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## THE IMPACT OF COVID-19 PANDEMIC ON FAN ATTENDANCE IN MAJOR LEAGUE SOCCER (MLS) 2018-2022

Benjamin Appiah

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THE IMPACT OF COVID-19 PANDEMIC ON FAN ATTENDANCE IN MAJOR  
LEAGUE SOCCER (MLS) 2018-2022

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A Project  
Presented to the  
Faculty of  
California State University,  
San Bernardino

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science  
in  
Information System and Technology:  
Cybersecurity

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by  
Benjamin Appiah  
December 2023

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December 2023

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Decision Sciences

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## ABSTRACT

This culminating experience project investigates the impact of the COVID-19- on Major League Soccer (MLS). The research questions are: (Q1) How did the pandemic impact the trend of fan attendance in the MLS during the COVID-19 pandemic? (Q2) What factors impacted fan attendance in MLS games before the COVID-19 pandemic? (Q3) What factors impact fan attendance in MLS games after COVID-19 pandemic? The findings were: (Q1) Average annual fan attendance declined by 93.61% in 2019 and 2020, and an annual increase of 49.47% between the year of 2020 and 2021. (Q2) The study revealed that 72.9% of the variations in the stadium attendance were explained by factors such as stadium capacity, team rating, the day on which a game was played, weather conditions, salary, and Fan Cost Index. (Q3) On the contrary, the findings in question 3 revealed that only 46.6% of the variations in stadium attendance could be explained by the above-mentioned factors. This finding indicates that the COVID-19 pandemic influenced factors impacting stadium attendance post-pandemic. The study discovered that FCI, team rating and weather conditions were factors that significantly impacted fan attendance in the MLS before the pandemic. However, stadium capacity, players' compensation and day of the week in which a game is played significantly influenced fan attendance post the pandemic. Future studies should consider ascertaining the economic impact of the reduced fan attendance caused by the pandemic on the MLS and the respective individual clubs. Additionally, future studies should also explore how

the virtual viewing of MLS games has been impacted by the COVID-19 pandemic even after the pandemic is over.

## ACKNOWLEDGEMENTS

Primarily, I would thank God for being able to complete this project with success. Then I would like to thank Dr. Conrad Shayo whose valuable guidance has been the ones that helped me patch the project and make it full proof success his suggestions and instructions has served as the major contributor towards the completion of the project. Also want to say a big thank you to Dr William Butler for your support.

Then I would like to thank my wife, parents, siblings, and friends who have helped me with their valuable suggestions, and guidance has been helpful in the various phases of the project's completion.

Lastly, I would like to thank my classmates who have helped me a lot.

## DEDICATION

This research paper is dedicated to my supportive wife who encouraged and inspired me in conducting this study. She has never left my side throughout the process and gave me strength and hope when I thought of giving this up. She provided me with a profound sense of enthusiasm and perseverance in continuing this. Without her love and assistance, this research would not have been possible.



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## CHAPTER ONE

### INTRODUCTION

The history of Major League Soccer (MLS) can be traced back dates to the late 1980s when the United States Soccer Federation created a professional Division soccer league as a prerequisite to host the 1994 World Cup. According to Dr. Luke Mashburn (as cited in Mino-Bucheli, 2022) of Georgia Highlands College, the US did not meet the minimum requirements to host a World Cup. He indicated that 'We didn't have one at the time, and so in a very American way, we named it the Major League Soccer' (Mino-Bucheli, 2022). MLS was officially formed in 1995 after the World Cup, and the league commenced in 1996. The first-ever MLS game was played between San Jose Clash and DC United on April 6, 1996, with a stadium attendance of 31,683 (The amount of revenue generated on this game is not publicly available)

Several scholars have elucidated the importance of fan attendance at sporting events (Douvis, 2014; Schreyer and Ansari, 2022). According to the Swinburne Research Bank, stadium attendance represents a major source of revenue generation for sporting clubs. Bradbury (2019) corroborates this assertion, stating that stadium attendance is a significant source of revenue for clubs in MLS. As of 2018, when 23 teams participated in the MLS, the teams collectively generated over 800 million USD in revenue (Smith, 2019). Atlanta United generated about 78 million USD, and LA Galaxy generated about 64 million USD. The COVID-19 pandemic came with several restrictions that

significantly impacted fan attendance, as mentioned by Bradbury (2019), which consequently impacted the revenue of these clubs. Therefore, it is not surprising that the MLS was projected to lose about 1 billion USD due to COVID-19 (Carlise, 2020).

Some researchers have expressed interest in the socioeconomic impact of the COVID-19-induced restrictions in the global sports industry (International Organization for Migration, 2020; Pak et al., 2020). However, researchers in recent times have also questioned the impact of the COVID-19 pandemic on fan engagement and stadium attendance (Reade & Singleton, 2020; Cross & Uhrig, 2022; Aleman 2023). Fan attendance has been described as having a significant influence on outcomes, revenue, and other aspects of sporting clubs (Cross & Uhrig, 2022; Wills, Addesa & Richard, 2023). In MLS, for instance, fan attendance is a major revenue determinant compared to other major leagues in the US (Bradbury, 2019). This confirms MLS's 1 billion USD revenue downturn due the COVID-19-induced restrictions in 2020.

Researchers have argued about diverse factors that influenced fan attendance at sports events (Douvis, 2014; Bajaras & Gasparetto, 2023). Valenti, Scelles & Morrow (2020) discovered that factors such as the reputation of the away club, weather conditions, uncertainty about the outcome of the game, and competitive influences have a significant impact on fan attendance. On the contrary, Soyguden et al. (2019) also discovered that factors such as personal relaxation, the opportunity for relaxation, and the atmosphere of the stadium significantly influence stadium attendance. Nevertheless, the COVID-19

pandemic has had a major impact on fan attendance at sporting events (Aleman, 2023). In Major League Baseball for instance, Aleman's (2023) findings reveal the significant impact of the COVID-19 pandemic on fan attendance. Riccobono (2023) reported that with fewer or no fans attending the stadium due to the COVID-19 pandemic, team hits per game experienced a significant slump.

Invariably, fan attendance has been identified as positively influencing the revenue of teams in MLS (Bradbury, 2019). Smith (2013) reported that in 2020, about 90% of revenues reported by individual teams in MLS were from fan attendance and other stadium-related revenue sources. With 47% of the US adult population expressing interest in MLS, it indicates the rapid growth of MLS. However, several researchers have reported on the negative consequences of the COVID-19 pandemic on global soccer leagues, of which MLS is not an exception (Parpa & Michaelides, 2021; Garcia-Calvo, 2022). The MLS is unique as it largely depends on spectators for its revenue. Therefore, investigating the impact of the COVID-19 pandemic on MLS is novel and necessary to ascertain the empirical impact of the pandemic on MLS. The table below shows how COVID-19 impacted attendance and revenue generation for major sport leagues across the world.

Table 1: Impact of COVID-19 on Fan Attendance and Revenue Generation in Major Leagues

Name of Sport League	Pre-COVID-19 Attendance	Revenue (in billion USD)	During COVID-19 Attendance	Revenue (in billion USD)	Percentage Revenue Decline
MLB(USA)	28,794	10.3	18,900	4.0	(61.17)
EPL(UK)	39,315	6.142	5,086	5.385	(12.32)
NBA(USA)	17,857	8.76	2,196	6.41	(26.83)
NFL(USA)	66,479	15	10,188	12.2	(18.67)
Ligue 1 (France)	22,529	2.0	3668	1.68	(16.00)

Source: Statista, NFL, MLB, and NBA

In figures 1 and 2, the trajectory of fan attendance and revenue generation for the above five major leagues is presented graphically. The graph depicted a very steep decline in fan attendance and revenue generation between 2019 and 2020 exactly when the covid-19 pandemic had commenced. This shows the significant impact of the pandemic on fan attendance and revenue generation in major leagues in the world.

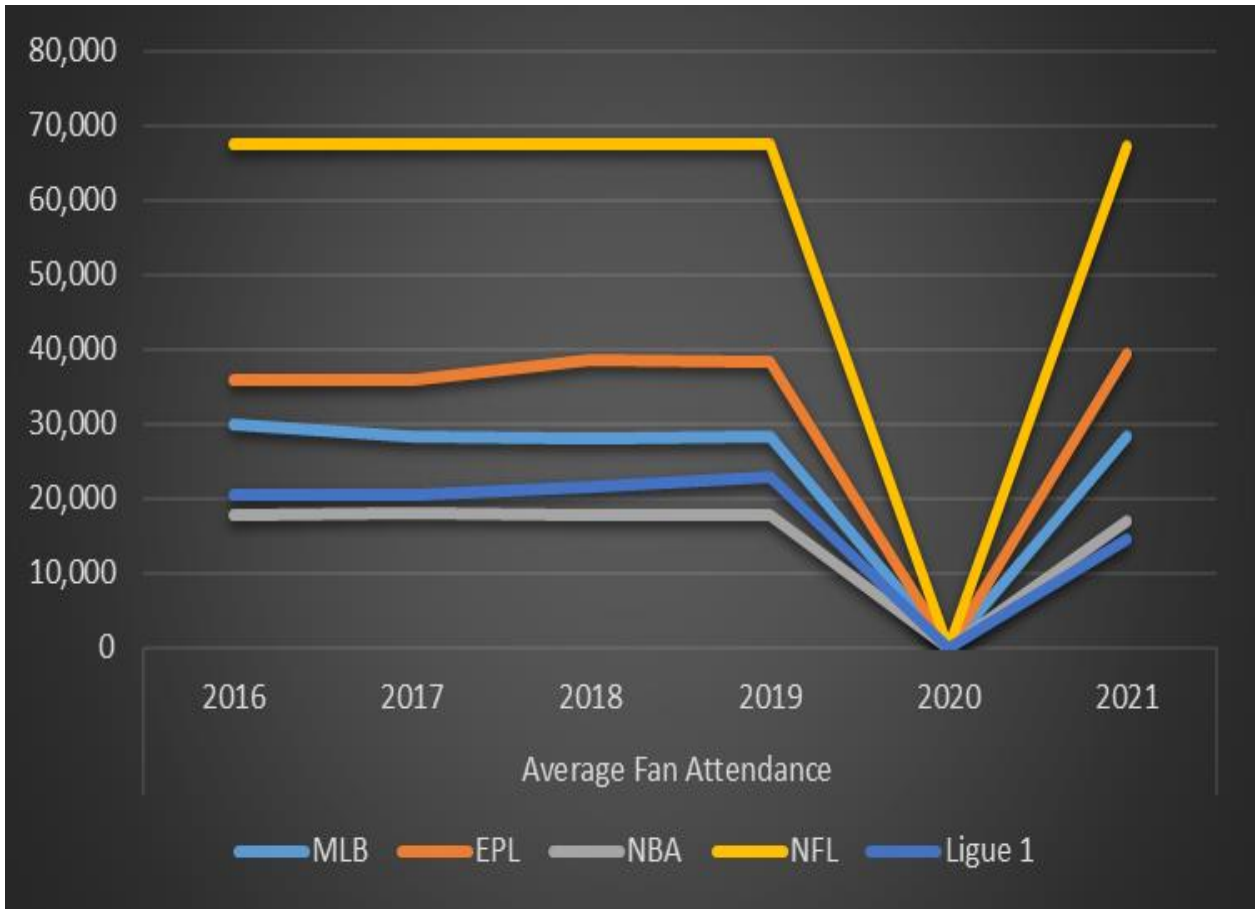


Figure 1: Fan Attendance In 5 Major Sport Leagues from 2016 to 2021



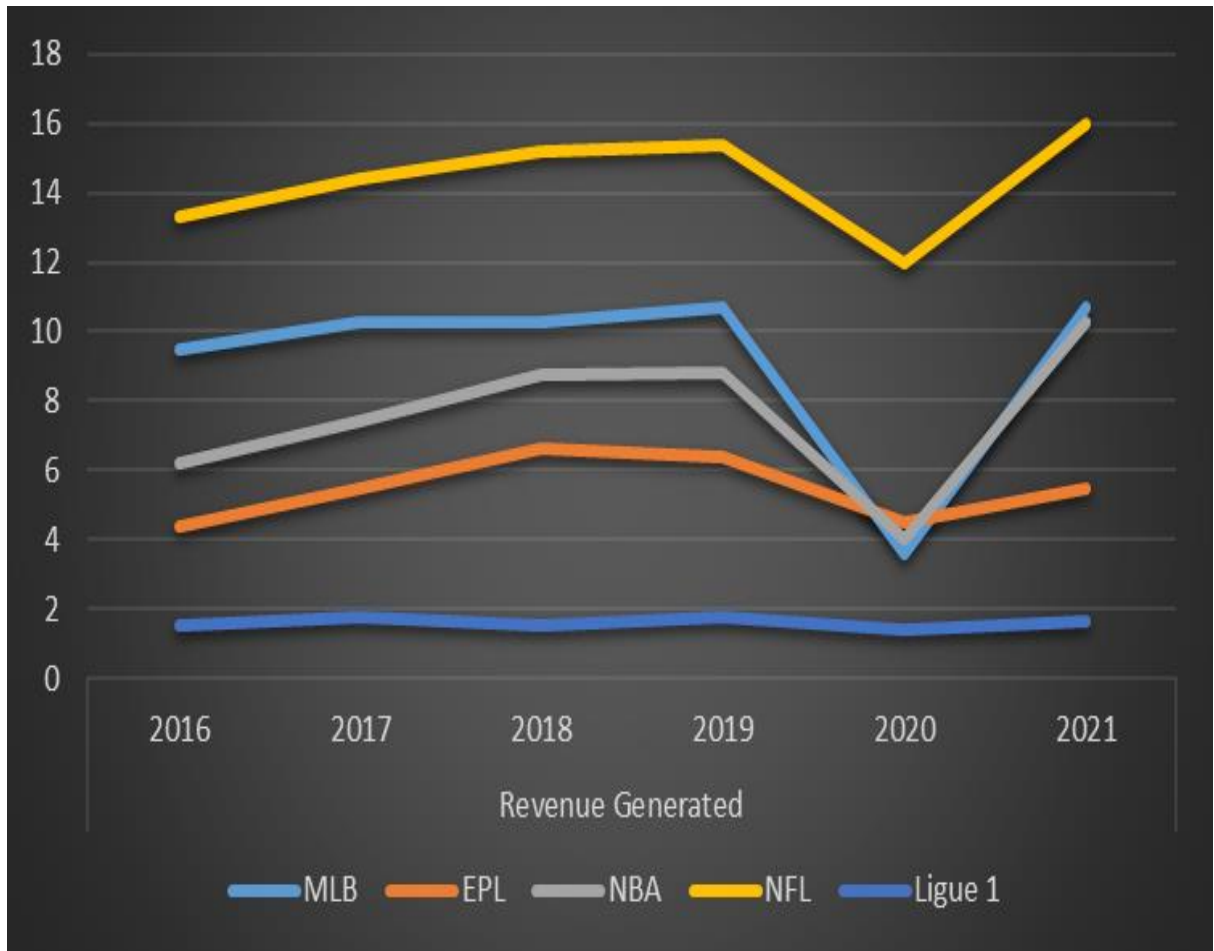


Figure 2: Revenue Generation Among 5 Major Sport Leagues from 2016 to 2021

### Problem Statement

While researchers have focused on the impact of COVID-19 on fan attendance at sports events in other major leagues in US such as Major League Baseball (MLB) (Aleman, 2023), National Football League (NFL) (Blauer & Joshua, 2023), and National Basketball Association (NBA) (Lu et al., 2022), no empirical studies have been conducted to investigate the impact of the COVID-19 pandemic on fan attendance in MLS. Previous studies have recommended the need for further research to investigate the impact of COVID-19 pandemic on fan attendance in major sports leagues in the US (Cross & Uhrig, 2022; Chiu and

Chang, 2022; Aleman, 2023). Therefore, this project intends to investigate the factors that influence stadium attendance in MLS before, during, and after the COVID-19 pandemic. [OBJ]

This project provides answers to the below questions:

1. How did the pandemic impact the trend of fan attendance in MLS during the COVID-19 pandemic?
2. What factors impacted fan attendance in MLS games before the COVID-19 pandemic?
3. What factors impacted fan attendance in MLS games after the COVID-19 pandemic?

This culminating experience project is divided into five chapters, with this section serving as the first chapter. Chapter two is a review of related studies, chapter three is the research methodology, chapter four is the analysis of results and finally, chapter five will be a discussion of findings, conclusions, and recommendations for further study.

## CHAPTER TWO

### LITERATURE REVIEW

**Question 1:** *How did the pandemic impact the trend of fan attendance in MLS during the COVID-19 pandemic?*

The COVID-19 pandemic altered several aspects of the global economy, and the sports industry was no exception. The global sports industry was significantly impacted by COVID-19 restrictions. During the pandemic, the implementation of safety protocols had a major impact on fan attendance. Several researchers have expressed that the COVID-19 pandemic significantly impacted fan attendance (Johnson & Lofgren, 2022; Aleman, 2023; Bilalic, Graf, & Vaci, 2022). Bilalic, Graf, & Vaci (2022) suggested that COVID-19 restrictions, such as social distancing, reduced fan attendance by 50%. Furthermore, McArdle (2020) indicated that during the COVID-19 pandemic, only about 12% of people were willing to attend sporting events. He also noted that sporting clubs incurred more expenses in implementing safety protocols during the pandemic (McArdle, 2020). With public health concerns and restrictions, major sporting leagues observed a significant reduction in fan attendance (Aleman, 2023; Matia & Krumer, 2023). Considering the above, the COVID-19 pandemic will likely reduce fan attendance in the MLS.

However, physical/social distancing measures had a significant effect on fan attendance. According to Reade and Singleton (2020), social distancing measures significantly reduced fan attendance in Western Europe. In the United

Kingdom, for instance, the social distance requirement was set 1 to 1.5 meters (Purves et al., 2023). These preventive measures reduced stadium capacity by significant margins. There were instances where stadium capacity were reduced to as low as 50%. For example, Atlanta United announced in 2021 that their Mercedes-Benz Stadium would operate at 50% capacity. These were legally mandated requirements that significantly reduced capacity, impacting stadium attendance, implying that at 100% legally mandated capacity, the stadium may host fans at 50% comparison to the original stadium capacity.

Reade & Single (2020) stipulated that stadium attendance dropped in 2020. This drop in attendance was primarily influenced by the COVID-19 pandemic which elicited the introduction of restrictions such as social distancing measures and stadium closures causing decline in fan attendance and revenue generated across major leagues as presented in Chapter 1. Aleman (2023) also expressed a significant downturn in fan attendance in the MLB recording a significant drop in attendance between 2019 and 2021. Johnson & Lofgren (2022) also posited that the scare in the rise of infection rates during the pandemic was major discouragement that prevented fan attendance. As recorded in other major leagues, the pandemic caused a significant decline in revenue and fan attendance.

**Question 2:** *What factors impacted fan attendance in MLS games before the COVID-19 pandemic?*

Before the COVID-19 pandemic, factors such as team performance and ticket prices impacted fan attendance at the stadium (Bradbury, 2019).

Therefore, this project investigated the factors that impacted fan attendance before the COVID-19 pandemic. Soyguden et al. (2019) identified factors such as the atmosphere at the stadium and personal relaxation that significantly impacted attendance. This project posits that factors such as ticket prices and team performance significantly influenced fan attendance before the COVID-19 pandemic. However, the restrictions during the pandemic may influence fan attendance determinants post the pandemic. Morton and Power (2022) suggested that factors that influenced fan attendance may have been impacted by the pandemic. They mentioned that issues of safety and human behavior may alter these factors. Additionally, this project investigates what factors impacted fan attendance after the pandemic.

Several studies have been conducted to ascertain the factors that drive fan attendance at major sporting events prior to the pandemic. According to Soyguden et al. (2019), some of the attendance includes personal relaxation, opportunities for recreational activities, and stadium pressure. Lee (2016) also reported in the MLB, for instance, that fan attendance is influenced by both the characteristics of the home and away teams. He indicated that factors such as uncertainty of the outcome and offensive performance have major influence on fan attendance in the MLB. In the Men's UEFA Champions League, Wills, Addesa, & Tacon (2023) conducted a similar study to ascertain the factors driving stadium attendance. While corroborating the findings of Lee (2016) on the influence of outcome uncertainty on stadium attendance, Wills et. Al. (2023) discovered that outcome uncertainty and competitive intensity have no significant

influence on stadium attendance. However, they concluded that team quality and the presence of star players from the top five leagues in Europe, (i.e., the UK, Germany, France, Italy, and Spain) significantly influence attendance. They also supported Lee's (2016) assertion of the influence of the away team, primarily the quality of away teams, in driving stadium attendance in the Men's UEFA Champion League.

In the Saudi Premier League, Binjwaied, Richards, & O'Keeffe (2015) indicated that major factors influencing stadium attendance include non-numbered seats and the facilities and services offered by the stadium. Silveira, Cardoso, & Quevedo-Silva (2018) highlighted the impact of customer satisfaction in driving stadium attendance. They stipulated that the identification of sports consumers with individual teams significantly influences satisfaction, leading to customer loyalty, which in effect drives attendance. Valenti, Scelles, & Morrow (2020) discovered that factors influencing attendance in the UEFA Women's Champions League include outcome uncertainty, competitive intensity, stage of the competition, weather conditions, and the quality of the away club. All other things being equal, certain major factors underpin fan attendance in major leagues. Among the most prevalent factors presented in this project are outcome uncertainty, competitive intensity, and the quality of away teams. These factors tend to significantly drive fan attendance across several leagues worldwide. Guironnet (2023) reported that fan attendance is significantly driven by competitive intensity in the French League compared to the English top leagues.

He discovered that the presence of star players is a major determinant factor of fan attendance at stadiums in the English top leagues.

Some researchers have strongly argued that the presence of star players plays a major role in driving fan attendance to major sports leagues (Wills, Addesa, & Tacon, 2023). Schreyer & Singleton (2023) strongly supported the impact of the presence of star players on stadium attendance. Using the Saudi Pro League (SPL) as a case study, they discovered that the transfer of Cristiano Ronaldo to the Kingdom of Saudi Arabia in December 2022 has had a significant impact on fan attendance. Schreyer & Singleton (2023) reported that the transfer of Ronaldo has increased home team attendance by 20% when he plays, increased attendance by 15% when he plays in away games, and by 3% if he does not play at all. This is an indication of the significant impact that Ronaldo alone is making on fan attendance in the SPL. It is therefore not surprising to see the rising trend of transfers of star players from Europe's major leagues to Saudi Arabia. While this could be described as the 'Ronaldo effect,' it is not a mutually exclusive event in the global industry. In 2007, David Beckham made a headline transfer to MLS (Eanet, 2011).

Researchers postulated that Beckham's transfer had major influence on the MLS. Shapiro, DeSchraver, & Rascher (2017) investigated the overall impact of Beckham's transfer on the MLS. They discovered that one of the major areas that Beckham's presence in the league impacted was fan attendance. While Bradbury (2019) estimated that 80% of MLS revenue originates from match-day proceeds, this invariably means that the presence of Beckham in MLS had a

positive impact on MLS revenue. Lamport-Stokes (2015) elaborated on the significant impact of Beckham's presence. He described Beckham's effect in the MLS as 'pretty significant'. After the expansion of teams in the MLS from 12 to 20 in 2006, Beckham's transfer in 2007 made a significant contribution to the growth of the MLS during his six-year tenure at LA Galaxy.

Lamport-Stokes (2015) reported that during the era of Beckham, average fan attendance at stadiums increased by over 3,000. He further indicated that there were instances at the time when MLS attendance exceeded that of the NBA and the National Hockey League. The presence of star players and their impact on attendance have recently gained scholarly attention. Similarly, Nikolic (2023) described Messi's transfer to the MLS as the 'biggest thing since Beckham'. He indicated that Messi's transfer in the immediate short term has had a significant economic impact on the MLS. Clubs have experienced significant increases in ticket sales, which are invariably influenced by fan attendance. This economic gain, according to Nikolic (2023), is similar to the 'Beckham Effect'.

However, physical/social distancing measures had a significant effect on fan attendance. According to Reade and Singleton (2020), social distancing measures significantly reduced fan attendance in Western Europe. In the United Kingdom, for instance, the social distancing requirement was set between 1 to 1.5 meters (Purves et al., 2023). These preventative measures reduced stadium capacity by significant margins. There were instances where stadium capacity was reduced to as much as 50%. For example, Atlanta United announced in 2021 that their Mercedes-Benz Stadium would operate at 50% capacity. These



were legally mandated requirements that significantly reduced capacity, impacting stadium attendance, implying that at 100% legally mandated capacity, the stadium may host fans at 50% relative to the original stadium capacity.

In determining the factors influencing fan attendance at major sports events, diverse methodological approaches have been adopted by researchers. In the work of Guironnet (2023), he adopted Bayesian statistical modeling to investigate the impact of competitive structure on fan attendance. Taking into consideration the linkage of the research outcome to the probability of an event, whether a certain outcome may materialize or not, Schoot et al. (2021) recommended that Bayesian statistics are an appropriate methodology for this type of research. Littlejohn (2019) reported that factors such as weather conditions, the day of the week and time a game is played, the quality of the home and away teams, the age of the team, and the stadium to which a game is played are factors that impact fan attendance at MLS games. Littlejohn (2019) suggested leveraging historical data in building a machine learning model to predict how each of these factors impacts MLS attendance.

Schreyer and Singleton (2023) adopted multilinear regression analysis in examining the Cristiano Ronaldo effect on the SPL. They identified several factors and regressed them on the linear regression model to ascertain how each of these factors impacts stadium attendance. While quantitative methodological approaches have dominated research on factors impacting stadium attendance, some studies have adopted qualitative approaches like systematic scoping reviews in stadium attendance demand research (Schreyer and Ansari, 2021).

**Question 3:** *What factors impacted fan attendance in MLS games before the COVID-19 pandemic?*

The COVID-19 pandemic has been reported by several researchers to have a significant impact on the global sports industry (Keshkar et al., 2021; Weston, 2021). Aleman (2023) investigated the impact of the COVID-19 pandemic on fan attendance in the MLB. He discovered a significant variation in fan attendance before and after the COVID-19 pandemic. Aleman (2023) found that fan attendance rates post-pandemic, relative to the pre-pandemic era, recorded a significant decrease. He also discovered that factors such as stadium capacity, runs per game, home runs, etc., influenced fan attendance prior to the pandemic. However, he found variations in factors influencing fan attendance after the pandemic. Lu et al. (2022) also investigated the impact of the COVID-19-induced lockdown on match performance in the NBA. They reported that NBA teams won more home matches compared to away matches before the COVID-19 pandemic. However, they discovered that home advantage had no influence on match performance after the COVID-19 pandemic. They found that fan attendance played a major role in the performance of NBA teams, particularly in winning games.

Cross and Uhrig (2022) conducted a similar study to ascertain how fans' impact match outcomes using the COVID-19 pandemic as a case study. Their investigation focused on the top four soccer leagues in Europe. They discovered that COVID-19-induced restrictions, affected match outcomes, particularly for home teams. They concluded that home field advantage in the Spanish La Liga,

German Bundesliga, English Premier League, and Italian Serie A has reduced by 50%. Alonso et al. (2022) conducted a similar study in Europe's Professional Basketball League to ascertain the impact of the COVID-19 pandemic on home advantage and winning rates for home teams. Their findings confirmed the conclusions made by Lu et al. (2022), indicating that teams had a higher home advantage and winning percentages before the COVID-19 pandemic compared to the period during and after the pandemic. Their study also affirmed the impact of the COVID-19 pandemic on fan attendance.

There had also been concerns about home advantage in the NBA eliciting biased reactions from referees. These concerns attracted the attention of several researchers. The COVID-19 pandemic presented an opportunity to investigate the claim as fans were not present in the stadium. Gong (2022) examined how the presence of fans impacted home bias in NBA games before and during the COVID-19 pandemic when no fans were present. He concluded that fan support does not elicit any preferential treatment from referees. Kurland et al. (2022) investigated the impact of fan attendance on COVID-19 incident in the NFL. They discovered that NFL games with large fan attendance increased the incidence of COVID-19 cases in the counties in which the games were played. They further emphasized that these factors were likely to impact fan attendance in the MLS after the pandemic. Though data has been collected for other sport leagues, no studies have been conducted to ascertain factors driving fan attendance in MLS post the pandemic.

## CHAPTER THREE

### RESEARCH METHODOLOGY

This project adopts a quantitative methodological approach. This chapter presents the process and methods that were used for the collection and analysis of data. The study replicated a methodological approach similar to the one adopted by Alondra (2023) in ascertaining the impact of the COVID-19 pandemic on fan attendance in the MLB. The study collected data for 28 soccer clubs that play in the MLS. The data collected spanned the period from 2018 to 2022. As indicated previously, the study examines factors impacting fan attendance at stadiums before and after the COVID-19 pandemic. Therefore, the DATASET was such that it reflected seasonal data for the period before and after the COVID-19 pandemic.

The data was collected from several sources, including [www.kaggle.com](http://www.kaggle.com), [www.soccerstadiumdigest.com](http://www.soccerstadiumdigest.com), [www.statista.com](http://www.statista.com), MLSPA Salary Guide, [The Athletic](#) , [The National Weather Service](#) and [The Xbet Whoscored](#). Data on primary variables collected for this project were from the above-mentioned sources. The dataset contained 140 observations emanating from each of the clubs. The main variables for the study included stadium capacity, the day of the week a game is played, weather conditions, average player salary in the season, and average ticket price in the season. Data collected was analyzed using IBM SPSS Statistics software. The comprehensive research design is presented in the subsequent section of this chapter.

## Methodology

This chapter provides a systematic methodological process for answering each of the above research questions. As previously indicated, this project aims to answer the following research questions:

1. How did the pandemic impact the trend of fan attendance in the MLS during the COVID-19 pandemic?
2. What factors impacted fan attendance in MLS games before the COVID-19 pandemic?
3. What factors impacted fan attendance in MLS games after the COVID-19 pandemic?

***Question 1:*** *How did the pandemic impact the trend of fan attendance in the MLS during the COVID-19 pandemic?*

Although not many studies have been conducted to ascertain factors accounting for disparities in MLS stadium attendance, Bradbury (2019) expressed that several factors account for differences in MLS attendance. Using a quantitative approach and primarily regression analysis, Bradbury (2019) observed that factors such as income, in relation to ticket prices, and soccer-specific stadiums impacted fan attendance. While similar research has been conducted prior to the COVID-19 pandemic, little focus has been given to the impact of COVID-19-induced stadium closure on fan attendance after the pandemic. As indicated in the research question, this project ascertains how the pandemic impacted the trend of fan attendance in MLS during the pandemic. That is, whether the COVID-19 restrictions had a positive impact on fan

attendance (increased fan attendance) in MLS during the pandemic or negative impact on attendance (decreased fan attendance). With the COVID-19 pandemic being a major bottleneck to fan attendance at the stadium, this project will conduct the analysis by comparing stadium attendance in 2019 (before COVID-19) to stadium attendance in 2020 and 2021 during the pandemic to ascertain the percentage change in fan attendance. The data collected for 2019 will be used as the base year to compare MLS attendance to attendance in 2020 and 2021 to ascertain the percentage change. The method will help in examining the trend of fan attendance in MLS during the COVID-19 pandemic.

**Question 2:** *What factors impacted fan attendance in MLS games before the COVID-19 pandemic?*

As indicated, previous studies have investigated factors impacting stadium attendance at major sports events. Studies such as Bradbury (2019), Alondra (2023), and Wils, Addesa, and Tacon (2023) have adopted multilinear regression to measure factors that impact stadium attendance in the MLS before the COVID-19 pandemic. The factors that will be used are those that have been reported in previous studies. To do that, a regression model will be developed to estimate fan attendance in MLS. Since question two examines fan attendance before the COVID-19 pandemic, the model will use data from 2018 and 2019. A Summary of the regression model (equation) is presented below, along with an in-depth description of the various explanatory (independent) variables.

$$STADIUM\ ATTENDANCE = \beta_0 + \beta_1STDCAPACITY + \beta_2TR + \beta_3DAYPLAYED + \beta_4WEATHER + \beta_5SALARY + \beta_6FCI + \neg\epsilon i$$

Table 2: Variable Description

<b>Variable</b>	<b>Description</b>
Stadium Attendance	<i>This represents the total tickets that were sold</i>
Stadium Capacity	<i>The total seating capacity in MLS stadium</i>
TR	<i>This represents the team's rating in terms of performance</i>
DayPlayed	<i>The day of the week in which an MLS game is played</i>
Weather	<i>Average weather condition at each of MLS club's home city during the season</i>
Salary	<i>Average salary of MLS players in their respective clubs</i>
FCI	<i>This represents the Fan Cost Index. This takes into consideration ticket prices, parking fees, merchandise, etc.</i>

### Variables

As presented in Table 2, the dependent variable for the study is stadium attendance and hence represents the average fan attendance in an MLS season. Several studies in the past have investigated factors impacting stadium attendance in general (Shobian, 2016; Shajie et al., 2020; Barajas and Gasparetto, 2023). Again, the independent variables include stadium capacity,

team record, the day of the week in which an MLS game was played, weather conditions, salary, and ticket prices. The uniqueness of this project lies in how the COVID-19 pandemic has influenced stadium attendance and in ascertaining how it has impacted these variables.

Stadium capacity has been described to have a varying effect on stadium attendance (Schreyer and Ansari, 2022). All other things being equal, the larger the stadium capacity, the more it will be able to accommodate fans. As such, Ours JC (2021) postulated that stadium capacity has a significant impact on stadium attendance. This underpins the reasoning for stadium expansion to increase capacity. Scholars have also expressed that a team's performance influences stadium attendance. This translates to the rating of the club. Fans of soccer clubs with a very good chance of winning are influenced to attend and watch their games. On the contrary, clubs with poor performance discourage fan attendance. All other things being equal, clubs with higher team rating have high probability of winning a game. The day of the week in which an MLS game is played has been observed to exert a significant influence on stadium attendance. According to Ermakov and Krumer (2022), the day of the week on which a soccer game is played is crucial to fan attendance. They further stated that games on Saturdays have been reported to attract larger attendance compared to any other day of the week. Gómez-González et al. (2016) reported that MLS stadium attendance is impacted by weather conditions. Indicating that weather conditions such as partly cloudy, cloudy, rainy, and snowy have varying effects on stadium attendance. As critically reviewed in Chapter Two, players may have diverse



impacts on attendance. According to Lehl (2020), players' salaries impact the performance of clubs in MLS, which also affects performance. Invariably, team performance also impacts stadium attendance. Fundamentally, prices significantly impact demand. Previous studies have reported on the diverse impact of ticket prices on MLS stadium attendance (Bradbury, 2019; Schreyer and Ansari, 2022). As such, Fan Cost Index (FCI) have been used to represent average amount a fan may spend on a club taken into consideration ticket prices, parking fees, merchandise, etc.

***Question 3: What factors impacted fan attendance in MLS games after the COVID-19 pandemic?***

While question two investigated the factors influencing fan attendance at MLS games before the COVID-19 pandemic, question three examines the factors that influence MLS stadium attendance after the pandemic. The seasonal stadium attendance is estimated using the regression model presented earlier. However, data from 2021 and 2022 were used. The primary focus of this question is to assess how each of the explanatory variables has been impacted after the COVID-19 pandemic. The COVID-19 pandemic significantly altered major sporting events in the world, of which the MLS was not an exception. Stadium closures, playing without fans, etc., were among the restrictions that impacted MLS attendance during the pandemic. However, the interest of this project is to assess how the above-mentioned explanatory variables have been altered post pandemic.

Finally, the dataset for this project was collected from several sources, as indicated above. Data were collected on all teams that participated in MLS the years of between the 2018 and 2022. While the MLS is not the most dominant league in the US, not much scholarly attention has been given to the impact of COVID-19 pandemic on fan attendance in the MLS. Overall, the study analyzes factors impacting stadium attendance in the MLS post the COVID-19 pandemic. This chapter provided a systematic approach for answering the above-stipulated research questions.

## CHAPTER FOUR

### DATA COLLECTION, ANALYSIS AND FINDINGS

This chapter provides the step-by-step process adopted in this project to analyze and provide answers to the research questions. This project offers insight into the impact of the COVID-19 pandemic on fan attendance in the MLS. As indicated earlier, the sports industry was significantly impacted by the pandemic. While several studies have been conducted to ascertain the overall impact of the pandemic on major sports leagues worldwide (Blauer & Joshua, 2022; Lu et al., 2022; Aleman, 2023), this project contributes to the body of knowledge by providing insight into the impact of the COVID-19-induced restrictions in the MLS. In this chapter, the responses to the main research questions show a breakdown of the data gathered to reflect the trends and factors impacting fan attendance in the MLS during, before and after the COVID-19 pandemic.

***Question 1:*** *How did the pandemic impact the trend of fan attendance in the MLS during the COVID-19 pandemic?*

The COVID-19 pandemic brought several restrictions and safety measures that significantly impacted the global sports industry. The MLS was not an exception; it was significantly affected by the pandemic, however, as of the time of writing this project, no studies have been conducted to investigate the impact of the COVID-19-induced restrictions on fan attendance in the MLS specifically. Thus, this section provides answers to the above question by ascertaining the trend of fan attendance during the COVID-19 pandemic for the

MLS. The pandemic led to stadium closures and social distancing measures significantly reducing capacities (Stringer, 2020; Piovani et al., 2021). To achieve this, this project used fan attendance figures for the respective MLS clubs that participated in the 2019,2020, and 2021 MLS seasons. The analysis adopted the percentage change between the base year, 2019, and the figures for the other years.

The base year was the period before the pandemic, and hence, the percentage change ascertains the difference between 2019 and the period during the pandemic, 2020 and 2021. The percentage change for each of the MLS clubs has been presented in table 3 for the perspective seasons under review. Table 3 also presents the percentage from 2019 to 2020 and from 2019 to 2021. It was observed that the 2020 season had a significant decline in fan attendance compared to the 2021 season.

Table 3: Fan Attendance During the COVID-19 Pandemic

<b>Team</b>	<b>2019 Attendance</b>	<b>2020 Attendance</b>	<b>2021 Attendance</b>	<b>%Change from 2019- 2020</b>	<b>%Change from 2020-2021</b>
Atlanta United FC	892,663	69,301	747,406	-92.24	-90.7278
Chicago Fire	209,516	-	167,091	-100.00	-100
Colorado Rapids	242,833	13,062	127,065	-94.62	89.7202
Columbus Crew	252,555	17,473	261,511	-93.08	93.3184
D.C United	301,644	34,115	203,441	-88.69	83.231
FC Cincinnati	464,720	-	359,969	-100.00	-
FC Dallas	252,313	32,084	209,014	-87.28	84.6498
Houston Dynamo	266,464	22,039	187,711	-91.73	88.2591
LA Galaxy	394,477	26,382	227,806	-93.31	88.4191
LAFC	378,265	44,233	323,271	-88.31	86.3171
Minnesota United	335,291	-	171,908	-100.00	-
Montreal Impact	274,904	21,006	5,000	-92.36	-320.12
NE Revolution	284,535	15,289	207,476	-94.63	92.631
New York Red Bulls	293,769	15,703	171,099	-94.65	90.8223
NYC FC	358,820	-	32,576	-100.00	-
Orlando City SC	386,940	25,527	231,270	-93.40	88.9623
Philadelphia Union	290,883	-	193,552	-100.00	-
Portland Timbers	428,706	50,736	255,422	-88.17	80.1364
Real Salt Lake	308,050	18,093	228,798	-94.13	92.0922
San Jose Earthquakes	319,272	30,223	144,886	-90.53	79.1402
Seattle Sounders	684,192	73,206	427,121	-89.30	82.8606
Sporting KC	316,211	21,188	262,603	-93.30	91.9315
Toronto FC	425,816	26,171	96,065	-93.85	-72.757

Vancouver Whitecaps	331,745	22,120	32,222	-93.33	31.3513
Average Annual Decline/Increase in Fan Attendance In the MLS					49.47
				-93.6213	

-NB: The figures represent seasonal attendance for each MLS club in 2019,2020 and 2021.

As indicated earlier, the average seasonal decline between 2019 and 2020 was 93.61%, compared to 2020 and 2021, which recorded an increase in fan attendance by 49.47%. This is evident that the COVID-19 pandemic reached its peak between 2020 and 2021, severely impacting fan attendance. In 2020, for instance, five teams had their stadiums closed: Chicago Fire, FC Cincinnati, Minnesota United, NYC FC, and Philadelphia Union. Moreover, 14 teams recorded over a 90% decline in fan attendance in 2020. Furthermore, the teams with the least decline recorded a percentage change of 87.28%, 88.17%, and 88.69% between 2019 and 2020. The teams were FC Dallas, Portland Timbers, and LAFC, respectively. This indicates the significant impact of the pandemic on the trend of fan attendance.

However, all the teams with the exception of Montreal impact recorded an increase in fan attendance between 2020 and 2021. Teams such as Sporting

KC, Real Salt Lake, Atlanta United FC, NE Revolution, New York Red Bulls experienced an increase in attendance of over 92%.

Stadium closure and social distancing measures significantly impacted fan attendance, as evidenced in related studies (Reade and Singleton, 2020). The figure represents the trend of fan attendance in the season before COVID-19, (i.e., 2019), and the seasons which were severely affected by the pandemic.

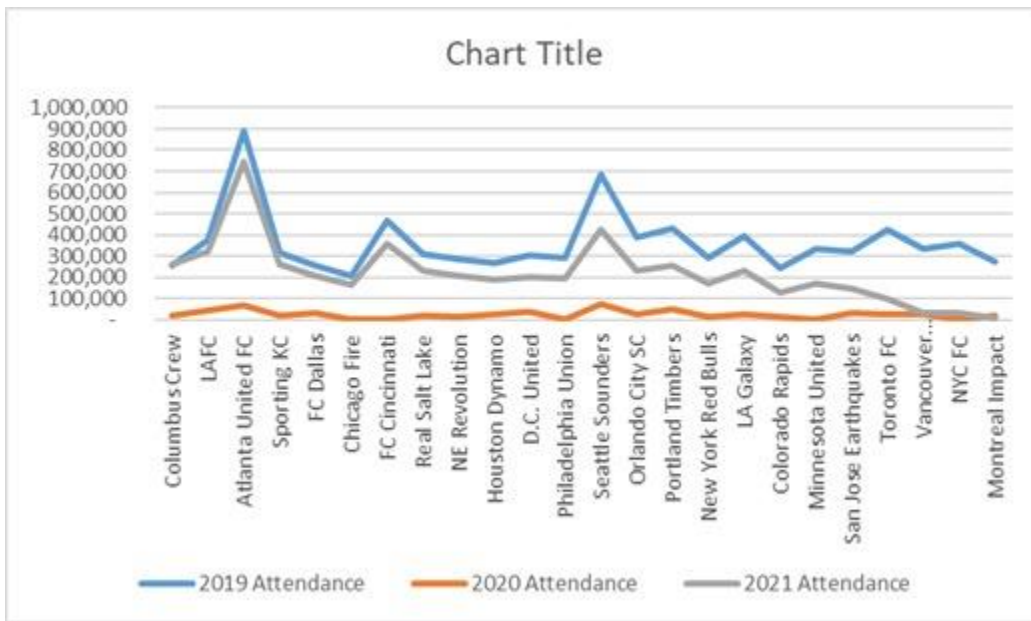


Figure 3: Comparison of MLS Seasonal Attendance in 2019, 2020 and 2021

Figure 3 shows a graphical representation of seasonal attendance in the MLS seasons, as indicated earlier. The orange line reflects the 2020 seasonal attendance, with 2021 attendance being represented by the grey line lying between the 2019 and 2020 attendance. The graphical representation reflects the significant reduction in fan attendance caused by the COVID-19-induced restrictions during the pandemic. Taking into consideration the above findings,

future studies should investigate the psychological impact of the absence of fans in the stadium on the overall team performance in the MLS.

**Questions 2:** *What factors impacted fan attendance in MLS games before the COVID-19 pandemic?*

### Results of Empirical Model

This section analyzes the factors that impacted fan attendance at MLS games. This project utilized common variables known to influence fan attendance at stadiums, which serve as the explanatory factors affecting the dependent variable, namely Stadium Attendance. The explanatory variables include Stadium Capacity (STDCapacity), Team Rating (TR), Day of the Week a Game is played (DayPalayed), Average Seasonal Precipitation (Weather), Annual Compensation (Salary), and Fan Cost Index (FCI). The table below, the study presents the regression results, indicating the coefficients and standard errors for the perspective explanatory variables for Model 1 (Before COVID-19) and Model 2 (After COVID-19)

Table 4: Results of Regression Analysis

<b>Stadium Attendance</b>				
	<b>Model 1</b>		<b>Model 2</b>	
<b>Variables</b>	<b>B</b>	<b>SE</b>	<b>B</b>	<b>SE</b>
Intercept	-273094.985	2159776.168	-1677280.634	1576088.898
STDCapacity	3.615	2.019	3.591	1.466
TR	-118342.492	330980.417	-16283.819	245922.563



DayPlayed	108176.604	79658.951	396844.421	219824.327
Weather	904.468	1791.682	-1759.558	1671.439
Salary	.078	.041	.018	.009
FCI	-392.337	2631.274	-317.471	514.979
R <sup>2</sup>	.729		.466	
Adjust R <sup>2</sup>	.627		.313	
N = 52	P-Value = .05			

NB: This is results for the empirical model presented in Chapter 3 with Stadium attendance as the dependent variable.

As stated earlier, the first model (Model 1) represents the time before the COVID-19 pandemic (i.e., 2018). Table 4 represents the regression results in three sections: the first is the B column, which represents the coefficients of the explanatory variables; the SE column represents the Standard Error for each of the explanatory variables, and finally, the R-squared and the Adjusted R-squared. In the first model, all the variables, except Team Rating (TR) and Fan Cost Index (FCI), have a positive relationship with the dependent variable. This implies that a unit change, such as a day in which a game is played in a week, will increase the seasonal attendance by 108,177 fans. Therefore, for each of the variables that have a positive relationship with stadium attendance (the dependent variable), a unit increase in those variables (explanatory) will increase stadium attendance by the respective value of the coefficient as presented above. However, FCI and TR have a negative relationship with the dependent

variable. This suggests that a unit change in FCI will reduce seasonal attendance by 392,337. Additionally, the study discovered that FCI, weather conditions and team rating significantly influenced fan attendance before the pandemic ( $p$ -value  $< \alpha = 0.05$ ). Furthermore, an R-squared value of 72.9% recorded in Model 1 suggests that 72.9% of the variations in the dependent variable is explained by the independent variables. This indicates a very strong relationship between the explanatory variables and the dependent variable, suggesting that the explanatory variables significantly impacted stadium attendance before the COVID-19 pandemic.

**Question 3:** *What factors impact fan attendance in MLS games after the COVID-19 pandemic?*

This project investigated the factors that impact MLS attendance in MLS games post the pandemic. In other words, the project assessed how the COVID-19-induced restrictions influenced attendance in the 2022 MLS season. As presented in Table 3, the results in Model 1 (season before the pandemic) are different from the results in Model 2. Nonetheless, FCI presented similar results for both models, reflecting the findings in the work of Barajas & Gasparetto (2023).

Moreover, there was a significant reduction in the R-squared value in comparison to Model 1. Model 2 recorded an R-squared value of 46.6%, which is a significant reduction compared to what was recorded in Model 1. This suggests that only 46.6% of variation in the dependent variable is explained by the independent variable. This indicates that the explanatory variables did not have a

strong relationship with the dependent variable post the pandemic. This finding corroborates the results in the work of Aleman (2023), indicating that the factors that affect stadium attendance are not constant; they change over time.

However, stadium capacity, day in a week in which a game is played, and the players' annual compensation significantly impacted fan attendance post the pandemic. Therefore, future studies should identify the different factors influencing MLS fans attendance at stadiums post the pandemic.

## CHAPTER FIVE

### DISCUSSION, CONCLUSION AND RECOMMENDATIONS FOR FURTHER STUDY

The last chapter represents a discussion of the findings, provides a conclusion and makes recommendations for further studies for each of the research questions. The project investigated how the COVID-19 pandemic impacted fan attendance during the pandemic in the MLS. This chapter, specifically, highlights the significant decline in stadiums attendance due to COVID-19-induced restrictions such as social distancing and stadium closures. Additionally, this chapter also investigates factors that affected stadium attendance in the MLS before and after the pandemic. Also taking note of the critical gaps that will significantly influence future studies were identified and are strongly recommended for further scholarly research in future studies.

***Question 1:*** *How did the pandemic impact the trend of fan attendance in the MLS during the COVID-19 pandemic?*

Fan attendance at MLS games is a significant revenue source for the league (Bradbury, 2019). The first research question in this project focused on identifying the trend of fan attendance during the pandemic, aiming to assess how the COVID-19 pandemic influenced fan attendance. While the pandemic's remnants persist, its notable impact was experienced during the 2020 and 2021 seasons. The findings, as presented in Table 3, indicated a significant decline in fan attendance during the pandemic. Specifically, there was a significant decline

of 93.61% between 2019 to 2020. This significant reduction in fan attendance could be attributed to COVID-19-induced restrictions such as stadium closures (Aleman, 2023) and social distancing measures (Reade & Singleton, 2020). One limitation of this project was the lack of consideration of the psychological impact of the pandemic, which may have discouraged fans from attending stadiums.

This gap highlights the need for future studies to explore the psychological impact of the pandemic on fan attendance, which likely contributed to the decrease in attendance in the MLS and other major league events worldwide. Additionally, further studies could examine how the implementation of COVID-19 management policies by respective countries has affected individual clubs worldwide.

***Questions 2: What factors impacted fan attendance in MLS games before the covid-19 pandemic?***

The second research question examined the factors that influenced fan attendance in MLS games before the COVID-19 pandemic. The regression equation model, as expressed in Chapter 3, was used to estimate MLS fan attendance using common factors that determine stadium attendance in the MLS. The findings from this question were primarily influenced by the coefficients of the explanatory variables and R-squared. The study highlighted the significance of the factors used in influencing fan attendance at MLS games before the COVID-19 pandemic. The R-squared provided additional insights into how the explanatory variables impacted stadium attendance in the MLS. One

limitation of these findings could be that the study did not include key variables that may have influenced the regression model's outcome.

Further studies should consider other factors, such as changes in consumer patterns of MLS fans, and how these changes impacted fan attendance before the pandemic. Additionally, a qualitative analysis could have complemented the quantitative findings, providing a more comprehensive understanding of the factors influencing stadium attendance in the MLS.

**Question 3:** *What factors impact fan attendance in MLS games after the COVID-19 pandemic?*

As presented in Table 3, Question 3 ascertained the factors that influenced fan attendance in MLS games post the pandemic. Model 2, as indicated earlier, provides the results for the empirical model covering the season after the pandemic. The results observed a major difference in the coefficient. For instance, DayPlayed returned a negative result compared to Model 1. Additionally, there was a significant reduction in the R-squared value, causing it to decline below 50%. The difference between the models may be associated with the significant influence that has impacted factors relating to fan attendance post the pandemic. This project limited itself to the common factors influencing fan attendance at stadiums, such as stadium capacity, weather conditions, fan cost index, etc.

It would be very insightful for future studies to conduct comparative studies between the MLS and other major leagues like the MLB, NFL, or NBA to examine how factors influencing fan attendance post-pandemic vary across the

major leagues. This project investigated the impact of the COVID-19 pandemic on fan attendance in the MLS. While studies have uncovered factors influencing fan attendance, this project explored how these factors were impacted by the pandemic and how it affected fan attendance at the stadium to witness live MLS games.

In all, this chapter posits the significant impact of the pandemic on fan attendance highlighting the substantial decline in fan attendance, associating it with the restrictions that accompanied the COVID-19 pandemic. The project also observes that factors such as stadium capacity, annual average, salary, and the fan cost index, among others, had significant influence on fan attendance in the MLS before the pandemic, however, also noting that these dynamics have changed. Additionally, the study observes that the psychological impact of the pandemic might have altered factors influencing fan attendance in the MLS post-pandemic. Hence, future studies should consider investigating the psychological impact of the pandemic on fan attendance in MLS. This project provides significant insights to stakeholders in the MLS, by leveraging the findings listed to alter their policies and marketing strategies in a way that reflects the contemporary factors impacting attendance in the MLS. Future studies should also explore how the virtual viewing of MLS games has been impacted by the COVID-19 pandemic even after the pandemic is over.

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