCoopers, 2016). With the advent of new digital technologies and social media, the engagement of new fans and of new clients from different markets has become a critical issue in the strategy of the clubs. Fans are enthusiastic and always connected to follow their preferred team through smartphone, which gives them access to real time responses. On the other hand, this new generation of “always connected” Fans also called Millennials are not used to watch TV or subscribe to cable. So, firms need to attract them with more engaging ideas, developing customized applications, platforms and social media pages, enhancing the experience both inside and outside the
stadium. New technology allows them to collect and sell huge sets of structured and unstructured data to Sport’s club to create precise and detailed profile of fans. The aim is to offer customer what they want, when they want and how they want it. Thanks to digital sports startups, this objective can be reached focusing on ten principal categories of interest:

*Mobile Fan Experience*

Sports Federations and clubs have embraced increasingly mobile technology in recent years, aiming to provide a personalized mobile fan experience that engages viewers and boosts attendance at arenas (Mobile Business Insights, 2018). Fans want to be more connected to their teams and their idols and also want a detailed set of information about team and athletes, including news, deep analyses about athletes’ life, media content, highlights of the main events, possibility to interact with players and to analyze matches with data and specific examination. The focus here is not regarding only a sport match, but to provide people the possibility to live an entertainment experience: the service provided here is not limited to the game but to an enlarged experience. Thanks to new digital technologies and the use of Augmented Reality and Virtual Reality, startups link the fan to a new form of engagement never lived before.

*Social Media Fan Experience*

Fans are considered as the main stakeholders of a club and they want continually to express their views about their team, the players or the live match. The advent of social media allows fans to live the club totally 24/7 giving them the possibility not to miss even an update and to reduce the distances with their favorite sportsman. Moreover, fans want to meet people that have their same need and that want to share their passion for the sports. For this reason, the startups want to satisfy this request of fans offering communities in which fans and enthusiasts of sports can meet, discuss, show their passion and post photos and videos. Through this connection, they are able to become part of the sports story, elevating their status from mere sideline viewers to active participants. The startups create virtual communities that also permit direct contact with clubs from which they can derive some important findings. Realizing the full potential of member-to-member interaction and collaboration, clubs can exploit various business opportunities that can generate increasing revenues. In fact, many are the benefits that clubs can gain from a passionate fan base and for this reason, recognizing the potential of this
new level of audience engagement, clubs have invested many resources, incorporating social media as an integral part of their overall marketing strategy.

**Streaming Platform**

Streaming Platform or Over the top platform (OTT) is a media distribution practice that allows a streaming content provider to sell audio, video, and other media services directly to the consumer over the internet via streaming media as a standalone product, bypassing traditional television service providers that traditionally act as a controller or distributor of such content (The Hollywood Reporter, 2017). According to Media and Entertainment Tech Outlook (Russo, 2018), these type of platforms, such as Netflix and Amazon Prime, have become an important part of the entertainment ecosystem. While the entertainment landscape has been dramatically impacted by the emergence of OTT platforms, the same cannot be said for the sports video consumption. The difference is due mainly to existing rights agreements that preclude the distribution of live games via OTT services. However, the recent streaming of games may signal the beginning of an OTT revolution in sports. The OTT platform can provide different products, both to major sport leagues and to emerging sports. Regarding major leagues, thanks to these platforms, they can offer extensive ancillary programming and selected game product, in the short run, and, over the long run, the sports television business will be transformed, when the current TV contracts expire over the next five to ten years, changing the nature of the relationship between the leagues, fans, media companies and distributors. Moreover, regarding the emerging/niche sports, these streaming platforms can be a useful tool for the primary distribution, allowing to reach targeted fan bases that otherwise would be underserved and to spread the knowledge of these sports improving fan engagement.

**Stadium & Online Experience**

With the advent of more and more offers by media providers regarding the vision of sports in the last years, the presence of people to stadiums was dramatically reduced, especially because stadiums were not inviting, comfortable and safe to enjoy the sports event. The concept of Smart Arena is a solution to this problem. According to Intel Report (Intel, 2014), smart arenas provide fans with a wealth of information on parking availability, bathroom and concession lines, seat upgrades, special offers and more. In this way, fans get a convenient, personalized experience with shorter lines and directions to navigate faster through crowded stadiums and
parking facilities. The general aim is to improve the fan experience, attracting more fans to the stadium. Through the growth of advanced smartphones, this object can be easily reached. The startups adopt new technologies such as augmented reality, apps and platforms to increase the live in-game experience with several new services such as: access to instant video replays from customized views, ordering food and beverages for personal delivery to the seat, location-based advice for the nearest available parking, washroom, concession stand or souvenir stall, advice for the quickest route home when the game is over and live statistics on player performance and biometric data. To provide these services, the arenas have to integrate a large number of sensors, cameras and digital signs that connect to wired and wireless networks and servers. These sensors and cameras permit to give update information to fans thanks to use of the apps, facilitating and enhancing the live experience.

E-Gaming
Another way to improve the engagement of fans to the leagues and to the sports is the gamification. We decided to divide Gamification in sports in two main categories: fantasy sports and e-sports. A fantasy sport is a game where participants assemble imaginary teams using real players of different professional sports team. These teams compete based on statistical performance of those players in actual games. Then, this performance is converted into points that are compiled and totaled according to a roster selected by each fantasy team’s manager. (Tech Crunch, 2016).

E-Sports is a form of competition using video games. These competitions take the form of organized, multiplayer video game competitions, particularly between professional players (Hamari & Sjöblom, 2017). Driven by the proliferation of broadband internet, the growth of e-Sports has been accompanied by the advent of an entire sub-industry. To serve this booming field and its growing customer base, startups, game publishers, hardware manufacturers and media companies have realigned their offerings. Moreover, the constant flow of new exciting content, advancements in streaming technology, the rise of social network platforms and the shift in consumer preferences towards increased engagement and community experiences are the main factors fueling the rapid growth of the e-Sports market. Noticing this growing trend of e-Sports, traditional sport teams (such as the European football clubs Valencia, FC Schalke, West Ham and UC Sampdoria) have increasingly invested in the industry, in order to improve fan engagement and to enlarge the fan base, providing new exclusive contents (Deloitte, 2017).
**Fan Management**

With the category of Fan Management, we defined all the startups that provide clubs solutions to better manage the fan base, through software similar to Customer Relationship Management (CRM) and that use analytics to have a complete vision of fans’ world to allow clubs to find new sources of revenues.

Customer Relationship Management is defined as a process that companies use to understand their customer groups and respond quickly or instantly to shifting customer desires (Bain & Company, 2017). According to ValueLab, the CRM approach has become fundamental for Sports Clubs, that have understood the importance of data and analytics to improve the relationship between clubs and fans. This type of process, applied to sports world, is called Fan Relationship Management (FRM). The new trend is to manage the fans in a way more analytical and structured added to the “emotional advantage” that Clubs raise in people, naturally and without efforts. Digital sports startups can help sports societies to gain effectively fans’ emotions offering solutions that permit to oversee both traditional marketing and analytical methods.

**Social Activism**

Social Activism is defined as the efforts to promote, impede or direct social, political, economic, or environmental reform or stasis with the desire to make improvements in society (Obar, Zube, & Lampe, 2012). According to Deloitte, athletes have a fundamental role in political and social activism. They should use their status to advance such public positions, growing the sensitivity to how these activities might be impacting the sports industry. These politically and socially-minded activities can lead fans to new perceptions and shifts in viewership of live sporting events. This can be done thanks to digital technologies that enhanced the capability to arrive to everybody, growing the number of people, believing in the sports values. Through digital sport startups, athletes can use platforms to bring awareness to the issues that matter them most, permitting also the clubs and Federations to have new tools to engage fans.

**Ticketing**

In the last years, clubs and Federations have developed on their websites, systems that help to manage the on-line ticketing for the events. This trend is due to the fact that many clients prefer
to buy online, avoiding queues and saving time. The smartphone has become a fundamental tool for the fan in buying tickets for sporting and entertainment events. According to Ticketing Business Forum (2018), Mobile Ticketing will revolutionize user experience at sporting venues. Sports Events Providers are looking for ways to improve their attendees ticketing experience and at the same time to increase safety and security. Through Digital Sports Startups that use technologies such as IoT, Bluetooth Smart and NFC, Clubs and Federations can provide fans services to securely and conveniently enter to sports venues with their digital devices, allowing also to use it for the whole ecosystem of the event.

Merchandising
According to Transparency Market Research (2017), the trend that clubs and Federations have to follow is that to improve the market of global licensed merchandise, providing authentic and exclusive products to customers, enhancing customer experience and leading to customer retention, that allow to unlock new streams of revenues. The digital evolution has permitted the sports subjects to reach fans all over the world and to increase the popularity of sports Federations and clubs, bringing to expand the fan base. Through Digital Sport Startups, Federations and Clubs can improve their positions in this market, serving new channels and allowing customers to buy quality and original products.

Betting
We observed that digital innovation has deeply permeated also the betting world. People are become interested in the possibilities offered by technology in betting: they appreciate the simplification of the process of betting and increase their experience of usage thanks to gamification of activities and to user-friendly interfaces.
Digital Sports Startups provide tools to increase the experience of the better and also to increase his fan engagement to the Federations or to the club.

2.2.1.4 Brands

The last subject taken into account in our model on the business side are the brands. With this term, we considered all the companies external to the clubs, that are interested to have relationships with sports entities in order to have higher visibility and reach more customers.
Thanks to new digital technologies, startups can help clubs and Federations to improve the relationships with external firms, allowing to unlock new sources of revenues. We focused our attention mainly on one category:

**Sponsorship**

Sponsorship is defined as a form of promotion through which a firm can obtain, for a fee, more visibility of its own brand or of its image by a public figure (testimonial) or by an organization during advertising activities or events (Chebli & Gharbi, 2014). In the sports industry this practice is very widespread. According to RTT Sports Marketing (2017), the main aim that lead firms to invest a considerable amount of money in sports sponsorships is to have the possibility of access an exclusive platform (such as that one regarding sports events) characterized by a relevant emotional load, very sought-after by any sponsors, in order to link their name to something very emotional, engaging, easily to remember by audience, that the brand want to transform from a potential to a real customer. Clubs have some problems in finding the right opportunities of sponsorship and on the other hand sponsors in finding the right clubs able to promote their brand.Thanks to new online platforms, clubs and brands can facilitate their interactions and easily find the perfect match.

Digital Sports Startups provide tools to effectively and efficiently manage the relationships with sponsors, allowing clubs to unlock new revenue stream of revenues and External firms to reach more customers.

2.2.2 The Amateur Ecosystem

Amateurs are not paid for their activities but they do it in their free time because they enjoy it while keeping their body fit. Running through huge parks taking them to amazing places, training their body through more advanced machines in a gym, joining some friends to play football, basketball, are all activities an amateur can do, when he/she wants, where he/she wants. Everyone can run or make fitness, whatever the age, size or background. Doing sports, people will not only get stronger in terms of body motions but also healthier and this creates thousands of business opportunities for new ventures which want to serve that broad category. Its potential is unlimited and knowing it startups focus their attention on two different Areas which represents the Amateurs’ main assets (Figure 2:6):
On the sport side, Amateurs athletes love participating in sport activities, which is the main motivation pushing them to highest results. To reach his objects amateurs must have a sufficient control of their body which must be treated as a temple to prevent unexpected injuries and which is his primary Asset. The business side instead is focus on the infrastructures where Amateur Athletes perform their workout (such as gyms or football amateurs club) and which can be considered as their secondary key Asset. The athlete uses the infrastructure paying a fee which could be daily, monthly or more generally repeated in a timely manner. This concept reminds us the operating leasing notion, which is effectively a firm asset. Digital Sport Startups found potential opportunities in the interactions between Athletes and Infrastructures, which can be facilitated though the use of platforms and apps. The following Categories describe the two main areas where Startups’ effort is directed:

2.2.2.1 Athlete/Team

This Area of interest has been developed focusing on feedback systems used for improving the quality of Amateur athlete’s workout and avoid injuries by creating data that generate useful insights. Through new technology (such as fitness wearable) Amateur Athletes are motivated to do better pushing their body as hard as possible and keeping track of their training to monitor healthy parameters such as quality of sleep or vital signs. Digital Sport Startups, having understood the importance and criticality of this technologies’ dissemination, developed new opportunities for their clients concentrating their efforts on four main Areas:
**Training**

Professional Athletes are not the only one that can find benefits from innovation in the training sector. Amateurs use wearable sensors, to track their motions and correct some mistakes in positioning aiming at the highest results. But there is something more we can say about it. The rapid spread of the Internet and mobile phone can lead to additional opportunities even in the sport sector. Young generation in particular use smartphones as a body’s extension and they are used to be inside the digital world more than the real physical one. This led new high-tech venture to develop sport app not only focused on tracking performances but also on the social side by using the concept of gamification. Amateurs are projected into sport challenges and create communities where they can share feedbacks on sport they practice and on their training. This trend is confirmed by the proliferation of non-professional and cheap sensors and the number of self-training apps for mp4 devices and smartphones available in markets. Additionally, online video training can be created for those people who don’t have enough time, money or willing to be part of a gym community. Startups created platforms where coaches perform both live or catch up training and motivational activities trying to reach those customers who want to perform fitness activities not moving from home.

**Health and Rehabilitation**

Wearables’ is not only to track motions to improve the quality of the performance but also to monitor vital individual sign such cardiac and respiratory activity, blood pressure, calories. Wearable tracking systems provide continuously physiological data and insights related to the general health of athletes. Thus, such systems will reduce health-care costs by preventing risk of disease and enhancing the quality of life (Yilmaz, Foster, & Hao, 2010). Wearable technology is not the only path an athlete can follow to monitor his health. An appropriate diet and nutrition influence a lot the quality of training. In particular, muscles used during exercises rely on food people eats during the day through their diet. Amateurs need to support their body before going training since it requires a large amount of energy during the physical effort and a good nutrition can give an added value to the quality of the workout. Following a DIY (do it yourself) diet is something an amateur usually does without thinking too much about it. Through DIY, Athletes consume additional calories exceeding by far the recommended daily levels, leading to an overconsumption of proteins or vitamins and minerals, exposing athletes to unexpected health risks (Della Guardia, Cavallaro, & Cena, 2015). Digital Sport Startups are
able to prevent those risks giving customers personalized nutrition programs based on level of training and on daily life habits. Using customized application and communities on platforms, Amateurs can share and give feedbacks about their diets, suggests the best path to follow according to their experience and motivate each other.

**Performance Measurement**

This category of Startups refers generally to amateur league such as football, volleyball or basketball ones where athletes train themselves two or three times a week, are not paid for their activities with the stress of having another job. Even if they don’t play at professional level, competition still exists and each team of the same league is willing to win and get a chance at glory. In this direction they are continuously searching for new technology in the market which can help them to do better by improving their performance. We have already talked about how innovation in the sport industry can boost the quality of individual training, but this is not enough when Athlete competes in League, whether it is at Amateur Level. As happens at many professional clubs, Amateur Teams adopt post video analysis to examine previous match to better understand how the team is working when it is under pressure, how it moves on the field, errors in positioning or movements. The main aim is to identify weaknesses and point of strength to create the best strategy that improve the team behaviour during matches and increase the overall probability of the team to win.

**Team Management**

An additional success factor that leads an amateur team to avoid wasting of information and of time is the proper organization of the team activities during the week and before the matches. Similarly, to the professional world, startups provide tools that can support the Team management, facilitating the spread of news, communications and important information between players and the staff, with the purpose of facilitating services such as the scheduling of the training during the week or which kinds of activities doing. These types of tools are also very useful for coaches to extract statistics of the players and insights that can be exploited in the future as changing the method by which players train themselves or improving tactics in preparing the next match.
2.2.2.2 Facilities

Sport is considered a phenomenon more and more relevant over time, since it affects and has a powerful impact on several aspects including the social and civil sphere. People face some hurdles in playing sports activities because they usually are not able to find the right place to play or they don’t have time to waste in performing this task. Amateur Athletes are looking for new solutions which allow them to facilitate this process. Entities, which are in charge to organize, manage and promote sports, can benefit from the technology progress in different ways. Digital Sports Startups offered this category of sport costumers, applications and platforms to accomplish the organization of this Event.

Events Arrangements
Digital technology revolution allowed different entities to have the possibility to facilitate the process of events organization, gathering together people in a unique platform. Friends playing football every week meet difficulties in search for additional players enjoy them for the match and gym enthusiasts usually fail in finding the proper courses that satisfy their expectations among the several options they have around them. In this category we identified all startups that provide tools to find the venue where to make the physical activity and to find people who desire to play the same specific discipline. These startups work as aggregators since similar users can find people with the same need, creating community places and events they can join. Moreover, these startups act as facilitators in finding the closest gym or the cheapest one.

2.3 Successful vs Unsuccessful Firm?

Once identified startups as one of the main actors involved in the process of innovation for the sport industry, we investigated the main critical factors that influence their performance. According to Forbes, nine out of ten startups will fail (Forbes, 2015) and the reasons of that hard truth could be several, including be lucky or not. Our purpose was to investigate the main important factors that lead a Digital Sport Startups to succeed in the market. John Rockard, a professor at MIT's Sloan School of Business, has defined critical success factors as, "Those things that must be done if a company is to be successful"(Freund, 1988).
Having a reasonable landscape of Startups’ work, well-explained by the above-mentioned Macro-Categories Model, we decided to better comprehend which variables could have an impact on the success of a new company. Several studies were conducted to identify Relevant Determinants used by the venture capitalists to evaluate whether a firm offer is good or not. (Knight, 1986) (MacMillan, Siegel, & Narasimha, 1985) (Tyebjee & Bruno, 1984). In 1987 MacMillan tried to explain whether these criteria could be used to predict the future success or unsuccess of the venture (MacMillan, Zemann, & Subbanarasimha, 1987). In a more recent study, M. Kakati (Kakati, 2003) referred to these previous researches, highlighting how their model was on one hand significant and interesting but on the other it resulted with low explanatory power. Given these assumptions, we decided to follow the methodology of M. Kakati which included five broad areas of interests, resulted from a previous research (MacMillan et al., 1987) and adjusted by the Author, as possible critical success factors for a high-tech venture:

2.3.1 Characteristics of The Entrepreneurs

From the sport industry to automotive companies, many businesses are able to survive in a changing market only thanks to the ability of an Entrepreneur, whose genius is the driven point of the company. Everyone could decide to open and start a new company but just few will succeed. Shumpeter in 1934 describes an entrepreneur as a person worth of study who is distinct from managers and managers. This function is fundamental to the economic development of a company (Carland, Hoy, Boulton, & Carland, 1984), since thanks to his background, past experiences and innate capabilities he has the potential to enter in a new market and beat competitors. In his research, M. Kakati included several different characteristics an Entrepreneur could have, that we decided to group into two main Macro areas:

**THE NEW VENTURE TEAM COMPOSITION**

Creating a new venture team is not easy. To succeed, people need to share the same idea, collaborate and motivate each other. In recent years scholars have increasingly identified how new ventures are commonly composed by teams and not by lone entrepreneur (Klotz, Hmielecki, Bradley, & Busenitz, 2014). The team composition is never the same. A new
venture can be initiated by individuals who can share the same background and experiences, or can have complementary skills.

**EXPERIENCE AND PERSONALITY**

Recent Studies suggests that the possession of certain personal traits make an individual more likely to be an entrepreneur (Westhead, Wright, & Mcelwee, 2011), which leads us to think about how technical talent, creativity, courage, enthusiasm for work and past experiences can help a new entrepreneur to succeed in a new market. Kakati distinguished in his research two common traits that could impact the probability of an entrepreneur to succeed in the market:

*Personality*

The Author arrived at the conclusion that entrepreneurial psychological characteristics have as critical role as other variables in the success of a startups. It is the founder that acquires resources and creates the winning strategy in order to sell the service or product on the market and achieve competitive advantage. People generally possess different traits or characteristics that make them unique and Kakati identified in his research a possible combination if traits which makes individual a potential Entrepreneur including:

- **Creativity** as the cognitive process of discovering new insights and patterns by mentally merging existing ideas and concepts is the trigger point that drives entrepreneurial discovery (Phan, Zhou, & Abrahamson, 2010).
- **Ability to evaluate and react risk well** is the most important factor to be taken into account. There are several risks an entrepreneur must face if he wants to initiate a new business venture such as his financial well-being, career opportunities, family relations and psychic well. (Brockhaus, 1980) All these factors are always challenged when an entrepreneur needs to make a critical strategic decision about his product or service.

**Background**

Many previous studies already showed the relations between entrepreneurial background and the development of successful innovative product (Dencker & Gruber, 2015) (Jo & Lee, 1996). We selected two main characteristics of the Founder which in general can have important ramifications for the new venture positioning in the market:
- **Technical skills** developed in the industry of reference is the first key resulting characteristic. Knowing the market of reference leads entrepreneurs to be users with unsatisfied need of the market, before to be suppliers of a new product or service. An entrepreneur needs to start with a full knowledge of the product to achieve better results (Jo & Lee, 1996), but on the other hand it was discovered how industry experience tends to constrain a founder to specific opportunities (Dencker & Gruber, 2015). In particular this category of entrepreneurs usually remains on the industry path they selected during their academic years, becoming increasingly specialized.

- **Economic Competences** tend to enlarge the number of potential opportunities given by other markets. Moreover, these new self-employees seem to be inclined to riskier opportunities. (Dencker & Gruber, 2015) On the other hand, the basic and only experience of management leads the firm to be unsuccessful because a rigid management may hamper the flexibility of a new organization (Jo & Lee, 1996).

Kakati in his research comes to the conclusion that a Relevant Determinant of success in high tech new ventures is a balance situation where diversified skills and capabilities in the market industry are combined with business backgrounds in other areas such as management, marketing or input-sourcing.

### 2.3.2 Competitive Strategy

Bruce Henderson defined Strategy in 1989 as “a deliberate search for a plan of action that will develop a business’s competitive advantage and compound it. The difference between a firm and its competitors are the basis for advantage. The objective is to enlarge the scope of this advantage, which can only happen at someone else’s expenses” (An et al., 2017; Henderson, 1989; Ramsborg, 2008). Thus, competitive strategy could be another determinant of a Startup’s performances. The engine of winning competitive strategy for a firm is to find the proper position in the market where it can best cope with its competitive forces (threat of new entrants, bargaining power of buyers, rivalry between existing competitors, threat of substitute products and bargaining power of suppliers) (An et al., 2017; Henderson, 1989; Ramsborg, 2008). Kakati identified four main competitive strategies a new venture could consider as a key success factor.
for a potential success in the market among which just one resulted to be effectively important for the study of analysis:

- Customization strategy, the emphasis on meeting specific customer requirement and needs, giving them exactly what they want, when they want it, in the shortest possible time, work in a better way than other strategies (Cost, Quality and Innovation Strategy) on most of the performance measure undertaken by the Author.

The research showed how it is not important the unique product to be successful (see the next paragraph) but how a new high-tech startup can meet the specific need of its customers. Moreover, this implies a transformation: from a technology driven to a market-led firm. Thus, after the first idea generation, the Entrepreneur needs to increasingly pay attention to what customers require.

### 2.3.3 Product Characteristics

A product is defined as the physical and psychological satisfactions the customer receives when he purchases the article. The Product, in a general sense includes all the characteristics for which consumer pays, which can describe how the product appear, its components or its capabilities (An et al., 2017; Henderson, 1989; Miracle, 1965; Porter, 1980; Ramsborg, 2008). Kakati in his research tried to evaluate whether different product features such as the uniqueness of the product or service relative to competitors, its level of protection, the market acceptance or its development to functioning prototype could increase the probability of a new venture to be successful in the market. Unlike previous features described above, the product characteristics do not appear to be important for the research, especially product uniqueness cannot be taken into consideration as significant factor, even though high-tech firm are used to boost their R&D department and their technological excellence. The only two characteristics that showed a modicum interest for the research were the development up to a functioning prototype and the product protection. Thus, the development of a new technology or product appears to be not correlated with initial success of a high-tech firm in the market of reference.
2.3.4 Market Characteristics

Different market characteristics were considered by M. Kakati in his study such as:

- The possibility of established distribution channel.
- The possibility of untapped market potential.
- Significant growth rate of the market.
- Familiarity with industry structure.
- Competition presented in the first two years.
- Venture created a new market segment.
- Venture stimulated existing market.

As it happened with the Product Characteristics, even this category did not show a significant correlation with the initial success of a new venture. Out of seven criteria listed above, just two can be selected for their minimum contribution to the outcome of analysis: market growth rate and stimulating existing market. It seems that a firm can reach initial success whether it will work in a growing market and by stimulating existing market rather than creating a product or service to explore a new one.

2.3.5 Financial Consideration

According to the Author, financial considerations appear not to be correlated with the success or unsuccess of a high-tech new venture. This doesn’t mean that an entrepreneur doesn’t need to consider financial aspects at all, they are still important. If the right entrepreneur, the right product with the right strategy are present, there will be an expected return. Financial aspects are not considered as critical success factors but the Author suggested to capture potential returns through the other criteria taken into consideration. The aspects considered in his research are the following:

- Investment could be made easily liquid.
- Expected returns 10 times within 5 years.
- No subsequent investment
- It was the first round of investment.
3 Methods and Materials

This chapter wants to describe the path we followed during our research of analysis. Literature review was fully explained in the first chapter and so it will not be present in the following lines to not create repetitions and overlapping of information. We divided the process into two main parts:

- DATABASE: it describes the process of data gathering and it is the starting point for every analysis we relied on.
- ANALYSIS: the aim of this section is to answer the questions that are at the basis of our work. We decided to split the analysis part into 3 main sections to reach a more complete and fully understandable view of the outcome of analysis:
  - Descriptive Analysis: it gives a general overview of how Digital Sport Startups bring innovation in the sport ecosystem.
  - Statistical Inference: regression coefficients provide information on how many units the dependent variable varies whether the independent one associated to that coefficient varies of 1 unit. (Wagemann, 2009). It examines the relative contribution of each variable (Kaminsky & Jordan, 2017).
  - Comparative Analysis: QCA seeks for causality, necessary and sufficient conditions that can lead to the outcome. What is important to remember is that there are likely several different combinations of factors that may result in an outcome (Kaminsky & Jordan, 2017).
3.1 Database

In this section we want to describe the methodology used working on the database (Figure 3:1). Osservatorio DigitalSport and Literature review provided us the initial material to create a general background on the Digital Startups Landscape. At this point, we created the Database from scratch. Before starting, assumptions were necessary in order to select the right sample of analysis. We decided to collect data about Digital Sport Startups which followed 3 specific characteristics:

- Date of foundation between 2011 and 2016.
- Last funding date after 2013.
- Startups related both to the Sport and Digital Area.
The whole process of identification was divided into three main parts according to different periods in which data were collected:

1) From June to July 2017, 400 Digital Sport Startups were classified.
2) From September to November 2017, we added to the original sample 326 Digital Sport Startups.
3) Lastly from December to January 2017, we reached a total number of 988 Startups.

The main purpose of the database was to obtain a satisfying overview of the industry’s dynamics and to extrapolate relevant insight about it. Several sources helped us in reaching our objective, whose information were intertwined to carry out a complete and representative analysis of the entire population:

- **Universities/Osservatorio DigitalSport**: universities and in particular Osservatorio acquired deep and specific knowledge about the sport industry during their yearly activities as powerful research centres. Osservatorio DigitalSport works actually with several Digital Sport Startups with the purpose of creating added value for the entire sport ecosystem through their collaboration. They were fundamental for our study, because they provided us a great initial impulse, giving us data about Startups and allowing to acquire a profound knowledge about sports industry.

- **Incubators/Accelerators**: as we have already explained in chapter 1, Accelerators and Incubators interact with new ventures during their first life steps. They help Startups develop their initial product or service, identify potential customer segments and resources such as capital and employees. Thus, consulting websites of these subjects was important to find out new startups and to understand which were the main trends and technologies adopted in the sports world.

- **Scientific Journals**: scientific publication aiming at reporting researches and news in the science field, in particular related to technologies just discovered. Examining these scientific periodicals represented a great added value to our work, allowing us to better understand which technological trends increased the value generation of the Sport Ecosystem.
➢ **Financiers’ Announcement**: players of the Sport industry or even working in not related one who decide to finance Startups and announce deals, through which they are going to provide means and resources. We used these sources to better understand the financial situation of a Digital Sport Startup.

➢ **Specialists and Operators Opinion**: Osservatorio DigitalSport periodically organizes conference with the aim of upgrading different players it works with, about new researches and discoveries on innovation in the sport Ecosystem. The presence of Startups and the vision of entrepreneurs was very important to share and compare ideas about innovation in the sports world.

➢ **Web Researches**: we integrated and joined a great amount of information referring to different websites to gather knowledge about startups, focusing on a multidisciplinary area of analysis. These sources were the last ones we checked with the purpose of understanding whether our general perspective on Digital Sport Startups were complete and exhaustive or something was missing.

Once defined the list of startups, we collected data from different sources to fill all the columns of the worksheet:

➢ **CrunchBase**: this platform is considered as the main source for discovering industry trends, investments done and news about numerous companies which work locally and globally. Through this website, we discovered new companies, identified startups, found investors and obtained a complete vision about the competitive environment. The platform represented for us the main source of information to fill the cells of the database.

➢ **Starters**: it is a community of sports technology founders, with the aim to foster innovation in the sports industry bringing together the stakeholders that make such innovation possible. The consultation of this website was fundamental to find out new startups to add to the database.

➢ **Angel List**: it is a platform that contains information about 800000 companies. It is very similar to CrunchBase, permitting to discover companies, gather data and discover the main financers.
- **Venture Radar**: through this tool, it was possible to discover and rank companies, making them accessible to potential partners, customers, researchers and investors.
- **Scientific Journals**: they give us complete and detailed information, describing the firms in a structured way.
- **LinkedIn**: this social network was very important to find out additional information about companies and founders.
- **Companies Website**: the consultation of the websites was essential to give us information about Startups’ survival rate.

Data were collected, adjusted and managed for a total number of 988 Digital Sports Startups present in the sheet and other 1438 analysed but not considered in the framework of analysis. Among this last set we can identify three main groups of startups:

- The startups born before 2013 and with last funding before 2013.
- New high-tech ventures working in the sport industry but not related with the digital world.
- The startups extracted from CrunchBase that are not related with sports industry.

We decided to track the eliminated startups to facilitate future work in the study of digital sports startups. On one hand, 1438 new venture were already analysed and in future they can be left out. On the other, in this way it can be developed, in a future study, important statistic about the number of Digital Sport Startups in relation with new high-tech venture to better understand which is the leading category in the sport industry.

### 3.1.1 Database Structure

Database’s structure can be divided into three main parts according to the different periods in which data were collected and to the related different levels of knowledge we acquired during the process of analysis.
FIRST SECTION

The first section can be identified as the initial period of analysis, coinciding with the months of June and July 2017, when we heard the words “Digital Sport Startups” for the first time. This period was characterised by doubts, questions and ignorance about that particular world. We relied on materials given us by the Osservatorio DigitalSport and on personal researches based especially on literature and scientific journals, leading us to have a first broad overview about the sport industry. We followed a process culminating with the developing of the Digital Sport Startups Ecosystem Model, which gave us the possibility to divide our sample of analysis in Category and Macro-category to which Digital Sport Startups belong. Thus, starting from the literature, from the model we created and adopting a logical process, we were able to fill a first framework of the Database characterized by 400 Digital Sport Startups and the following characteristics related to the main traits of innovation in sport industry:

Descriptive Characteristics

Descriptive characteristics (Figure 3:2) are related to information that qualify the company about where it works (Headquarter), when it initiated (Date of foundation), who is its leader (Founder/Founders) and which is its original concept describing what the company does (Concept Description).

Beneficiaries

Beneficiaries dimension is related to the end-user who are going to purchase and use first-hand the Digital Sport Startups’ offer. In particular, this category includes the Macro-Categorie where Startups concentrated their efforts, the related sub-categories explaining more in detail trends in the sport industry and lastly the type of Sports where innovation happened. Regarding sports we need to specify how a new digital product could serve just one or two disciplines or it can
be applied to different sports without any problem (category “Multi” represents this condition) (Figure 3:3).

![Figure 3:3 Beneficiaries](image)

**Technology**

Technology (Figure 3:4) refers to the way in which the end-user is engaged by the company. A new digital functionality can be provided through different technologies which act as enablers allowing a complete revolution of the sector in every aspect and area. As we have already explained, six different technologies are considered in this study of analysis which are able to enlarge and facilitate the end-user experience:

- IoT - Wearable
- Augmented Reality
- Virtual Reality
- Applications
- Platform
- Cameras

![Figure 3:4 Technology](image)

**Incubators/Accelerators**

Accelerators and Incubators interact with new ventures during their first life steps (Figure 3:5) Accelerators help Startups develop their initial product or service, identify potential customer segments and resources such as capital and employees. Their duration is limited to few month (generally three) and they usually provide a small amount of seed capital, places to work, networking and educational and mentorship programs. Incubators on the other hand, may host Startups from one to five years after they begin, are designed to help nascent venture by offering
them the right environment, room to growth, administrative support services, and usually they don’t present their own investment since they are mostly publicly owned (Cohen, 2013; Wagemann, 2009).

Economic Dimension

The economic dimension refers to the total amount of funding a new Startups can obtain from different types of investors such as angels, Accelerator, venture capital firm or private investors. Total funding is split into the main three funding step of a Startup Lifecycle: Emerging Phase, Growth Phase and Expansion Phase (Figure 3.6).

SECOND SECTION

The second section comprehends 3 months of research, from September to November 2017, and led us to a total number of Digital Sport Startups equal to 726. In this period, we focused on potential relevant determinants related to the initial success of a new high-tech venture. In particular, our aim was to check and discover which relevant determinants might be also applicable to our topic of analysis, focusing on causality, sufficient and necessary conditions. Some of the factors we identified from the research were already present in the Database,
instead for what concern two main variables we didn’t have any information yet and data had to be collected:

Founders’ Background
Entrepreneurial background is fundamental in the development of successful product. In particular, technical skills developed in the industry of reference and economic competences which tend to enlarge the number of potential opportunities given by other markets, can be analysed as relevant determinants according to past research. Thus, we decided to keep track of the main competences of every Digital Sport Startups’ founder, whose data are extracted by their LinkedIn profiles (Figure 3:7). We divided this analysis according to two different factors we wanted to manage:

- Technical skills: Digital Sport Startups can be founded by entrepreneur who are actually or have been sportsman in the past. They are able to provide deep and accurate know-how about the sport sector in which they are going to work, coming up with new innovative and creative ideas, developed just from their passion and experience for sport.
- Competences: a different range of competences was analysed, giving us a complete overview about what Digital Sport Startups’ founder studied for. Information on their background were collected considering six different field:

  1) Economics: founders who have degrees in management, economics, business administration and finance.
  2) Electronic/Digital: founders who are experts in Computer engineering, Electronics and IT.
  3) Letters/Humanistic: founders who studied humanistic subjects in their academic path (such as Philosophy, Letters, History).
  4) Medicine: founders with degrees in Medicine, Biology, Biomedical Engineering and Physiotherapy.
  6) Technical/Scientific: founder who have a background with degrees in Engineering, Mathematics, Chemistry and Physics and Design.
The New Venture Team Composition

The team composition is never the same. A new venture can be initiated by individuals who can share the same background and experiences, or can have complementary skills. In recent years scholars have increasingly identified how new ventures are commonly composed by teams and not by lone entrepreneur, which could be a potential relevant determinant for the success of a new Digital Sport Startup (Figure 3:8).

THIRD SECTION

The third and last section lasted two months, from December 2017 to January 2018. During this time horizon, we added new Digital Sport Startups to the Database, reaching the total final number of 988 and we analyzed new literature review to understand which could be a possible performance measure to be used in our statistical models. Some measure of performance adopted by different authors include:

- Sales.
- Production Cost.
- Profits.
- Market Share.
- ROI.
- Funding.

Unfortunately, we couldn’t rely on those performance indicators since information were not publicly available for every single startups. Thus, survival rate of startups was considered to check whether a new venture could be successful or not. To understand which company was still alive or not, we relied on information coming from its Website. If it was reachable, the startups was surely opened, otherwise we introduced new factors before saying it was dead, since there could be different reasons why a website appears not available (such as a change of domain). Social networks pages were used to answer this question. Does a Digital Sport Startup rely on Facebook, Twitter, Instagram or LinkedIn? And when was its last update social? If the last update social was recent (at least 3 months before the date in which we checked) we concluded that the Digital Sport Startup was still alive, otherwise it was dead (Figure 3:9).

![Figure 3:9 Startup Open/Closed Section](image)

Once completed the fulfilment of the database, we focused on the analysis section.
3.2 Analysis

The aim of our analysis was to find some possible insights from the study of the database and discover the main reasons that lead to the success of a Digital Sport Startup.

We divided this section of analysis in two ways:

- The first, more descriptive, providing a general overview of the elements available in the database, with a precise path to follow in our explanation.
- The second part instead was developed with the objective of highlighting the relevant determinant to understand causality, sufficient and necessary condition for the Startups’ success.

3.2.1 Descriptive Statistics

![Figure 3.10 Thesis Flowchart: Descriptive Statistics]
Descriptive Statistics (Figure 3:10) were used to describe characteristics of the Digital Sport Startups Industry. The main purpose was to extract relevant insight which could be useful for understanding how and where Digital Sport Startups bring innovation to the Sport ecosystem, focusing in detail on different aspects related to their world:

- Geographical Dispersion.
- Year Trend.
- Product offered.
- Sport subdivision.
- Category distribution.

The analysis was divided into different parts trying to cover as much as possible and in a detail way the Digital Sport Startups world. The following schema (Figure 3:11) describes the process followed performing descriptive statistics:

The figure represents the logical flow we followed in the analysis: we concentrated firstly on a **Global Focus**, introducing a general overview of Digital Sport Startups’ distribution in the World and then we focused on two different contexts such as North America and Europe and...
Lastly on Italy. The main purpose is to highlight, when possible, whether there are differences between the place in which we live and the world in general. Then we developed a bipartite analysis focusing on the Club/Federations and the Amateur World, since from the analysis of the Literature Review we understood how they are two complete different contexts where Digital Sport Startups offer their product or service.

3.2.2 Logistic Regression and QCA: Assumptions

An important point to be discussed related to the second section of the analysis (Figure 3:12) regards the assumptions made for a better understanding of the models used:

- The sample considered for the logistic regression and for the QCA includes startups born in 2013, 2014 and 2015. The number of Startups to be used decreased to 714 through this path.
- Since we decided to consider the Founder’s background as relevant determinant that might explain the Startup’ success, we added another filter to the sample of analysis. We considered only those firm that present in the database at least one founder’s competence, leading to a total number of 541 Startups.
- We decided to reduce the above-mentioned number to 406, eliminating Digital Sport Startups opened but without any funding with the purpose of having a more comprehensive sample of analysis.
- The dependent variable must be dichotomous for both the models, thus the survival of Digital Sport Startup was used.
- Four explaining variables were modified and grouped into variables easier to understand and which can provide us more insights concerning the initial success of Digital Sports Startups. The following table summarizes this process (Table 3:1).

<table>
<thead>
<tr>
<th>Initial Variables</th>
<th>Modified Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macro-category</td>
<td>Sport/Business Side</td>
</tr>
<tr>
<td>Category</td>
<td>Multi-Single Sport</td>
</tr>
<tr>
<td>Sports</td>
<td>Economic Competences</td>
</tr>
<tr>
<td>Competences</td>
<td></td>
</tr>
</tbody>
</table>

Table 3:1 Modified Variables

Macro-category and category groups were merged in one single new variable referring to the main division we made with the Digital Sport Startups Ecosystem Model, the Sport or Business side. Our main purpose was to evaluate whether Digital Sport Startups focused their efforts on the Sport side, offering services for Athlete and Team or on the Business side, relying more on Fans, Brands and Facilities. In our opinion this could be more interesting than focusing the attention on different and numerous categories trying to evaluate whether one is more important than another one. The same reasoning could be adopted for Sports, which are collapsed in the variable “Multi/single Sport”. We differed Digital Sport Startups offering a product or service which can be used just for a single Sport (such as Football), with those ones that provide an innovative idea that can be applicable in different sports without any differences. Lastly
competences are translated into the Boolean variable “Economic competences” since we noticed from literature that the Economic background of the founder can bring value added to the initial success of Startup.

Now we are going to describe more in detail the models, software and outputs we used to answer the specific questions that are at the basis of this work.

3.2.3 Logistic Regression

Logistic Regression is the appropriate regression analysis to conduct when the dependent variable is dichotomous (binary). It is used to describe data and to explain the relationship between one dependent binary variable and one or more categorical, ordinal, interval or ratio-level independent variables. The objective of this analysis is to identify the best fitting model to describe the relationship between the dichotomous dependent variable (outcome variable) and the set of independent variables (explanatory variables). In this way, we can generate the coefficients, its related standard errors and significance levels of a formula to predict a logit transformation of the probability of presence of the characteristic of interest. Before starting we need to introduce some key terms and concepts that will be useful and make simpler understanding the explanation of the outcome (StatisticsSolutions, 2009):

- **Dependent variable:** dichotomous in nature and it has two categories. Its values depend by the independent variables.
- **Independent Variables:** are used to predict the dependent variables.
- **Maximum Likelihood estimation:** it is the method used to predict the odd ratio relating to the dependent variable in which the log likelihood is maximized.
- **Odd ratio:** In SPSS the Exponential beta gives the odd ratio of the dependent variable, giving us information about the probability of the dependent variable. If the exponential beta is higher than one, the probability of the outcome increases, otherwise decreases.
- **P-value:** it helps determine the significance of results (Rumsey, 2006). To test the validity of a claim about a certain population a hypothesis test is adopted. The claim that is on trial is called null hypothesis. On the other hand, the alternative hypothesis is
the one to believe whether the null hypothesis is untrue. The hypothesis test uses a p-value to weight the strength of the evidence. P-value is a number between 0 and 1 and is interpreted in the following way:

- Small p-value (typically ≤ 0.05) shows strong evidence against the null hypothesis, that will be rejected
- A large p-value (> 0.05) shows weak evidence against the null hypothesis, thus the model fails to reject the null hypothesis.

- **Chi-squared test**: to show the relationship between categorical variables, a chi square statistic is usually adopted. It is a single number that explains how much difference exists between the observed counts and counts expected whether were no relationship at all in the population (Statistichowto, 2018).

- **Parameter estimate and logit**: the parameter estimate is the coefficient b which is used to predict the log odds (logit) of the dependent variable. If z is the logit for a dependent variable, the logistic prediction will be:

\[
z = \ln(\text{odds(event)}) = \ln \left( \frac{\text{prob(event)}}{\text{prob(onlinevent)}} \right) = \ln \left( \frac{\text{prob(event)}}{1 - \text{prob(event)}} \right) = b_0 + b_1X_1 + b_2X_2 + \ldots + b_kX_k
\]

Where b0 is constant and k is independent variable (X)

To run the Logistic Regression, we used the SPSS Software, which is the most used tool available online for this kind of analysis. It has online manual very useful for the whole process built by IBM company (IBM, 2016) In the following lines we want to describe the main steps we followed in performing the analysis (Figure 3:13):

![Figure 3:13 Logistic Regression Flowchart](image-url)
First step we made was to split the analysis in two main parts: one sample related to 112 Digital Sport Startups born in Europe and another one with 234 born in North America. This strategy was adopted since we wanted to compare the most innovative area in terms of Digital Sport Startups’ proliferation (American Startups) with the environment and context in which we live (European Startups).

**IDENTIFICATION OF RELEVANT DETERMINANTS**

The preparation phase was the most difficult part faced during the process of analysis, since a selection of the relevant determinants to use as input in the software, was needed. To accomplish this goal, firstly we referred to the Literature review adapting variables presented in the Database to what different Authors thought to be relevant for the success of new high-tech venture. The following table (Table 3:2) will clarify better this concept:

<table>
<thead>
<tr>
<th>Paper used from Literature</th>
<th>Variables from Literature</th>
<th>Potential Relevant Determinants for Digital Sport Startups</th>
<th>Effectively Used for Logistic Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Founder’s Background</td>
<td>Economic Competences</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Team Composition</td>
<td>Single/Multi Founder</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Competitive Strategy</td>
<td>Multi/Single Sport - Sport/Business side - Amateur/Professional</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Product Characteristics</td>
<td>Technology</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Market Characteristics</td>
<td>Headquarter (Geographic Area)</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Financial Consideration</td>
<td>Funding</td>
<td>NO</td>
</tr>
</tbody>
</table>

*Table 3:2 Potential Relevant Determinants*

A decision to not include the “Funding” as relevant determinant was taken, since it might be redundant compared to the independent variable and so interfere with the final results of the Logistic regression. We supposed that whether a Digital Sport Startup received a high level of funding, it would be opened with high probability.
**SELECTION OF REFERENCE CATEGORY**

Next step was to find which was the baseline category for each of our relevant determinant. SPSS Software, adopting dummy codes predictor variables, uses a default to choose reference categories. The default let us to select the category that comes first or last alphabetically. Which is the best category to choose as reference? Which strategy should we perform during this path? First thing to know is that it is not important which is the reference category in terms of results. It’s about which comparisons the software does and which p-values will be shown in the final table “Variable in the Equation” whose meaning will be better defined later. Thus, what makes sense is to choose a category that leads to an easier interpretation of results. Three main strategies could be selected in this path (The Analysis Factor, 2013):

- The Normative Group: the most logical and important comparison to be use.
- The Largest category: to use whether there is not a normative group and sample sizes are very different in the groups.
- Category whose mean is in the middle: to choose if all the other options fail, when there is no a specific norm and sample sizes are similar.

Literature review helped us in the selection of the reference category for some variables, giving us the possibility to rely on the Normative Group Strategy. Regarding the rest of the sample we decided to move to the second strategy listed above. The following table (Table 3:3) summarizes the final decisions we made.
### Table 3.3 Reference Categories

<table>
<thead>
<tr>
<th>Relevant Determinants</th>
<th>Normative or Largest Category</th>
<th>Reference Category</th>
<th>Reasonings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Competences</td>
<td>Normative Group</td>
<td>Yes</td>
<td>The interesting comparison is to see how founders without Economic Competences differ from the normative group in terms of determinants of Digital Sport Startup’s success</td>
</tr>
<tr>
<td>Single/Multi Founder</td>
<td>Normative Group</td>
<td>Multi Founder</td>
<td>The interesting comparison is to see how Single founder differ from the normative group in terms of determinants of Digital Sport Startup’s success</td>
</tr>
<tr>
<td>Sport/Business side</td>
<td>Largest Category</td>
<td>Sport</td>
<td>The interesting comparison is to see how Business Side differs from the Largest category in terms of determinants of Digital Sport Startup’s success</td>
</tr>
<tr>
<td>Technology</td>
<td>Largest Category</td>
<td>Platform</td>
<td>The interesting comparison is to see how Different New Technologies differ from the Largest category in terms of determinants of Digital Sport Startup’s success</td>
</tr>
<tr>
<td>Multi/Single Sport</td>
<td>Largest Category</td>
<td>Multi Sport</td>
<td>The interesting comparison is to see how Single Sports differ from the Largest category in terms of determinants of Digital Sport Startup’s success</td>
</tr>
<tr>
<td>Amateur/Professional</td>
<td>Largest Category</td>
<td>Professional</td>
<td>The interesting comparison is to see how Amateur differ from the Largest category in terms of determinants of Digital Sport Startup’s success</td>
</tr>
</tbody>
</table>

**ANALYSIS OF THE MAIN TABLES RESULTS**

For sake of simplicity we are going to describe in the following lines just the tables of results which were useful to identify the goodness of the model and the significance of the independent variables.

The SPSS software shows an output divided in two main blocks (Statistical Consulting Group, 2016):

- **Block 0: Beginning Block**: in this part “Null Model” is described, which is the model that does not contain predictors, but takes into account just the intercept.
- **Block 1**: the most interesting part to study, in which are present very important charts to evaluate the goodness of the model and which variables could be relevant determinant for the outcome Y.

**Block 0: Beginning Block**

The “Classification Table” (Figure 3:14) summarizes the results of the initial block, showing the percentage of cases for which the dependent variable was correctly predicted with reference to the variable more observed.
Block 1
differently to Block 0 considers the independent variables and contains the following charts:

Omnibus Tests of Model Coefficients
Omnibus tests of model coefficients (Figure 3:15) show the result of the Likelihood Ratio (LR) test which indicates if the introduction of the independent variables contributes significantly to model fit. A p-value (sig) lower than 0.05 for block means that the new block model is a significant improvement to the initial model (The university of Shffield, 2013).
**Model Summary**

In standard regression, the coefficient of determination (R2) value indicates how much variation in y is explained by the model. This cannot be computed for logistic regression, since it is not based on the formula for a line (as it happens for the linear regression). However, someone indicates new ways to estimate an R-square like measure, giving the name of “pseudo” r square (Jenster, 2011). The “Model Summary” table (Figure 3:16) shows values for two pseudo R2 values.

![Model Summary Table]

**Hosmer Lemeshow Test**

Hosmer-Lemeshow test is a statistical test to evaluate the goodness of fit for the regression model. In particular, the test indicates whether the observed event rates match the expected rates in population subgroups. The output (Figure 3:17) shows a chi-square value and a p-value. A small p-value mean that the model is a poor-fit (Statistichowto, 2017). It should be said that a large p-value does not imply that the model fits well, since lack of evidence against a null hypothesis is not equivalent to a positive evidence of the alternative hypothesis. For instance, if a sample is small, a high p-value may just be a consequence of the test which has a lower power to find misspecification, rather than being indicative of good fit (Barlett, 2014).

![Hosmer-Lemeshow Table]

Figure 3:16 Model Summary

Figure 3:17 Hosmer-Lemeshow test
Classification Table Block 1

This table (Figure 3:18) is the respective of the one in the initial Block, but now it relies on the model that incorporates our explanatory variables (Restore, 2011). This box refers to how well the software can predict the outcome Y with the additional information about the independent variables.

![Classification Table](image)

Figure 3:18 Classification Table

Variables in The Equation

Two columns (Figure 3:19) are necessary to evaluate the relevance of the determinants:

- Exp(B): this column basically indicates how strong the significant variable is. For instance, minorities have almost 7 times the likelihood of getting the outcome compared to non-minorities.
- Sig.: this column points out if the next column Exp(B) means anything. To be significant, it needs to be lower than 0.05, otherwise the output identified by the next column might just happen randomly.

![Variables in the Equation](image)

Figure 3:19 Variables in the Equation
3.2.4 Qualitative Comparative Analysis

According to Ragin, Qualitative Comparative Analysis is defined as a data analysis technique which determines which are the logical conclusion that a data set supports. (Cohen, 2013; Ragin, 2009; Wagemann, 2009) This kind of analysis starts with listing and counting all the combinations of the variables that are present in the data set, applying the rules of logical inference to determine which descriptive inferences or implication the data we have selected supports. It is a set-theoretic approach that search for causality and differs from probabilistic methods, which examines the independent influence of variables to the outcome. Regression models are focused on which factor, holding all other factors constant, will increase (or decrease) the likelihood of an outcome. QCA researches instead which conditions, alone or in combination with other conditions, are necessary or sufficient to develop an outcome (Cohen, 2013; Kane, Lewis, Williams, & Kahwati, 2014; Ragin, 2009; Wagemann, 2009).

In the following lines we want to describe the main characteristics of QCA developed by Ragin, with the purpose of answering three specific questions (Wagemann, 2009):

- Has a Relevant Determinant a casual role for the outcome of analysis?
- If so, it is a sufficient or necessary condition?
- If a condition has a relevant causal role for the outcome but it is neither sufficient, nor necessary, how its role can be specified?

QCA analysis is a method that bridges qualitative and quantitative analysis. This means that to run this analysis an in-depth knowledge of the argument is fundamental. QCA makes possible analysing casual complexity through a deep study of INUS (Insufficient but Necessary parts of casual recipes which are themselves unnecessary but sufficient) conditions, which helped us in answering the third question mentioned above. Thanks to this method it can be assessed very complex causation, involving different combinations of casual conditions capable of returning the same outcome (Cohen, 2013; Ragin, 2009; Wagemann, 2009).
To run the QCA, we used the fsQCA Software, which has an online manual very useful for the analysis (Legewie, 2013). In the following lines we want to describe the main steps we followed in the analysis of QCA (Figure 3:20):

As it happened for the Logistic Regression Analysis, we decided to analyse two different samples to make our study more complete and precise: American and European Digital Sport Startups. The aim is to discover the similarities and differences regarding the geographical areas in which the startups were funded.

Two different kind methodologies could be used: The Crispy set QCA (csQCA) which works only with dichotomous variables and the outcome must be just present or absent, and the fuzzy set QCA (fsQCA) which instead could include values between 0 and 1. Our analysis is performed through the first methodology since every single variable is dichotomous: 1 means presence while 0 absence (Schneider & Wagemann, 2010; Wagemann, 2009).

Finally, the researcher computes two parameters of fit, coverage and consistency: Coverage defines the empirical relevance of a solution and quantifies the variation in causal pathways to an outcome. When coverage of a causal pathway is high, the more common the solution is, and more of the outcome is accounted for by the pathway. Consistency instead determines whether the causal pathway produces the outcome regularly. A high consistency value states that all cases in a causal pathway generated the outcome. A causal pathway with high consistency and coverage values indicates a result useful for providing guidance (Kane, Lewis, Williams, & Kahwati, 2014).

**IDENTIFICATION OF RELEVANT DETERMINANTS**

QCA is usually applied to researches involving small and medium sample size and is characterised by the existence of a relationship between the number of cases and the variables selected. Claudius Wagemann converted this discussion moving to the direct relationship between the number of variables and the truth table rows (number of possible configurations
developed by the software). He observed that the number of rows present in the truth table exponentially increase with number of conditions adopted:

\[ r = 2^k \]

where \( r \) refers to the number of rows of the truth table while \( k \) measures the number of variables. Reasoning in this way, it results that in analyzing 2 different conditions, we will need 4 different configurations. Selecting 4 conditions, the configurations performed by the software will be 16. Thus, we should resort on as many cases as the number of rows in the truth tables are. But having too many conditions will be a problem when no cases fall into a particular configuration. Heather Kane pushed us in the selection of Digital Sport Startups number. It suggests that ideally, for a case study with a small (e.g., 10–15) or intermediate (e.g., 16–100) sample sizes, one should aim for fewer than five conditions (Cohen, 2013; Kane, Lewis, Williams, & Kahwati, 2014; Ragin, 2009; Wagemann, 2009). Taking a cue from the last sentence, we chose for both samples (European and American) 16 different Digital Sport Startups (8 opened and 8 closed) and 4 relevant determinants imported by the Logistic Regression Analysis as is shown by the following table (Table 3:4):

<table>
<thead>
<tr>
<th>Variables from Regression</th>
<th>Relevant</th>
<th>Possible to be Used</th>
<th>Effectively Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Competences</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Single/Multi Founder</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Sport/Business side</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Technology</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Multi/Single Sport</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Amateur/Professional</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

*Table 3:4 Variables Imported to QCA*

**PROCESS OF ANALYSIS**

Now we are going to describe the process of analysis we followed to run a Crispy Set Qualitative Comparative Analysis according to the guide of Thomas Elliot (Elliott, 2016):
1. Construct a “Truth Table” that represents all possible combinations of conditions, even those without empirical instances. It sorts the cases following the combinations of the casual conditions that they show.

2. Assess the consistency of each configuration formed by the software considering the outcome: the consistency score 1 or 0 indicates perfect consistency, other scores indicate inconsistency.

3. Identification of contradictory rows: the casual conditions which consistency scores are not equal to 0 or 1 are substituted or eliminated.

4. Delete Empty Rows: Drop any rows with no cases. These rows are called Remainders, since they don’t include any data and they are eliminated to simplify the solution.

5. Code the Outcome: choose the consistency cut off at 1, sort by row consistency and fill the empty column with 1s for rows consistent with the outcome and 0s otherwise. The software now minimizes the truth table rows with Boolean logic to create simpler solutions.

6. Prime Implicants: some solutions selected by the software are redundant. It’s a choice of the researcher to include or not additional implicants in the final solutions.

7. Intermediate Assumptions: Simplifying assumptions that are theory-driven of how a given condition might be casually related to the outcome (Legewie, 2013).

RESULTS

Lastly, the software presents three solutions deriving from the truth table analysis:

- Complex solution: it does not take into account any counterfactual cases (rows without cases, remainders).
- Parsimonious solution: it permits the use of any remainder that will yield simpler (or fewer) recipes. If a reminder leads to a simpler solution, it will be included in the solution (Elliott, 2016).
- Intermediate solution: it differentiates between “easy” and “difficult” assumption, and just the first category of remainders are included in the simplifying solution. This analysis is input by the user and it is based on its theoretical and substantive knowledge (Intermediate).
There is no solution which is better than others, but typically researchers show the Intermediate Solution, as it is simpler compared to the complex solution and not present assumptions that cannot be justified (Elliott, 2016). Thus, according to what explained by literature, we decided to consider the “Intermediate Solution” for defining the sufficient conditions (X is sufficient for Y, if Y is present every time X is present).

The last step we faced in performing the QCA analysis was to define the Necessary Conditions. X is necessary for Y if it is present every time Y is present. A necessary condition is a superset of Y. QCA software allows to compute single necessary conditions or more often it happens that a combination of conditions can be considered as necessary for the target outcome.
4 Analysis and Results

This chapter is the heart of our work and provides relevant insight about the situation of Digital Sport Startups in the sport ecosystem. After having defined all the fields of the database and having completed the fulfilment of it, it was possible to proceed with the analysis to discover the possible interactions between the different voices of the worksheet.

4.1 Descriptive Statistics

The main aim of this chapter was to understand which were the relationships between each factor that characterize Startups’ operating activities, trying to describe a general overview of the Digital Sports Ecosystem and how Startups’ peculiarities influence each other. First of all, we wanted to give an overview of the subdivision of Digital Sport Startups according to the Macro-Category Model we built to better understand where Entrepreneurs develop innovation in the Digital Sport industry. The second issue we wanted to show as regards the model, is to understand which of the 4 main Areas is the best environment for Digital Sport Startups to live, compete and win. To reach this goal, we decided to rely on the survival rate. Lastly 6 different descriptive variables are measured according to the following schema (Figure 4:1 Descriptive Statistics Flowchart):
The figure represents the logical flow we followed in the analysis: we concentrated firstly with on a **Global Focus**, introducing a general overview of Digital Sport Startups’ distribution in the World and then we focused on two different context such as North America and Europe and lastly on Italy. The main purpose is to highlight, when possible, whether between the place in which we live and the world in general. Then we developed a bipartite analysis focusing on the **Club/Federation** and the **Amateur** World.

All the analyses have been conducted considering a time window between 2011 and 2016 and a final number of Startups of 988.

### 4.1.1 Digital Sport Startups Domain Distribution

![Domain Distribution](image)

As we defined in chapter 1, Digital Sport Startups serve the sport industry in 4 main different domains. We wanted to give an overview of how Digital Sport Startups are divided in terms of end-users and application field, following the schema given by the Macro-Categories Model. We can observe that the 53% of the startups (Figure 4:2) is directed to the Professional World, the 40% just to the Amateur World and the 7% both to the Professional and Amateur World. This last set represents every single Digital Sport Startups which develop a product or service
for the sport industry which can serve both professional and amateur market, without any difference. In all our following analyses, we decided to consider this middle ground a part of the Professional World just for sake of simplicity: Digital Sport Startups are now subdivided in 60% for the Professionals and 40% for the Amateurs. Then we analysed the startups in the 4 quadrants of the model: the combination Business and Professional World has the higher percentage (37%), followed by Sport and Amateur World (25%), Sport and Professional (23%) and lastly Business and Amateur World (15%).

4.1.2 Startups Subdivision: Dead/Alive

![DOMAINS DIAGRAM](image)

The second issue we wanted to show as regards the model, after having identified Business/Professional as the main area of interest for Digital Sport Startups, is to understand which of the 4 main Areas is the best environment for Digital Sport Startups to live, compete and win. To reach this goal we measured we decided to rely on the survival rate. In the figure above (Figure 4:3), we can observe the distribution of the startups dead and alive in the 4 quadrants. As explained previously, to state whether a Startup is successful or not, we relied on information coming from its Website. If it was reachable, the startups was surely opened,
otherwise we introduced Social Network factors before saying it was dead. This was the only measure of performance available to analyse the success of the Digital Sports Startups, since we did not have complete information about financial indicators.

There are 111 startups dead and 255 alive in the Business and Professional World, 75 dead and 155 alive in the Sports and Professional World, 29 dead and 116 alive in the Business and Amateur World and 77 dead and 170 alive in the Sports and Amateur World. The percentage of dead is 30% in Business and Professional, Sports and Professional and Sports and Amateur quadrants, while is lower (20%) in the last quadrant Amateur and Business.

4.1.3 Descriptive Variables

We decided to start with the broadest possible view to examine first where startups concentrate more innovation and for whom, which are the main technologies used and lastly the main areas of development in terms of Sport, Categories, application field. For each variable we decided to provide then a focus on the Italian Situation and a separated analysis for what concern Amateur and Professional World to understand whether similarities and differences exist. Additionally, for Sport and Macro-Category sections we decided to provide a deep focus on what happens in the North American and European Context since they were the main market of interests for further analysis that are developed with inferential statistic and QCA and they are the two sections where these two worlds find out major number of differences according to what was explained in the Introduction Part.
First of all, we decided to show the temporal trend (Figure 4:4) related to a growing number of Digital Sport Startups. It has been observed an increasing trend from 2011 to 2014, year in which we have the peak of birth (259). In 2015 the number remains stable (250), instead there is a lower number (183) in 2016. This last information should not freak out since it might be possible that data present in the main sources of information we consulted are not yet recently update and thus just a small number of Digital Sport Startups born in 2016 could be included in the source of data.
Italian Situation

From the chart (Figure 4:5), we can observe that in Italy there is an increasing trend from 2011 to 2015 in which we have the peak (15) even thought, differently compared to the global situation, in 2014 a sligh decline of the number of Digital Sport Startups is displayed. As seen in the Global analysis, there is a light decline in 2016.
In line with the Global situation, there is an increasing trend between 2011 and 2014 (161 peak of the Startups’ birth) (Figure 4:6). In 2015, the number of new startups born remains more or less stable (157), whereas 94 Digital Sport Startups are present at the moment in our sources of information for the 2016. On the other hand, Amateur world present more or less the same situation. It starts from 10 Digital Sport Startups in 2011 and increases this number reaching the top in 2014 (98), remained stable at level of 2015 and 2016.
GEOGRAPHICAL DISTRIBUTION OF DIGITAL SPORT STARTUPS IN THE DATABASE

Global Situation

Figure 4.7 Startups per Continent

Downline of the temporal distribution, it was logic to provide a visual tool (Figure 4:7) for the distribution of the 988 Digital Sport Startups categorised in the database around the world. North America is the continent with the highest number of startups (543), followed by Europe (303), Asia (86), Oceania (34), South America (18) and lastly Africa (4). Thus, North America is the main continent where Digital Sports Startups find fertile ground to develop innovative and creative ideas, followed by Europe and by Asia.
Concentrating the attention on Italy, me made an analogous analysis on Digital Sport Startups’ distribution but focused on regions (Figure 4:8). The distribution in the regions, follow this order: Lombardia (20), Lazio (7), Liguria (6), Trentino-Alto Adige (6), Emilia-Romagna (4), Veneto (4), Piemonte and Puglia (1). As we can notice the North Italy has the major concentration of Digital Sport Startups.
Professional Vs Amateur

Referring to Professional World, we can see how North America is the continent where there is the highest proliferation of Digital Sports Startups (Figure 4:9) with 352 new innovative businesses, followed by 171 firms working in Europe, 38 in Asia, 24 in Oceania, 9 in South America and 2 in Africa. As observed in the Global Situation, a great boost to the birth of new Digital Startups in the Sports ecosystem is given by the North America and Europe. The same situation was displayed considering the Amateur World where the continents with the higher proliferation of new Digital Sports Startups are North America (191) and Europe (132). These two continents are then followed by Asia with 48 startups, Oceania with 10, South America with 9 and Africa with 2. In comparison with the Professional World, we observed that, differently from the other continents in which offers are more directed to the Clubs and Federations, Asia has a higher number of Digital Sports Startups for Amateurs (48) than Professional (38).
MACRO-CATEGORY DISTRIBUTION OF DIGITAL SPORT STARTUPS IN THE DATABASE

Global Situation

We globally identified the categorization of 4 main Macro-Category where Digital Sport innovation is created. Thus, we tried to access in a quantitative way how Sport and Business side are split into their related Macro-Categories. Referring to figure (Figure 4:10), they are subdivided in the following way: 477 directed to the Athlete/Team and thus to the Sport side, instead the Business side displayed 335 Digital Sport Startups working for a better engagement of Fans, 164 providing solutions as regards Facilities Area and 12 for the management of the Brands. We can observe that Digital Sports Startups provide a great amount of offers for Athlete/Team and Fan (812 on 988, 82%).

Figure 4:10 Macro-Category Distribution
North America Vs Europe

In the figure above (Figure 4:11), we can observe that in North America, Fan is the Macro-Category with the highest number of Digital Sport Startups (206), followed by the Athlete/Team for Amateurs (134), Athlete/Team for Professionals (130), Facilities for the Amateur World with (57), Facilities for Professional World (11) and Brands (5).

Figure 4:11 Macro-Categories Model: North America

In the figure above (Figure 4:12), we can observe that in Europe, Fan is the Macro-Category with the highest number of Digital Sport Startups (84), followed by the Athlete/Team for Amateurs (77), Athlete/Team for Professionals (78), Facilities for the Amateur World with (54), Facilities for Professional World (6) and Brands (4).

Figure 4:12 Macro-Categories Model: Europe
From the chart (Figure 4:12) we can note that in Europe the Macro-Category related to Fan is the more represented with 84 Digital Sport Startups. The second more represented is the Athlete/Team for Amateurs with 78 solutions followed by Athlete/Team for Professionals with 77, Facilities for Amateurs with 54, Brands with 6 and Facilities for the Professional World with 4.

**Italian Situation**

Italy shows its main focus on the Sport Side (Figure 4:13), with more than 50% of Digital Sport Startups offering service or products to Athletes and Team (29), followed by Fan engagement (10), Facilities (9) and Brands (2) to which Digital Sport Startups Are less concentrated.

![Figure 4:13 Distribution of macro Category in Italy](image)
Professional Vs Amateur

In the professional world great importance is given to the Athlete/Team Macro-Category (Figure 4.14), that is the largest represented with 355 Startups, followed by the Fan Macro-Category with 230 Digital Sports Startups. Merged together these two Macro-categories represent 95% of the Professional World Sample. Less importance is addressed to other two Macro-Categories, which have respectively 19 Startups (Facilities) and 12 Startups (Brands). On the other hand, analysing the Amateurs, we can observe that there are just two Macro-Categories that are interested by startups: Athlete/Team, that is the largest with 247 solutions offered, and Facilities with 145 offers, highly pushed by the category of Events Arrangements.

Figure 4.14 Professionale vs Amator - Macro-Category
The aim of this section was to display the Digital Sport Startups’ utilization of new technologies analysed and described in chapter 1 (Figure 4:15). Platform clearly Results the most exploited technology with 462 Digital Sport Startups using them to offer their product or service to the customer. Application and IoT – Wearable follow with 330 and 135, which leads us to an evaluation of the importance of going mobile. Lastly, we can observe complex technologies like Cameras (18), Virtual reality (12), Augmented reality (10) and Artificial intelligence (3) which are used to serve this market even though in smaller number.
From the figure above (Figure 4:16), we can see that in North America, the technology more used is the Platform (225), followed by solutions that adopt Applications (210), IoT -Wearable (86), Virtual Reality (5), Augmented Reality (6), Cameras (6) and last Artificial Intelligence (3).

Similar is the situation in Europe: the technology more employed is the Platform with 161 solutions developed, at the second place we found out the Applications with 73 Digital Sport Startups that use it, followed by the IoT – Wearable with 52, Cameras with 10, Virtual Reality with 5 and Augmented Reality with 2.
The histogram above (Figure 4:17) provides a quick view about the distribution of Digital Sport Startups among different technologies in Italy. The leading technology, as the global situation showed, remains Platforms with 28 Digital Sport Startups relying on it to serve the sport market. Differently instead is what at second place is displayed. IoT – Wearable technology (12) is more used than applications, confirming the importance of the Sport Side for the Italian Situation. Cameras (3) and Virtual Reality (1) are adopted even in Italy, but on the other hand, there is no presence of Augmented Reality and Artificial Intelligence.
Comparing Professional and Sport Side (Figure 4:18) we can notice that both of them shows the same trend, with Platform always called as the leading category, followed by applications and IoT – Wearable and lastly by more complex technologies which are present in really lower numbers compared to the first three technologies just mentioned. The Professional world present high differences in utilization between Platforms (302), applications (184) and IoT – Wearable (75), which is not the case of the Amateur side where Platforms (160), Applications (146) and IoT – Wearable (75) show a more similar usage rate. A particular we can notice is that Augmented Reality and Artificial Intelligence are not adopted in the Amateur World while Cameras and Virtual Reality are present.
**Technology: Use of Analytics**

Data Mining is a fundamental tool to identify possible insights in our business or to offer a better product experience. From the chart above (Figure 4:19), we can see that at least 35% of the Startups (203) use analytics for their offer, whereas 65% of them (393) did not adopt it.

An additional focus was needed to better understand how Analytics are spread among the 4 Macro-Categories (Figure 4:20). We observed that Data Mining is more adopted by Athlete/Team with 133 Startups, followed by the Fan with just 62. The use of Data Mining in the Athlete/Team is pushed by wearables, that transform the information of the sensors to provide insights for improvements in training and in preparation of the game.

**SPORTS DISTRIBUTION OF DIGITAL SPORT STARTUPS IN THE DATABASE**

*Global*

---

**Figure 4:19 Distribution of Analytics**

**Figure 4:20 Distribution of Analytics per Macro-Category**

---

**Figure 4:21 Distribution Multi Sport vs Single Sport**

**Figure 4:22 Single Sport Distribution**
Serving different kinds of Sports can make the difference and this is a relevant choice to take when Entrepreneurs start a new business in the Digital Sport Industry. They need to decide firstly whether their new firm will be vertically integrated on just one Single Sport or it can be not specialized but serve different a broader market focusing on more different sports, without any differences. As we can see from the figure (Figure 4:21), Entrepreneurs preferred to be strictly focused on a single Sport (516 Digital Sport Startups are present in this category) rather than offering their service or product to a broader industry (472 Digital Sport Startups analysed in the Multi-Sport Category).

Focusing on specialized new ventures (Figure 4:22), the main sports to which offers are addressed are: Fitness with 249 Digital Sport Startups, Football with 93 and Basketball with 24.

**North America vs Europe**

![Distribution Multi-Sport vs Single-Sport - North America vs Europe](image)

As we can see from the chart above (Figure 4:23), in North America more Digital Sport Startups are developed for Multi-Sports with a number of 291, whereas for Single-Sport are 252. As regards the European situation, we can observe that 187 solutions are addressed to Single-Sport and 116 to the Multi-Sport.
In the figure above (Figure 4:24), we can observe that in North America the majority of Digital Sport Startups are addressed to Fitness with 137 (on a total amount worldwide of 249) solutions developed, Basketball and Golf with 17, American Football with 14 and Tennis with 7. In the Europe, Football is the sport to which more solutions are directed with 55 (on a total amount worldwide of 93). The other sports more present are: Running with 9, Cycling with 6 and Equestrian Sports with 6.

**Italian Situation**

Specialized Digital Sport Startups (28) are preferred even in Italy compared to those ones serve more Sport (22) (Figure 4:25). On the contrary, the Italian situation shows Football (Figure 4:26) as the leading sport, where 11 Digital Sport Startups developed product or service to serve
this market, confirming its importance for what concern Italians sports preferences. Other two main sports are considered relevant talking about innovation: Fitness and Basketball respectively with 5 and 2 Digital Sport Startups. The category “Others” includes 10 different minor or less viewed sport such as swimming, tennis, volleyball, boxing.

*Amateur vs Professional*

![Distribution Multi-Sport vs Single-Sport - Amateur vs Professional](image)

*Figure 4.27 Distribution Multi/Single Sport - Amateur vs Professional*

In the Professional World, great attention is addressed to the Multi-Sports category (67%), pushed by all the solutions for Fan engagement and Athlete/Team that can be used by different sports without any constraint, in order to reach more customers with Digital Sport Startups’ solutions. Only 33% of Digital Sports Startups in the Professional World is directed to just a Single Sport (Figure 4.27).

On the other hand, Amateur World displays a situation totally reversed where Single Sport is widely the leading Category with 318 Digital Sport Startups specialized in just one Sport, while only 74 enlarging their proposal to serve different sports without any differences.
Focusing on Single Sport Category we can notice how the Amateur Side (Figure 4:29) matches almost perfectly with Fitness (249), followed by Football (14), Running (10), Golf (9) and Basketball (4). Focusing just on the Single Sports side for Club and Federations (Figure 4:28), the sport more represented is Football, which has the largest number with 79 Digital Sports Startups, followed by Basketball (20), American Football (14), Golf (13), Cycling (10), Equestrian Sports (7), Tennis (7), Running (6), Baseball (4). All the other sports which are represented with less than 3 Digital Sport Startups are merged in the “Others” category (38).

**SNAPSHOT ABOUT CATEGORIES, SPORT AND TECHNOLOGIES OF WORLD’S DIGITAL SPORT STARTUPS**

Since not every Macro-Category has the same weight in the global landscape, we decided to provide an additional analysis. With the following charts we wanted to create a snapshot about how the main Sport category above mentioned are distributed among the 3 main categories (Events Arrangements, Mobile Fan Experience and Training) matched with the 3 most relevant technologies (App, IoT – Wearable and Platform).
We can observe from the charts above that for Multi-Sport (Figure 4:31), in sport such as Football (Figure 4:32) and Basketball (Figure 4:30) is given great importance to the Fan Engagement, since the highest percentage of solutions was developed for the Mobile Fan Experience, with App and Platforms as the technologies more adopted, whereas a marginal role is played by the Athletic Performances.

Different is the case of Fitness (Figure 4:33) where great effort is concentrated on the Athlete or Team. The highest number of offers is provided for training category with a similar distribution of the technologies (54 for App, 42 for IoT – Wearable and Platform). As regards the Events Arrangements category, which includes every Startups heel to find a venue where practicing the physical activity, the most used technology is the Platform with 33 solutions, followed by Applications with 29.
Lastly, we wanted to make an additional note for what concern the E-gaming category (Figure 4.34), since it is of the opinion that it could be a one of the most interesting trend related to the Fan engagement. It is a new form of fan Engagement that Clubs and Federations can adopt to engage large fan base, in particular the millennials. On 988, 69 Digital Sport Startups rely on E-Gaming. We can observe from the chart that from 2012, there is an increasing trend in the birth of Digital Sports Startups addressed to E-Gaming, with a peak in 2015 with 24 Startups. As explained above in 2016 we can see a slight decreasing trend in the creation of new Digital Sport Startups for E-gaming: this is due to the fact that the sources where we collected information did not have complete information for the recent years.
5 Logistic Regression

In the following lines, we are going to show provide the analysis and the results developed with the Logistic Regression.

The aim of this analysis was to understand which were the relevant determinants that lead to Digital Sports Startups’ success.

The investigation was split in two samples since it is of the opinion that they are different contexts and cannot be considered in one single analysis:

- 234 Digital Sport Startups born in North America between 2013 and 2015.
- 112 Digital Sport Startups born in Europe between 2013 and 2015.

First of all, we wanted to briefly recap which variables were used in the following process:

- the dependent variable: “Startup Opened/Closed”, which indicates whether the firm was still alive or not at the moment of the analysis. With \( Y=1 \) the software defines a Digital Sport Startup as Opened, while with \( Y=0 \) it refers to one that is closed
- the independent variables: the reasoning adopting for independent variables is more complex and we decided to summarize it with the following table (Table 5:1)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Reference Category</th>
<th>Variable Output Codification</th>
<th>Categorical Variables (North America)</th>
<th>Categorical Variables (Europe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sport/Business side</td>
<td>Business</td>
<td>Sport/Business side (1)</td>
<td>Sport</td>
<td>Sport</td>
</tr>
<tr>
<td>Multi/Single Sport</td>
<td>Single Sport</td>
<td>Multi Single Sport (1)</td>
<td>Multi Sport</td>
<td>Multi Sport</td>
</tr>
<tr>
<td>Technology</td>
<td>Platform</td>
<td>Technology (1)</td>
<td>Ai</td>
<td>App</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology (2)</td>
<td>App</td>
<td>Ar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology (3)</td>
<td>Ar</td>
<td>Cameras</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology (4)</td>
<td>Cameras</td>
<td>IoT – Wearable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology (5)</td>
<td>IoT – Wearable</td>
<td>Vr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology (6)</td>
<td>Vr</td>
<td>/</td>
</tr>
<tr>
<td>Amateur/Professional</td>
<td>Professional</td>
<td>Amateur/Professional (1)</td>
<td>Amateur</td>
<td>Amateur</td>
</tr>
<tr>
<td>Single/Multi Founder</td>
<td>Multi Founder</td>
<td>Single/Multi Founder (1)</td>
<td>Single Founder</td>
<td>Single Founder</td>
</tr>
<tr>
<td>Economic Competencies</td>
<td>No</td>
<td>Economic Competencies (1)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Table 5:1 Categorical Variables*
Through the table above (Table 5:1), we decided to highlight which are the reference categories we have chosen and the codification of this different variables in the output for both cases (North America and Europe) to facilitate the reading of the final result present in the table “Variables in the equation”.

Results for both samples includes the analysis of two main block:

- Block 0: Beginning Block: in this part “Null Model” is described, which is the model that does not contain predictors, but takes into account just the intercept.
- Block 1: the most interesting part to study, in which are present very important charts to evaluate the goodness of the model and which variables could be relevant determinant for the outcome Y.

5.1 North America

5.1.1 Block 0:

*Classification Table*

<table>
<thead>
<tr>
<th>Osservato</th>
<th>Previsto Startup OPENED/CLOSED</th>
<th>Percentuale di correttezza</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fase 0</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>Percentuale globale</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 5:1 Classification Table Block 0 North America*

Observing the overall percentage in Block 0 (Figure 5:1), we can see that the SPSS software initially predicted correctly 59% of the cases taken into account. This measure is predicted without considering a potential correlation with all the independent variables but just relying on what the software knows about the Dependent one. This value is the starting point to compare with the overall percentage in Block 1.
5.1.2 Block 1

Omnibus Tests of Model Coefficients

Looking at the significance of the Omnibus Tests (Figure 5.2), the p-value displayed is equal to 0.138. This means that the introduction of the independent variables doesn’t contribute significantly to model fit, since the threshold has to be lower than 0.05.

Model Summary

The “Model Summary” table (Figure 5.3) shows values for two pseudo R2 values. In standard regression, the coefficient of determination (R2) value indicates how much variation in y is explained by the model. This cannot be computed for logistic regression, since it is not based on the formula for a line. SPSS software computed here the R-square di Nagelkerke, which, according to Perugini (a professor of the University of Bicocca of Milan) is the most one used related to the American sample and it is a little bit low (0.09).
**Hosmer-Lemeshow test**

The value represented in the table (Figure 5:4) is 0.884, indicating no evidence of poor fit. Thus, we can state that the model is correctly specified.

**Classification Table**

<table>
<thead>
<tr>
<th>Osservato</th>
<th>Previsto Startup OPENED/CLOSED</th>
<th>Percentuale di correttezza</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fase 1 Startup OPENED/CLOSED</td>
<td>No</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>23</td>
</tr>
<tr>
<td>Percentuale globale</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The overall percentage in Block 1 (Figure 5:5) is 62.4%, and comparing this value with the overall percentage of the Classification Table in Block 0 (59%), we can safely say that there is an improvement in the Percentage of Correctness of 3.4% thanks to the introduction in the model of the independent variables.
From the chart above (Figure 5:6), we can observe that just the variable Multi/Single Sport is significant for the model. The significance is 0.014 that is lower the threshold we fixed. All the other variables analysed instead have a significance value that is higher than 0.05 and this means that they are not correlated with the success of a Digital Sport Startup in North America.
5.2 Europe

5.2.1 Block 0

Classification Table

<table>
<thead>
<tr>
<th>Osservato</th>
<th>Previsto</th>
<th>Percentuale di correttezza</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup OPENED/CLOSED</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>Percentuale globale</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 5.7 Classification Table Block 0 Europe*

In the European case, the Overall Initial Percentage of correctness computed by the SPSS software in the Block 0 (Figure 5.7) is represented by the value 71.4%. As in the American case, this number has to be compared with the value computed in the Overall Percentage of Block 1.

5.2.2 Block 1

Omnibus Tests of Model Coefficients

<table>
<thead>
<tr>
<th>Test omnibus dei coefficienti del modello</th>
<th>Chi-quadrato</th>
<th>gl</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 Fase</td>
<td>25,959</td>
<td>10</td>
<td>.004</td>
</tr>
<tr>
<td>Phase Blocco</td>
<td>25,959</td>
<td>10</td>
<td>.004</td>
</tr>
<tr>
<td>Phase Modello</td>
<td>25,959</td>
<td>10</td>
<td>.004</td>
</tr>
</tbody>
</table>

*Figure 5.8 Omnibus Test of Model Coefficients Europe*
The p-value that we can observe in the table (Figure 5:8) is equal to 0.004. This means that the introduction of the independent variables contributed significantly to model fit, since the threshold has to be lower than 0.05.

**Model Summary**

<table>
<thead>
<tr>
<th>Riepilogo del modello</th>
<th>Logaritmo della verosimiglianza - R quadrato di Cox e Snell</th>
<th>R quadrato di Nagelkerke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fase</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>108.053&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.207</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.296</td>
</tr>
</tbody>
</table>

*Figure 5:9 Model Summary Europe*

The result of Nagelkerke R square in the table (Figure 5:9) of the Model Summary is 0.296, which means that almost the 30% of the Y variation is explained by the model (even though we need always to remember that we are talking about a Pseudo R-square).

**Hosmer Lemeshow Test**

<table>
<thead>
<tr>
<th>Test di Hosmer e Lemeshow</th>
<th>Fase</th>
<th>Chi-quadrato</th>
<th>gl</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>8,335</td>
<td>8</td>
<td>.401</td>
</tr>
</tbody>
</table>

*Figure 5:10 Hosmer - Lemeshow Test Europe*

As explained above, the significance of Hosmer – Lemeshow test has to be higher than 0.05. In the table above (Figure 5:10), we can observe that the significance is 0.401, indicating no evidence of poor fit. Thus, we can state that the model is correctly specified.
The overall percentage of correctness of the Classification Table of the Block 1 (Figure 5:11) is 72.3%. Comparing this value with the overall percentage of the Block 0, we can state that there is an improvement of 0.9% (from 71.4% to 72.3%) thanks to the introduction of the independent variables in the model.

**Variables in the Equation**

From the table above (Figure 5:12), we can observe which variables in the equation tested are relevant determinants for the success of Digital Sports Startups. Comparing the value of Significance with the threshold value (0.05) and codifying each variable with the help of the
table represented above (Table 5:1), we can declare that the variables Business side, IoT – Wearable, Amateur and Economic Competencies have a good correlation in making the outcome occur. Looking more in detail we can also access how strong the significant variable is, considering the coefficient Exp (B).

- Business have 4 times the likelihood of getting the outcome compared to Sport.
- IoT – Wearable have 7 times the likelihood of getting the outcome compared to Platform.
- Amateur have 3 times the likelihood of getting the outcome compared to Professional.
- Economic Competence have 3 times the likelihood of getting the outcome compared to No-Economic Competences.

Through the following tables we wanted to sum up the main results of the analysis, counterpoising the Northern American and European situation. We need to remember that we started from a situation in which the initial model predicted correctly the 59% of cases in the American Sample and the 71.4% of cases in the European Sample (data given by The classification tables of Block 0 of the 2 analysis respectively). Results are summarized in 2 different tables:

- Table 1: Goodness of fit of the model is showed.
- Table 2: correlation of the dependent variable with the outcome is showed.
In the chart above (Table 5:2), we can observe that the Overall Percentage of correctness of Block 1 is higher than the Overall Percentage displayed by Block 0 for both cases. The Omnibus test of Model Coefficients has a good value (less than 0.05) for the European sample, whereas it is higher for the Northern American Startups (0.138). Analysing the Nagelkerke R Square, the value computed by the software is higher in Europe (0.296) than in North America (0.090). As regards Hosmer Lemeshow test, the value calculated by SPSS Software is perfect for both cases taken into account.
**TABLE 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Threshold</th>
<th>Criteria</th>
<th>North America</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sport/Business side (Business)</td>
<td></td>
<td></td>
<td>0.536</td>
<td>0.010</td>
</tr>
<tr>
<td>Multi/Single Sport (Single Sport)</td>
<td></td>
<td></td>
<td>0.014</td>
<td>0.585</td>
</tr>
<tr>
<td>Technology (app)</td>
<td></td>
<td></td>
<td>0.724</td>
<td>0.348</td>
</tr>
<tr>
<td>Technology (ar)</td>
<td></td>
<td></td>
<td>0.411</td>
<td>0.999</td>
</tr>
<tr>
<td>Technology (cameras)</td>
<td></td>
<td></td>
<td>0.377</td>
<td>0.999</td>
</tr>
<tr>
<td>Technology (IoT – Wearable)</td>
<td></td>
<td></td>
<td>0.225</td>
<td>0.022</td>
</tr>
<tr>
<td>Technology (vr)</td>
<td></td>
<td></td>
<td>0.459</td>
<td>0.999</td>
</tr>
<tr>
<td>Amateur/Professional (amateur)</td>
<td></td>
<td></td>
<td>0.112</td>
<td>0.041</td>
</tr>
<tr>
<td>Single/Multi Founder (Single Founder)</td>
<td></td>
<td></td>
<td>0.382</td>
<td>0.451</td>
</tr>
<tr>
<td>Economic Competencies (Yes)</td>
<td></td>
<td></td>
<td>0.092</td>
<td>0.032</td>
</tr>
</tbody>
</table>

Table 5.3 Logistic Regression Solution Summary 2

In the chart above (Table 5:3), we can observe that in Europe the variables that are significant for the success of a Startup are: Sport/Business side, Technology, Amateur/Professional and Economic Competencies, whereas in North America just the variable Multi/Single Sport is relevant for the outcome to occur. All the other variables are not significant for explaining the model.
6 QCA

In this section of the thesis, we wanted to display the analysis and the results computed through the Qualitative Comparative Analysis.

The aim of this analysis was to explain the occurrence of the success of Digital Sport Startups, starting from the comparison between the different combinations of logic conditions (independent variables) that characterize the cases where the outcome is verified and the cases in which is not achieved.

As in the Logistic Regression analysis, also in the QCA the investigation has been divided in two main routes:

- 16 Northern American Startups born between 2013 and 2015 (8 opened and 8 closed)
- 16 European Startups born between 2013 and 2015 (8 opened and 8 closed)

The dependent variable we defined was the variable “Startup Opened/Closed”. As explained above, it specifies whether the Digital Sport Startup was Opened or Closed at the moment in which the analysis has been conducted.

The independent variables we selected were:

- Sport/Business side.
- Amateur/Professional.
- Single/Multi Founder.
- Economic Competencies.

All these variables are dichotomous. In the following table (Table 6:1) we wanted to sum up how the independent variables will be translated in the output of fsQCA software.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Variable Codification (1)</th>
<th>Output Codification (1)</th>
<th>Variable Codification (0)</th>
<th>Output Codification (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sport/Business side</td>
<td>Sport</td>
<td>SportBusiness side</td>
<td>Business</td>
<td>~SportBusiness side</td>
</tr>
<tr>
<td>Amateur/Professional</td>
<td>Amateur</td>
<td>AmateurProfessional</td>
<td>Professional</td>
<td>~AmateurProfessional</td>
</tr>
<tr>
<td>Single/Multi Founder</td>
<td>Single</td>
<td>SingleMultiFounder</td>
<td>Multi</td>
<td>~SingleMultiFounder</td>
</tr>
<tr>
<td>Economic Competencies</td>
<td>Yes</td>
<td>EconomicCompetencies</td>
<td>No</td>
<td>~EconomicCompetencies</td>
</tr>
</tbody>
</table>

Table 6:1 QCA Indipendent Variables Codification
Sport, Amateur, Single Founder and Economic Competencies “Yes” have been transformed in 1, whereas Business, Professional, Multi Founder and Economic Competencies No have been converted in 0. In the columns Output Codification, the independent variables are represented as in the output to facilitate the reading of the results.

6.1 North America

In this chapter, we are going to describe the results of QCA for the Northern American case. In the first part we will show the Sufficient Condition for achieving the Outcome, whereas in the second part we will analyse the Necessary Conditions.

6.1.1 Sufficient Conditions

In the figure above (Figure 6:1), it is represented the Intermediate Solution for the North America. We can observe that 3 sufficient conditions are computed by the fsQCA software:

- Solution for the Business Side, with a Single Founder and without Economic Competencies.
- Solution for the Sport Side, for the Amateur World with Multi Founders.
- Solution for the Business Side, for the Professional World, with Multi Founders with Economic Competencies.
The first two solutions have a Unique Coverage of 0.25, whereas the last solution has a Unique Coverage of 0.5.

### 6.1.2 Necessary Conditions

![Analysis of Necessary Conditions](image)

**Figure 6.2 Necessary Conditions North America**

From the analysis of the necessary conditions (Figure 6:2), we identified five necessary conditions for the success of a Digital Sports Startup in North America:

- a solution must be addressed for the Sport Side or for the Professional World.
- a solution must be addressed for the Business Side or for the Amateur World.
- a solution must be addressed for the Business Side or with Multi Founder.
- a solution must be addressed for the Professional World or with Multi Founders.
- a solution must be addressed with Multi Founders or a founder without Economic Competencies.

### 6.2 Europe

In this section we are going to discover which are the relevant determinants for the success of Digital Sports Startup in Europe. As for the Northern American case, also for Europe we divided the analysis in two parts: the first about Sufficient Conditions and the second about Necessary Conditions.
6.2.1 Sufficient Conditions

We can observe from the Intermediate Solution (Figure 6:3) that in Europe 3 sufficient conditions are present:

- Solution for Sport Side, with Multi Founder and with founder without Economic Competencies.
- Solution for the Business Side, with Multi Founders and with founder with Economic Competencies.
- Solution for Sport Side, for the Professional World and with a Single Founder.

The first solution has a unique coverage of 0.25, whereas the others have a value of 0.375 for the unique coverage.

6.2.2 Necessary Conditions

We can observe from the Intermediate Solution (Figure 6:3) that in Europe 3 sufficient conditions are present:

- Solution for Sport Side, with Multi Founder and with founder without Economic Competencies.
- Solution for the Business Side, with Multi Founders and with founder with Economic Competencies.
- Solution for Sport Side, for the Professional World and with a Single Founder.

The first solution has a unique coverage of 0.25, whereas the others have a value of 0.375 for the unique coverage.
Running the analysis of necessary conditions (Figure 6:4) for the European case, we can observe that there are three necessary conditions for the success of Digital Sport Startup in Europe:

- a solution for the Sport Side or a founder with Economic Competencies.
- a solution for the Sport Side or with a Multi Founder.
- a solution for the Professional World or with Multi Founder.
7 Discussion

At the light of what we discovered with the carried-out analysis, this chapter provided a discussion and interpretation of the main identified results, related to the research questions on which this work was developed. The first objective of the thesis was to investigate the contribution of Digital Sport Startups in the Sport Ecosystem, which means evaluating how they support and create opportunities for the entire system, where they lie respectively compared to Big Players already present in the Sport market and how they help them in achieving better results and performances in different areas. The second objective was to look for relevant determinants of a winning Digital Sport Startup with the aim of being able to provide relevant information to new Entrepreneurs that are going to make a run into this particular world and share insights with them on how to face it.

7.1 First Research Question

From an extensive literature review related to the Sport Ecosystem, first of all a model has been identified, through which Digital Sport Startups are classified into 4 main domains. The model was useful to show where Digital Sport Startup positioned themselves respectively compared to Big Players already present in the Sport market.

As regards the Professional World, four main Areas of interest are involved related to the Club/Federation Ecosystem: on the sport side we can find the Macro-Category “Athlete/Team” while on the Business side, Digital Sport Startups provides services and products for Fans, Brands and Facilities. They represent the main assets of a club and a federation (Figure 7:1):
Looking at the left side of the model, a better enhancement of the team and the athletes is fundamental to achieve sports results and objectives in the championships. Digital Sport Startups create, on one hand, offers to improve sportsmen’ performances, in terms of training and better rehabilitation systems and on the other hand solutions to improve the overall team behaviour during the next game through in depth post-analysis, with the aim of identifying relevant insights about the opponents. Achieving results in the sport side is fundamental for a Club/Federation to improve its image and increase its brand awareness. This might be a way through which they can grow in terms of number of fans, type of contracts with external brands and media providers.

Looking at the right side of the model, Digital Sport Startups are focused on improving the management of three main Assets: Fan, Facilities and Brands. Great importance is given to the Fan Engagement, since fans represent the first customer of the Club/Federation. For this reason, new innovative solutions aimed at better engaging fans have been developed to enhance his/her whole experience inside and outside of the Stadium. Through a better experience, fans will be more likely to spend their money in terms of tickets, food at the stadium or official products of the preferred team.
The management of Facilities is also crucial: Digital Sport Startups help Clubs/Federations with new solutions to better manage the Arena, its security and events planning and scheduling. Last but not least is the management of Brands, through which Clubs/Federations can enter into agreements for sponsorships, increasing revenues while attracting more Fans to the Team.

We can conclude that these assets can be compared to the Porter’s Value Chain model, since the management of Athletes/Team, Fans and Brands represents the set of primary activities that leads directly to the generation of added value for Clubs/Federations, whereas the management of the facilities can be considered as a Support Activity, which are considered surely important, but secondary in the creation of value.

Considering the Amateur Ecosystem (Figure 7:2), the main actors involved are the Amateur Athletes, who on the sport side are focused on improving sports performances and results, whereas on the Business Side are looking for services and products that facilitate their interactions with Amateurs Clubs such as Gyms.

![Amateur Athlete Ecosystem](image)

The Amateur Athlete are focused firstly, on being fit through a daily training and monitoring of his vital parameters and secondly on benchmarking themselves with friends or with Professional Athletes.

On the sport side, solutions offered by Digital Sport Startups help them to achieve the first objective, through customized exercises and wearables that track vital parameters.

On this side of the model, the Amateur Athlete is the only one actor involved and Digital Sport Startups might gain profits working in 2 different ways: through a freemium business model,
relying on advertising and then selling data to external brands that can exploit it for a better targeting of the market or by a premium version of their solution, which could be an app, access to relevant information on a website or a physical product such as the wearable.

On the business side instead, Digital Sport Startups provide network aggregators which facilitate the Amateur Athlete in finding the best place where to make the physical activity or in organizing friendly games with other people. In the “Events Arrangements” Category the Athlete is not the only actor involved, since also Amateur Clubs such as Gyms can benefit from these offers, increasing revenues.

The identification of the Macro-Categories Model made easier the construction of the Database and thus, answering the First Research question with an in depth descriptive analysis.

Observing quadrants through which it was built, the majority of Digital Sport Startups categorised in the database relies in the Professional World (60%) compared to those ones of the Amateur World (40%). As regards the club and federation ecosystem, a great amount of solutions is provided for the Business Side (57%), whereas in the amateur side, 63% of the total amount of Digital Sport Startups is addressed to the sport side.

We can conclude that the Digital Sport Startups in the Professional World are mainly focused on the management of Fans, Brands and Facilities and in second place on Athletes and Teams, whereas in the Amateur World the situation is reversed.

Analysing numbers about Digital Sport Success in the Sport Ecosystem, through a deep study of their mortality, we can observe that the fourth quadrant is the one with the lower percentage of dead firms, which is represented by the Category “Events Arrangement” with just 20% of dead firms, whereas in the other three quadrants the percentage is at least 30%. From these Data we can observe that there is the possibility that investing in solutions for the Amateur World and related to the category “Events Arrangements” leads to higher probabilities to survive than investing in the other fields of the sport industry. In particular, we studied this probability with further analysis that are well-explained in next chapters.

It follows the report of the main findings carried-out through the Descriptive Analysis, characterized by discussion and interpretation:
TEMPORAL DISTRIBUTION

As regards the temporal distribution of Digital Sport Startups, an increasing trend is observed from 2011 to 2014, with the numbers that remain stable in 2015 and a lower amount in 2016. This result is totally in line with what is explained in the Introduction part where we identified how the Global Startup trend is increasing with 100ML Startups opening each year. In particular, it was showed how in 2015 number of funding applications submitted by startups has doubled and in the first half of 2016 more than 21% applications were submitted respectively compared to the second half of 2015. Thus, the lower number of Digital Sport Startups found in 2016 can be explained since many sources of information consulted are not yet updated with every Digital Sport Startups born in 2016. Further improvements for answering this question are needed.

GEOGRAPHICAL DISTRIBUTION

Analysing the geographical distribution, we can observe that North America is the region where there is the higher proliferation of Digital Sport Startups, followed by Europe and Asia. These three areas represent the main markets where to exploit innovation in the sport industry. This result confirmed the insights we found in the Introduction part where we stated that USA is the leader in total funding applications with more than 50% of solutions that received funding, which means that Digital Sport Startups could find the right environment to grow in this Area. Other countries followed and continue to show strong growth: France (4.3%), India (8.2%), Canada (4.6%) and the United Kingdom (5.1%) which generate higher volumes of funding applications.

Looking at the Italian situation, Lombardy and in particular, Milan is the region that invest more in the digital innovation in sport industry, followed by Lazio, Liguria and Trentino-Alto Adige. These numbers can be explained by the fact that firstly Lombardy is the main Industrial Centre of the country, then in Rome there is the headquarter of CONI, the entity that guides the sport in Italy, and lastly since in Trentino-Alto Adige and Liguria, two incubators for the innovation in the industry of sport are present. Referring to the division between Amateur and Professional World, we can observe that in almost every region where Digital Sport Startups are concentrated, the percentage referring to the Professional World is higher than the one that is related to the Amateur Side. The only exception is in Asia where there is more interest for the Amateur Side.
In this section we can observe that the main assets involved are the Athlete/Team and Fan, with a slight predominance of the offers for the Sport Side. The same situation can be found for Italy. The leading position of Athletic performance might be justified by the explosion of Iot – Wearable solutions for the Sport industry and by new facilities as an app like Runtastic which are useful to customers to increase their sport activities. Additionally, the relevance that Fitness had acquired in last years and the major attention of Clubs and Federations, especially in Europe, on their Athletes which are considered “means” to win championships, better explain the increasing trend of this Macro-category. Next, the engagement of Fan is acquiring more and more importance, and it is increasing the awareness of companies about that. The main reason that lies behind this increasing trend might rely on the explosions of the “Always connected” trend. This kind of sport customers rapidly adopt mobile technologies and platforms to keep them always connected with their preferred Teams and sports idols. Focusing on the American Context, results are useful to better understand how much the Fan Engagement is relevant more than other categories, where almost the 40% of the Digital Sport Startups are developed to better satisfy Fans’ needs by providing innovative technologies and experiences. Comparing this number with the 23% of Digital Sport Startups that are created for enhancing the performances of Athletes of a professional Club/Federation, the different perception between Professional Athletes and Fans in America is clearly highlighted. The result in in line with the American Sport Culture where where millions of Fans watch different sports on TV, go to the games hours beforehand to celebrate, eat at sports bars where they meet their friend to watch the game and bet on everything, from the Super Bowl to tennis matches. In Europe the situation is different, since the two percentages related to the above-mentioned Areas are basically the same. A result that is in line with the European Sport Culture where Clubs enjoy Open Leagues where they want to win at any cost and Fans are passionate and would follow their team wherever just to support it. Similarities were found in relation with the bottom part of the Macro-Categories Model, where a significant number of Digital Sport Startups develops products and services for satisfying uncovered needs of Amateur Athletes (132 out of 303 in Europe and 191 out of 543 in North America). A sign that might be explained by the Fitness growing trend which is shaping the two different markets in recent years. Focusing on the Professional and Amateur situation, it is showed how the solutions for the Amateur side are more concentrated on the Sport side (247) than on the Business Side (145).
Instead, referring to the Professional World, the offers for the Fans (335) exceed that ones for the Athlete/Team (230).

**TECHNOLOGY DISTRIBUTION**

Observing the global situation, the three main technologies adopted are Platform, Applications and Wearables. In Italy, the first technology used is the platform that is adopted by more than 50% of Digital Sport Startups, followed by wearables and applications.

As we already know, platform and applications have signed the proliferation of the Digital Innovation, thus we weren’t surprised about this result. On the other hand, in line with what was discovered in the Literature review, wearable technology shows an increasing trend confirming its importance even in the Sport industry where Amateurs and Professional Athletes use them to monitor and enhance the Athletic performances.

Referring to North American and European context, technology distribution highlighted on one hand the relevance of “Going Mobile” and the growing trend of IoT-Wearable and on the other side, confirmed insights found out for Macro-Categories. In North America there is an unbalance situation between Platform (225), App (210) and IoT-Wearable (86), that once again shows the greater Digital Sport Startups’ propensity to develop products and services for Fan Engagement rather than for Athletes/Team. On the other hand, the situation is more balanced in Europe where Applications (73) and IoT-Wearable (52) are used with almost the same numbers.

In the Professional World we can observe that the technology more adopted is the Platform, that is present almost twice compared to applications and 4 times compared to the IoT-Wearables, whereas for the Amateurs, platforms and application technologies have almost the same numbers, followed by wearables. The great number of platforms in the professional world can be explained since the majority of solutions have been developed for improving the fan engagement, whereas the same number of platforms and app on the amateur side can be justified by the fact that more solutions have been created for the events arrangements and the training.

Focusing on analytics, just the 33% of Digital Sport Startups use the data mining to find out key insights about customers which can be sold in future to private companies. On the Sport Side, there are 249 solutions provided by Digital Sport Startups relying on Analytics, followed by 77 focused on the Business Side (66 on Fan). This result might be explained by the growing importance of IoT-Wearable in the Sport Market and confirms the positive trend showed in the
Literature Review Section about the total global market of sports analytics which is expected to grow from 120 million of US dollars of 2016 to the 615 million of dollars by 2021.

**SPORT DISTRIBUTION**

Looking at the sports distribution in the global context, solutions that are addressed for Single-Sport are more than Multi-Sport. This fact is strongly influenced by the Digital Sport Startups for fitness, which are 249 and represents the half of offers for Single-Sport in the database. The other main sports that are present in the database are Football, Basketball, Golf, American football, Running, Cycling and Tennis. A result that well represents the most viewed Sports around the world. Focusing on the Italian situation, we can observe that almost 60% of solutions have been created for Football, followed by Fitness and Basketball. This can be easily explained since Football in Italy is everything, it represents the passion of thousands of Fans that every week-end are present in the Stadiums to support their preferred team.

As regards the Amateur and Professional situation, we can observe that for the first category, solutions are specialized more on one sport, whereas for the second category, Multi-Sport offers have a predominance to Single-Sport. This might be explained since Solutions related to Fan Engagement, which are a huge part of the sample related to the Professional World, are nearly all aimed at reaching more people as possible, without any differences in terms of Sport. On the other hand, for Amateur World, Data are strongly affected by all Digital Sport Startups targeted at fitness.

Focusing on the two main markets of reference, we can observe that in North America the sports more present are Fitness, Basketball, Golf and American Football, and Digital Sport Startups are more likely to develop products and services for many sport rather than concentrate their efforts on a single one. Whereas in Europe, Football plays the main role and Digital Sport Startups are more likely to develop products and services specializing in just one single sport. The reason lies behind the different cultures of the two regions: Europe is the home of football, whereas in North America the most spectacular leagues are NFL, PGA, NBA. Talking about Fitness instead, we already know its importance in both the European and American Context. Even though USA represents a mature market in this field, it counted a total of €23.3bn of revenues in 2015.
**CATEGORY, SPORT AND TECHNOLOGY**

Considering the technology and category in the different sports, we can observe that the majority of Digital Sport Startups for Multi-Sport are addressed to the Mobile Fan Experience, with platforms and applications as technologies more used and with just few solutions aimed to Events Arrangements or Training. This result might be explained by the fact that it is easier to develop an application or a platform that can work for many different sport in parallel, rather than create shorts with sensors attached that can be applied both in Volleyball and Football where the players motions are completely different. Similar is the situation for the two main Single Sports, Football and Basketball, in which there is more attention on the business side, focusing on the Fan Engagement. As we have already carried out, Football is very famous in Europe, where Fan Engagement is increasing in its importance. Analysing the first 5 major Leagues in European Football, we can count 204 Clubs, 34 tech Brands and 1.2 Billion of Fans, increased by +0.98% compared to the first of February 2018 (Data entry: 01/03/2018). Premier League counts 387.8M of supporters (Southampton +8.55% and Tottenham +6.96%) where a Brand such as Nike is able to attract 129.4M of them. On the other hand, Basketball is one of the main Sport practised in USA where Millions of Fans watch it on TV, go to the games hours beforehand to celebrate, eat at sports bars where they meet their friend to watch the game and bet on everything.

Concerning the fitness, the two main addressed categories are Training and Events Arrangements: in the Training category, the technology more adopted is the application, sign that when we talk about body fit, individuals prefer to adopt easy-to-use application that can suggest how to make an activity rather than use wearables to track motions or healthy parameter. This result might be explained by the fact that Amateurs Athletes are not ready to buy wearables technology since it is something very innovative and not so cheap. For the Events Arrangements, the two technologies more used are Applications and Platforms which act as facilitators for the amateur to find the best place where to make exercise.

**E-GAMING**

In the last years, a new form of fan engagement has been developed: E-Gaming. As observed in the previous chapters, Digital Sport Startups working on this field are increasing, showing a positive trend. It is fundamental for a club or a federation to exploit this trend to succeed in enlarging its fan base, especially trying to reach people that are not interested in sports and to
win millennials’ hearts and wallets, always more involved in this world. As E-Gaming continues to grow, new commercial opportunities will emerge and scale for top gamers and companies. This result is in line with the Literature Review where we stated that the market of E-Gaming is expected to generate revenues of about 325 million of US dollars this year and are forecasted to 1 billion of dollars by 2019.

7.2 Second Research Question

The second performed statistical analysis were the Logistic Regression model, which allowed to test in a deeper way whether or not a relationship between some key traits and characteristics of a Digital Sport Startups and its future success exists, and the QCA which aimed at analysing the causal contribution of different conditions to the outcome of interest. More in particular, from an extensive review of the Literature, 7 variables which might lead a High-Tech Startups to be successful in a new market were analysed by different Authors and our main purpose was to check which of these ones might be adapted to our case. The discussion about carried out results was divided in two parts respectively including two-different context: European and North American situation.

7.2.1 North America

A logistic regression was performed to ascertain the effects of Founder’s Background (Economic Competences), Team Composition (Single/Multi Founder), Competitive Strategy (Multi/Single Sport - Amateur/Professional – Sport/Business Side) and Product Characteristics (Technology) on the likelihood that Digital Sport Startups in the North American market achieve success. The Logistic Regression Model was not statistically significant since through the Omnibus Tests of Model Coefficients we can states that the introduction of the independent variables doesn’t contribute significantly to model fit (p> 0.05). The model Explained 9.0% (Nagelkerke R-square) of the variance in Digital Sport Startups’ Success and correctly classified 62.4% of the cases. These first results are not so useful to provide an in-depth overview on what happens in North America in the Sport Digital Innovation field and are not in line to what has been discovered in the literature. It might be possible that other variables,
which are not investigated in this work, are relevant for the success of a Digital Sport Startup in the American Sport market. These results might be explained by the fact that the American context is so different from that one of other countries, in terms of Culture, Sports, Rules and Organization. Additionally, the only variable that resulted as relevant determinant among the ones tested is Multi Sport which is 2 times more likely to lead a Digital Sport Startup to be successful than Single Sport. As we said in the Introduction part, in Europe everybody knows that Football is the king for instance while in America many other sports are watched by thousands of fans as well, such as Golf, Hockey, American Football and this might be a reason why Digital Sport Startups created for many Sports are more likely to succeed.

In the North American situation, independent variables considered individually didn’t provide the answer we were looking for. On the other hand, QCA gave us more information compared to the Logistic Regression about Digital Sport Startups born in the American context. Three Sufficient Conditions were identified among which we chose to interpret just the one with the highest coverage, since the higher the coverage of a causal pathway is, the more common the solution is, and more of the outcome is accounted for by the pathway. The most covered Sufficient Condition that has been identified was the following:

*A Digital Sport Startup founded by more than one Entrepreneur where at least one possesses economic competences, working in the Business Side of the Sport Ecosystem, for the Professional World is sufficient to be Successful in the Sport market.*

The statement refers to a Digital Sport Startup that is positioned into the second quadrant of the Macro-Categories model, which works under the leadership of more than one Entrepreneur with economic competences and is focused on areas such as Fan Engagement, Brands and Facilities (Figure 7:3).
First of all, we can notice that this result is in line with what discovered in the literature review, since in recent years on one hand scholars have increasingly identified how new ventures are commonly composed by teams and not by lone entrepreneur and on the other side among these individuals there should be present at least one with an economic background since it tends to enlarge the number of potential opportunities given by other markets. Additionally, at the same time we need to consider that, among the Areas identified above, the most critical one is surely the Fan engagement, a result that is in line to what is expressed by the American Culture, where Millions of Fans watch different sports on TV, go to the games hours beforehand to celebrate, eat at sports bars where they meet their friend to watch the game and bet on everything, from the Super Bowl to tennis matches. Investing in this market could create several opportunities for Digital Sport Startups which have understood it and try to offer more and more customized products and services for this set of Sport enthusiastic. Necessary conditions didn’t add relevant insight to what we have just mentioned since the most covered situation identified by the fsQCA software is the following:

*A necessary condition for a Digital Sport Startup to be Successful is to deliver an offer to the Professional World or one developed by more than one Entrepreneur.*
The sentence shows once again the importance of serving the Professional World and building a Digital Sport Startups with more than one Entrepreneurs. These are the only occasions through which a Digital Sport Startup can succeed in the North American Sport Ecosystem.

### 7.2.2 Europe

A logistic regression was performed for the European Context as well to ascertain the effects of variables mentioned above on the likelihood that Digital Sport Startups achieve success in this market. Looking at the carried-out analysis, first of all is important to notice that the independent variables properly explained what happens in the European market. The logistic regression model was statistically significant since through the Omnibus Tests of Model Coefficients we can state that the introduction of the independent variables contributed significantly to model fit ($p< 0.05$). The model Explained almost the 30% (Nagelkerke R-square) of the variance in Digital Sport Startups’ Success and correctly classified 72.3% of the cases. Additionally, several variables are significant and positive affecting the overall probability for a Digital Sport Startups to be successful, which are also in line with what is expressed by the literature review:

- **The Relevance of the strategy:** On one Side, **Business** have 4 times the likelihood of getting the outcome compared to Sport. This result might be justified from the major importance that Fans, Brands and the management of the Facilities have in the European Context. Literature review can help us in better explaining what we have just said. Concerning the Fan Engagement, Football is the driving force of the context. Now the match is played online through new digital touchpoint and new media to better engage Fans. Through data driven strategies more and more customized, Clubs and Brands are aimed at improving sport results and increasing profits. Analysing the first 5 major Leagues in European Football, we can count 204 Clubs, 34 tech Brands and 1.2 Billion of Fans, increased by +0.98% compared to the first of February 2018 (Data entry: 01/03/2018). Premier League counts 387.8M of supporters (Southampton +8.55% and Tottenham +6.96%) where a Brand such as Nike is able to attract 129.4M of them. Fan Engagement is growing and a first major contribution is provided by Social Media. Facebook is used to entertain, Twitter to inform Fans with relevant information about
events and matches, Instagram for exclusive contents. And what about You Tube? Sampdoria in Italy is collaborating with an Italian E-gamer (Mattia Guarracino) with the aim of increasing their views on You Tube and thus to enlarge their Fan Base. As we showed already in the Introduction part European Fans are passionate and strong supporters of their preferred team and so it shouldn’t seem strange that Digital Sport Startups want to offer Fans products and services to be more in contact with Teams. Talking about Smart Stadiums the trend is the same. This market is expected to grow from USD 4.62 Billion in 2016 to USD 17.32 Billion by 2021 and Europe will be the driving force in this field. Probably, Digital Sport Startups recognized this trend and pushed in the right direction.

On the other side, Amateurs Athletes have 3 times the likelihood of getting the outcome compared to a Professional drive one. This result might be explained by the growing importance of Fitness in Europe which trend was already showed in the Literature Review. In 2016 Europe confirmed and enhance its dominant position worldwide in terms of participants in a Club (56.4M at the end of 2016). Europe continues to be the World’s largest fitness and health market, with €26.3bn in 2016, compared to the €23.3bn of the USA in 2015. A first reasoning is the impact of the low-cost fitness sector which is one of the fastest growing sector, sign that in Europe there is the tendency to be fit and healthy while training in gyms at relatively Low Costs. But premium and upper mid-market operators such as Migros Group and Nuffield Health continues to work to better engage their customers with acquisitions. This shows a growing polarisation between the low-cost segment and premium operators.

The Relevance of Product Characteristics: IoT – Wearable have 7 times the likelihood of getting the outcome compared to Platform. This result might be explained referring to Literature Review where it was showed that wearable technology industry is playing a growing role in Sport, selling $14bn worth of wearables until 2016 and expected to increase to $34.2bn by 2020. To better understand its importance, we can refer to Premiere League, in which there are top teams, such as Leicester City and Southampton FC that in 2016 began to use wearable technology and the results were significant. Data were computed in January 2016, roughly the halfway point of the season, Leicester City’s Players had missed a total of 184 days through injury. Whereas other top teams such as Manchester City had a total of 769 days missed through injury.
The Relevance of the Founder’s Background: **Economic Competence** have 3 times the likelihood of getting the outcome compared to No-Economic Competences. This result is totally in line to what the literature review has declared, where an economic background is really useful when an entrepreneur is building a Startup since it tends to enlarge the number of potential opportunities given by other markets.

QCA confirmed what the Logistic regression founded and even enlarged the set of solutions, providing us a better understanding of what is relevant for Digital Sport Startups to be successful in the European market, thanks to the identification of causal conditions. Three Sufficient Conditions were identified among which we chose to interpret just the two with the highest and equal coverage, since the higher the coverage of a causal pathway is, the more common the solution is, and more of the outcome is accounted for by the pathway. The first one is expressed by the following statement:

*An Digital Sport Startup founded by more than one Entrepreneur where at least one possesses economic competences, working in the Business Side of the Sport Ecosystem, is sufficient to be Successful in the Sport market.*

This result is in line with what is expressed by the Logistic Regression. Again, we can notice that a Digital Sport Startup needs to be founded by more than one entrepreneur where at least one possesses economics competences that is in line with what discovered in the literature review.

Having the right Team of Entrepreneurs is not enough, because if a Digital Sport Startup wants to be successful in the Sport market, it shall also concentrate its efforts on the Business side of the Ecosystem. Precising, the first statement above mentioned refers to a Digital Sport Startup that is positioned on the right side of the Macro-Categories model, which delivers a service/product for Amateurs Athletes or Clubs/Federations, under the leadership of more than one Entrepreneur with economic competences and is focused on areas such as Fan Engagement, Brands and Facilities.
As we can see (Figure 7:4), compared from the logistic regression we lost the solution represented by the third quadrant, which refers to products and services offered for the enhancement of performances for Amateurs Athletes, sign that in Europe this category of sportsman preferred to find the best offers for the next Gym rather than purchase a wearable for monitoring their motions or health parameters.

The second statement instead enlarged the main results found until now, focusing on the other side of the Macro-Categories Model. It is expressed in the following way:

*A Digital Sport Startup founded by only one Entrepreneur, working in the Sport Side of the Ecosystem and delivering a product or a service for Clubs and Federations, is sufficient to be Successful in the Sport market.*

The statement refers to a Digital Sport Startup that is positioned into the first quadrant of the Macro-Categories model, which works under the leadership of one Entrepreneur that can possess or not an economic background and is focused on the enhancement and improvement of Clubs’ Athlete and Team Performances (Figure 7:5).
First of all, we can notice that the result refers to Digital Sport Startups founded by a lone Entrepreneur and that, in contrast with all the analysis made before, possessing an Economic Background is not considered into the set of conditions that lead a Digital Sport Startups to be successful in the Sport Industry. But this result might be reasonable if we consider the context.

We are referring to the first quadrant of the Macro-Categories model where Digital Sport Startups deliver products and services to Athletes/Teams to enhance their performances. It might be possible that what is really needed is not an Entrepreneur with an Economic Background but one Leader that know exactly the market (such as a professional sportsman or someone with high skills in the technology of reference). Additionally, this result showed the relevance of the Macro-Category “Athlete /Team” related to the Professional World and is in line to what is expressed in the Introduction part about the European Sport Context. Clubs and Federations in Europe take good care of their Athletes since they were child. Talent Scouting starts from children of any regions or Clubs who, once discovered and selected, are then entered in the Top Club. In the European Context, Sport represents a mean to win at any cost. Most of the European Leagues are “Open Leagues” characterized by a promotion/relegation system. The worst teams in the League are relegated to a lower division at the end of the tournament, while the top Team in that lower division are promoted in order to replace the aforementioned teams in the higher division. Every team is pushed and motivated to do their best, even those one playing in the lower divisions. Thus, Digital Sport Startups which allow Clubs and
Federations to improve the performances of their Athletes and Team can survive in the European Sport Ecosystem since Clubs are always looking for new ways that allow them to reach the Top. On the other hand, this is not intrinsic in the American Culture where sport can be seen as a mean to obtain profits and is more focused on the Economic dimension. Additionally, the American Leagues are Closed and provide the Clubs and Investors the certainty that they will always be part of the League and having this market competitive balance rules, many different teams have a realistic opportunity to win the league.

Necessary conditions didn’t add relevant insight to what we have just mentioned since the most covered situation identified by the fsQCA software is the following:

* A necessary condition for a Digital Sport Startup to be Successful is to deliver an offer related to the Sport Side or one developed by one or more Entrepreneurs with Economic Competences.

The statement above shows once again the importance of both side of the Macro-Categories Model. In the European Context, a Digital Sport Startups must be built and manage focusing on the Sport Side or relying on the Economic Background of one or more Entrepreneurs, a result that might address us to the Business Side of the model since it could reasonable and explained by the above-mentioned analysis that Economic competences are needed when Digital Sport Startups rely on the right side of the model.
8 Conclusions

The main objectives of our Master Thesis’s work were the investigation of the contribution of Digital Sport Startups to Sport Industry through digital innovation, describing first of all, which are their characteristics, common traits and trends, and secondly, identifying the Relevant Determinants that lead to the success of a Digital Sport Startup.

The elaborate started with a meticulous review of the Literature that allowed us to understand the field of actions of Digital Sport Startups, detected as the major source of innovation of the industry. After having deeply analysed the main stakeholders as the main “players” involved, trends and digital technologies adopted in Sport Industry, we developed the Macro-Categories model. Then, we gathered the information needed to define the dimensions of analysis and to structure a database for empirical evaluations. The final version of the database counts 988 Digital Sport Startups born between 2011 and 2016, each one catalogued along eight dimensions: Descriptive Characteristics, Beneficiaries, Technology, Incubators/Accelerators, Economic Dimension, Founders’ Background, The New Venture Team Compositions and Measure of Performance.

Based on the available data on the database, two different analyses were conducted:

- Descriptive Statistics: aimed at providing a general overview of the Startups’ contribution to the industry activities.
- Statistical Inference and Comparative Analysis: aimed at highlighting the relevant determinants that lead to the success of Digital Sport Startups.

It follows the report of the main findings of our work, the list of the limits of the research and finally some reasonings for further improvements.
8.1 Findings

Sport Industry Overview: the leading role of Athletic Performance and the progress of Fan Experience

According to Macro-Categories Model, four main assets involved in the implementation of digital innovation have been identified: Athlete/Team (on the Sport Side of the model), Fan, Facilities and Brands (on the Business Side of the model). Each one of these assets has been further divided in different categories according to the different segments within each field. Athlete/Team is the broader area, followed by Fan, Facilities and Brands. This data provides a specific information about the direction in which the entire industry is going. The leading position, characterized by solutions for the sport side, has been guided by 2 growing trends:

- The explosion of wearable technologies applied to the sport world and applications like Runtastic that are useful for users to monitor their performances during the physical activity.
- The powerful impact of Fitness, a market with revenues for 24 billion of US dollars in North America and 26.3 billion of US dollars in Europe.

These two trends lead to an increase of active sportsmen of the potential market, resulting in an increase of revenues and interest of entrepreneurs and venture capitalists.

On the other side on the Macro-Categories Model we can find Fan Engagement as one of the main field of application for Digital Sport Startups: Fan Engagement is acquiring more and more importance and it is increasing the awareness of companies about that. The main reason that lies behind this increasing trend might rely on the explosions of the “Always connected” trend. This kind of sport customers rapidly adopt mobile technologies and platforms to keep them always connected with their preferred Teams and sports idols. Live news and contents to share, social media and communities, streaming platform used to watch matches when there is not the possibility to go to the Stadium, are examples of solutions that make Fans’ world easier and more interesting.
North America: the driving region of innovation, and the positive influence of Fans

North America has been demonstrated to be the driving region of digital innovation in the sport industry with 543 on 988 Digital Sport Startup born in this Context. This data does not surprise us since it is the leading region in funding applications per Startups.

A sufficient condition to be successful in the North American market was that more Entrepreneurs, where at least one possesses an Economic Background, decided to build a Digital Sport Startup that provides products and services for the Professional World on areas such as Fan Engagement, Brands and Facilities. Between these categories the Fan Engagement is surely the most relevant one, since 206 on a total of 222 Digital Sport Startups born in the North American context and built for the Professional World on the Business side, are focused on it. This result was expected, since in the American Culture, Fans are more important than Athletes and Teams. In North America, Sport is considered as pure entertainment, where millions of Fans watch different sports on TV, go to the games hours beforehand to celebrate, eat at sports bars where they meet their friend to watch the game and bet on everything, from the Super Bowl to tennis matches. Sports managers pay attention not only on the match but also on the entertainment pre- and post-match. It is very common to organize concerts during halftime, recreational activities for fans and areas equipped just for families.

Sport, in this context, is seen as a Business, since North American Leagues are more likely to attract owners who think about Sport as a business investment and who rely on Fans as the perfect customers to attract with innovative experiences and technologies.

Europe: The Business of Sport and The Importance of Being Competitive in Championships

Europe is the second continent in terms of number of Digital Sport Startups (303), in particular in countries as like as France, Italy, Spain and United Kingdom. Results show a growing attention of Digital Sport Startups to Fan Engagement in a region where Fans are passionate and follow their idols wherever they go, they usually take pride supporting their preferred club and are not afraid to show it. Now the match is played online through new digital touchpoint and new media, inside and outside of Smart Stadium, with new innovative solutions that better engage Fans and increase profits of Clubs/Federation and related Brands. Next considering the Sport Assets, results lead us to give great relevance to solutions created for professional Athletes and Teams. Clubs and Federations in Europe take good care of their Athletes since they were child. Talent Scouting starts from children from wherever, who, once discovered and
selected, are then entered in the Top Club. In the European Context, Sport represents a mean to win at any cost. Most of the European Leagues are “Open Leagues” characterized by a promotion/relegation system. The worst teams in the League are relegated to a lower division at the end of the tournament, while the top Team in that lower division are promoted in order to replace the aforementioned teams in the higher division. Every team is pushed and motivated to do their best, even those one playing in the lower divisions. Thus, Digital Sport Startups which allow Clubs and Federations to improve the performances of their Athletes and Team can survive in the European Sport Ecosystem since Clubs are always looking for new ways that allow them to reach the Top.

**Italy: The Industrial Area and Growing Trends**

Italy shows an increasing willingness in developing Digital Innovation in the Sport Ecosystem through Startups, that reach his peak in 2015 with 15 Digital Sport Startups created on the Italian ground. Lombardy (Milan in Particular) is the region that invest more in the digital innovation in sport industry, followed by Lazio, Liguria and Trentino-Alto Adige. The north of Italy is the main Industrial Centre of the country and thus it might be reasonable this attendance of Startups. Athlete/Team is the broader area with almost the 60% of Digital Sport Startups focused on it. This data provides a specific information about the direction in which the entire industry is going. It was highlighted how Italian Entrepreneurs prefer to develop innovative solutions to enhance Athletes performances in Football, the most important and viewed sport in this context, rather than creating customized products and services addressed to Fans. A result that is confirmed even by the Technologies’ utilizations since IoT Wearable (12) are more adopted than applications (6).

**Founders’ Background and Team Composition**

Logistic Regression and QCA confirmed what was discovered in the literature review about the importance of Founders’ background and Team composition in building a successful Startups. First of all, we have to say that just the Relevance of Economic Competences were searched and demonstrated in this research, since it was impossible for us collecting data about Technical skills developed by Entrepreneurs in the industry of reference, and thus ascertain whether a Digital Sport Startup’s Founder was a Professional Sportsman or not. Digital Sport Startups, born in Europe and which work on the Business side of Sport, show a higher probability to win
in the Sport Ecosystem whether they are composed by teams and not by lone entrepreneur and whether among these individuals, it is present at least one with an economic background since it tends to enlarge the number of potential opportunities given by other markets. In North America the situation is more or less the same, but these variables are considered relevant just whether we are talking about the Business side of Sport and products and services are developed for the Professional World.

**Explosion of IoT and the Importance of “Being always connected”**

Information about technologies adopted in Sport Industry, which were discovered through the Literature Review, was confirmed through database’s descriptive statistics: Platform is the technology more used, followed by Applications and IoT – Wearables. As regards Platforms and Applications, this data is linked surely to the “being always connected” trend that has shaped the Digital Innovation Revolution. This trend covers all areas of Sport Industry: from the interaction of fan with athletes considered as idols, to sportsmen passionate about fitness that prefer to watch workout videos from their home rather than going to the gym. The user wants always to be connected for not missing any update and entrepreneurs and innovators through these technologies can satisfy effectively this need.

Another important fact that has not to be unnoticed is the explosion of IoT – Wearables. This technology shows an increasing trend and confirms the very important role that plays in Sport Industry, where always more Amateur and Professional Athletes use these products to better monitor and enhance the Athletic Performances.

**Amateur and Professional**

Amateurs and Professionals are the major players in the sport ecosystem. They represent the two polarities of the first attribute used to build “The Macro-Categories Model”.

As regards the Professional world, the main assets to which Digital Sports Startups are addressed can be compared to the elements of the Porter’s Value Chain Model: the management of Athlete/Team, Fans and Brands represents the primary activities that lead to the generation of value for Clubs/Federation, whereas the management of the facilities can be considered as a Support Activity.

Regarding the Amateur World, two main actors are involved through the solutions offered to the Digital Sport Startups: The Amateur Athlete and the Amateur Club. On the sport side of
“The Macro-Categories Model”, the Amateur Athlete is the only one to which products are offered and there can be two sources of revenues for the Digital Sport Startups: through a freemium business model, Digital Sport Startups can earn new revenues relying on advertising or selling of data to external brands or through a premium version of the solution, which can include the purchasing of the application or the physical products (such as the wearable). On the business side, the amateur athlete is not the only actor that can benefit from these products, since Amateur Clubs such as Gyms can increase their revenues through Digital Sport Startups’ offers.

Looking at the geographical distribution, it was observed from data extracted from database that almost in every region, the percentage of Digital Sport Startups for the Professional World is higher than solutions directed to the Amateur World. The only exception is Asia.

Concerning the Macro-Category distribution, it was observed that the products for the Amateurs are more focused on the Sport side rather than on the Business side, whereas on the Professional side the offers the fans exceed that one for the Athlete/Team.

About technologies, in the professional world the majority of Digital Sport Startups work with Platform as main technology. A result that might be explained by the fact that many platforms have been developed for improving the fan engagement (such as streaming platform). The same result for the Amateur side is justified since more solutions have been created for satisfying the need of events arrangements and training.

As regards the sport Distribution, for amateurs the solutions of Digital Sport Startups are more specialized on one sport with data highly affected by the fitness products. On the Professional Side, Multi-Sport offers have a predominance to Single-Sport, since solutions addressed to Fan Engagement are aimed at reaching more people as possible, without differences in terms of sport.

8.2 Limits of The Research

In the following chapter, we are going to point out which are the main limitations of our study. They are mostly related to the acquisition and completeness of data used for analyses.

The first limitation that we had to face was due to the fact that Digital Sport Startups are not obligated to publish Financial Reports such as Balance Sheet or Income Statement. This fact forces us to gain information through other sources. In addition, not all firms allow to publish data about
their activities and this generates a huge lack of information in analysing in detail the sport industry and understanding which were the companies that were successful. The only one information concerning economic dimensions that we could approximately gather from CrunchBase was funding received during the years, which introduce the next limitation: the completeness of funding data. The use of funding as a proxy could bring to specific analyses, but this data was not available for each Digital Sport Startup since it was not published on sources of information we relied on. For this reason, it could not be used as a metric to measure the performance.

We decided instead to rely on a new performance measure, the mortality of a Digital Sport Startup whose process introduced a new limitation. As regards the study of the success or unsuccess of a firm, we based our study on the website accessibility at the moment in which the analysis was conducted. If the website was accessible, the Digital Sport Startups was declared alive on the other case we introduced a new variable related to the social pages, since there can be several causes a website cannot be reached: the domain might be changed, the Digital Sport Startup might have changed the business name or the firm has not renewed the rent of the domain. Thus, we relied on social pages and if the match was negative also in this case, we considered the Digital Sport Startup as dead. It was a logical process ideated by us and it not ensure with clear certainty whether a Digital Sport Startup was dead.

Another important point to highlight concerns founders’ background: all academic paths were identified through information collected thanks LinkedIn, but nothing can be said about the Sport career: were they professional sportsmen or not? This kind of information might be relevant for our research as we stated in the Literature chapter, but unfortunately it wasn’t collected properly in the Database since just few founders have written about this on their LinkedIn profiles and thus it was not used for the process of analysis.

**8.3 Further Improvements**

Further improvements for this Master Thesis Work can be the continuous update of database, the enlargement and upgrade of variables in the database identifying which are the more relevant determinants to add and completing the work through some interviews to founders trying to understand if insights discovered through our analysis are confirmed also by subjects present every day on the field.
Digital Sport Startups’ world is an environment very vibrant and constantly evolving. Because of this, the research work can be out of date very rapidly and the update and the refresh of new data is needed at least once a year, which is also very useful for verifying possible future trends. In fact, through the path followed for our analyses, not only it is possible to check whether a trend is increasing or it is going to expire, but it is also feasible to replicate the main reasonings of the Thesis to find out new ones.

The enlargement of Digital Sport Startups Database voices could be very valuable not only in making analysis more robust and consistent, but also opening the possibility to run analyses more in depth, where our research has been blocked by a reduced number of observations. Lastly, conducting some interviews to Digital Sport Startups founders could be very relevant to have a complete view about company’s evolution and structures and to check the main determinants that entrepreneurs have to consider for innovating through digital technologies in the sport industry.
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