



**mulier institute**

# **Formula E race Brainport Eindhoven region**

Potential economic and social impact

Paul Hover

Eva Heijnen

# **Formula E race**

## **Brainport Eindhoven region**

Potential economic and social impact

Commissioned by BrabantSport

**Paul Hover**  
**Eva Heijnen**

Photo's: Formula E Operations Limited.

© Mulier Institute  
Utrecht, March 2020

Mulier Institute  
Research for Sport and Public policy

PO Box 85445 | 3508 AK Utrecht  
Herculesplein 269 | 3584 AA Utrecht  
T +31 (0)30 721 02 20 | I [www.mulierinstituut.nl](http://www.mulierinstituut.nl)  
E [info@mulierinstituut.nl](mailto:info@mulierinstituut.nl) | T @mulierinstituut

# Contents

<b>1.</b>	<b>Introduction</b>	<b>5</b>
1.1	Formula E ambitions	5
1.2	Objective	5
1.3	Method	5
1.4	Reading guide	5
<b>2.</b>	<b>Formula E</b>	<b>7</b>
2.1	Motorsport and beyond	7
2.2	Dutch E-Prix Eindhoven	13
2.3	Conclusion	14
<b>3.</b>	<b>Potential economic and social impact</b>	<b>16</b>
3.1	Economic impact	16
3.2	Social impact	18
3.3	Leveraging	19
3.4	Conclusion	20
<b>4.</b>	<b>Opinion key persons</b>	<b>23</b>
4.1	First impression	23
4.2	Opportunities and threats	23
4.3	Economic and social impact	25
4.4	Side events	25
4.5	Ambassador	26
4.6	Conclusion	26
<b>5.</b>	<b>Conclusion</b>	<b>28</b>
	<b>Literature</b>	<b>29</b>



# 1.

## Introduction



# 1. Introduction

## 1.1 Formula E ambitions

Formula-Eindhoven (the organising foundation Dutch E-Prix Eindhoven) has the ambition to organise at least three Formula E races in the Brainport Eindhoven region, spread over three years. According to the organising foundation, the races will be the apotheosis of a year-round program of side events. Formula-Eindhoven supposes that the Dutch E-Prix Eindhoven can economically and socially strengthen the Brainport Eindhoven region, and that the event and side events can be of value for the further development of this relatively new branch of motorsport.

Formula-Eindhoven informed BrabantSport about the possibility of organising a Formula E race in the Brainport Eindhoven region. BrabantSport is an implementing organisation of the province of North Brabant. In addition, BrabantSport was asked to support the initiative. As a result of this enquiry, BrabantSport asked the Mulier Institute to conduct a study about the potential economic and social impact of a Formula E race for the Brainport Eindhoven region and the support for an E-Prix among key persons. BrabantSport and the province of North Brabant intend to use this information to make a thorough judgement regarding the economic and social potential of a Formula E race in the Brainport Eindhoven region, and possible (financial) support for the races. If the results of this study are shared with other organisations, they can also take advantage of the information.

## 1.2 Objective

The objective of this study is fourfold:

- Describing Formula E and its mission.
- Estimating the potential economic and social impact of a Formula E race for the Brainport Eindhoven region.
- Providing advice about how the economic and social impact of a Formula E race in Eindhoven can be maximised for the Brainport Eindhoven region.
- Mapping the opinions of key persons regarding the opportunities, threats of a Formula E race for the Brainport Eindhoven region and willingness to cooperate.

## 1.3 Method

A mixed method approach was applied. A literature study was conducted, existing data were analysed and a survey was sent to key persons. Key persons were selected in consultation with BrabantSport and Formula-Eindhoven. Most of these key persons work in the Brainport Eindhoven region, but independent experts outside the region were also consulted. We thank these persons for their time and willingness to share their view and expertise. Their names are not listed as their anonymity was guaranteed.

## 1.4 Reading guide

In the following chapter, the characteristics and objectives of Formula E races are delineated. In chapter 3, the potential economic and social impact is described, as well as strategies for leveraging. The opinions of key persons are the topic of chapter 4. The conclusion can be found in chapter 5.

# 2.

## Formula E





## 2. Formula E

Firstly, the Formula E series are described, as well as its objectives. Secondly, Formula-Eindhoven's initiative is delineated and reflected on. This chapter ends with a brief conclusion.

### 2.1 Motorsport and beyond

#### Formula E

Formula E Operations Limited is part of the Formula E Group which was granted the exclusive FIA right to organise a single-seater electric motor racing championship for 25 years, starting in 2013 (Formula E Operations Limited, 2019). During Formula E races, electric racing cars are used. The races predominantly take place on two or three kilometres circuits. The length of the race is 80 to 100 kilometres. Formula E was created in 2011, and the first championship dates from the season 2014/2015.

In the current season, twelve teams are participating (table 2.1), with a total of 24 cars and 24 drivers. Two of the 24 drivers have the Dutch nationality: Robin Frijns and Nyck de Vries. Teams have almost identical cars at their disposal, making the differences between them small. Formula E will be given the status of an official world championship starting next (7<sup>th</sup>) race season.

**Table 2.1 Races, drivers and teams in Formula E, season 1 – season 6 (in numbers)**

Season	1	2	3	4	5	6
Years	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Races	11	10	12	12	13	13
Drivers	35	25	25	25	24	24
Teams	10	10	10	10	11	12

Source: Wikipedia (2020). Adapted by: Mulier Institute.

In the current racing season, thirteen races take place in eleven different cities, with five races held in Europe (table 2.2).

**Table 2.2 Seasons and races Formula E, from 2014–2015 to 2019–2020**

Season	1	2	3	4	5	6
Years	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Race 1	Beijing	Beijing	Hong-Kong	Hong-Kong	Ad Diriyah	Ad Diriyah
Race 2	Putrajaya	Putrajaya	Marrakesh	Hong-Kong	Marrakesh	Ad Diriyah
Race 3	Punta del Este	Punta del Este	Buenos Aires	Marrakesh	Santiago	Santiago
Race 4	Buenos Aires	Buenos Aires	Mexico City	Santiago	Mexico City	Mexico City
Race 5	Miami	Mexico City	Monte Carlo	Mexico City	Hong-Kong	Marrakesh
Race 6	Long beach	Long beach	Paris	Punta del Este	Sanya	Rome
Race 7	Monte Carlo	Paris	Berlin	Rome	Rome	Paris
Race 8	Berlin	Berlin	Berlin	Paris	Paris	Seoul
Race 9	Moscow	London	New York	Berlin	Monte Carlo	Jakarta
Race 10	London	London	New York	Zurich	Berlin	Berlin
Race 11	London		Montreal	New York	Bern	New York
Race 12			Montreal	New York	New York	London
Race 13					New York	London

Source: Wikipedia (2020). Adapted by: Mulier Institute.

Starting in the 2020/2021 season, the drivers will drive generation two (Gen2) Formula E cars. Preparations for Gen3 cars have already been made. Designs for the Gen3 Formula E car must be capable of reaching a 350kW maximum power, and be lighter and smaller than Gen2 cars (Kalinauckas, 2019).<sup>1</sup> The number of E-Prix per season (table 2.2) is limited as a result of a maximum capacity of the batteries of the cars. It is expected that the Gen3 cars offer opportunities to increase the number of races per season.

Formula E Operations Limited is predominantly focussed on the millennial generation (Standaert & Jarvenpaa, 2016). This target group, also referred to as generation Y, was roughly born between 1980 and 2000 (there are different definitions for this target group). According to Standaert & Jarvenpaa (2016), it is difficult to make millennials enthusiastic about motorsport, for the following reasons:

- Millennials are environmentally conscious, which clashes with the carbon dioxide emissions of motorsport.
- Millennials have showed little interest in motorsport in the past.
- Millennials have less interest in driving cars and car ownership (result of sharing economy).
- Millennials are not wealthy and tickets for motorsport events are priced relatively high.
- Motorsport has a ‘male character’ which pushes off millennials who appreciate diversity and gender-equality.
- Motorsport is predominantly broadcasted via television, but the millennials grew up with other media.

So, marketing traditional motorsport among millennials is a challenging, if not an impossible, job. This is different for Formula E, due to the nature of the sport and the way it is framed, with an emphasis on promoting sustainability and innovation (see below).

The success in engaging the millennial generation is revealed by its audience, as two thirds of the Formula E fans are under 45 years old (Blauw, 2019). Formula 1 fans are older. Furthermore, according to Blauw (2019), 41 per cent of the Formula E fans is female.

<sup>1</sup> For more information about rules and regulations, visit <https://www.fiaformulae.com/en/championship/rules-and-regulations>.



## Sustainability

As revealed before, Formula E races are not marketed as just another motorsport event. The opposite may be true, for the reason that motorsport is regularly associated with social exclusivity (high ticket prices), gasoline engines and loud noise (Sturm, 2018). With the Formula E races, Formula E Holdings Limited aims to provide a platform or story context for projects on sustainability, waste reduction (recycling), technology, social awareness, smart mobility, smart city and innovation (EY, 2013; Standaert & Jarvenpaa, 2016). The ambition of Formula E is put into practice in several ways:

- Selecting venues (temporary rather than permanent race tracks and infrastructure).
- Promoting sustainable transport during races (encouraging public transport and not offering spectator car parks).
- Striving for good accessibility (relatively cheap tickets, located in city centres).
- Striving for zero waste (using recycled tyres).
- Reducing carbon footprint (freighting equipment by sea and road instead of flying).
- Creating innovative and high-tech supplemental activities, focussed on sustainability.

The Formula E proposition is in line with the Paris Climate Agreement and the rules in European Union about CO<sub>2</sub> emission, and has set a sustainability benchmark for the motorsports industry by retaining its ISO 20121 certification for sustainable events (Campelli, 2020). Formula E also established a sustainability committee, chaired by the actor Leonardo DiCaprio. It is not surprising that Formula 1 also anticipates the sustainability trend, as the sport has the ambition to be climate neutral by 2030 (Bloemhof, 2019).

The aspired long-term impact of Formula E is to accelerate the use of electric vehicles, and there seems to be good opportunities to realise this (EY, 2013). The introduction of electric vehicles marks the second turning point of the automotive industry, according to McKinsey & Company. The first turning point was at the beginning of the 20th century, when horse-drawn carriages were replaced by cars (Tschiesner et al., 2020).

## Fan experience

Optimising fan experience is key in the Formula E concept. A variety of digital innovations, leveraging social, mobile, virtual reality, gaming, and artificial intelligence technologies, were introduced in the past years (tables 2.3 and 2.4). This shows that Formula E is continuously innovating to improve the fan experience by applying new technologies, and that Formula E is intertwined with eSports, a rising new star in the sports industry (Hover & Tiessen-Raaphorst, 2018; Sjöblom et al., 2019).

Products for enhancing the on-track digital fan experiences are the eRace, Instant Replay, the Roborace and the attack mode (table 2.3).

**Table 2.3 On-track digital fan experiences**

Product	Introduction (season)	Description
eRace	2	The eRaces were set up in a computer racing simulator. This simulator was used by real professional racing teams for driver training and track familiarisation. While 1-year online access could be purchased for 44 USD, it required a PC with high-performance central and graphics processing units.
Instant Replay	2	Fans watched instant replays on-demand on their mobile phone. The app was called Rewind.
Roborace	3	A driverless car championship, using the same city tracks. Purposes are: to raise awareness and interest of the millennial generation for driverless car technology and to provide a test-bed for artificial intelligence and technologies embedded in self-driving cars.
Attack Mode	5	The Attack Mode offers drivers access to an extra 25kW of power for eight minutes, either in one period or in bursts. Use of the mode has been made compulsory, all cars will have to use it during the race.

Source: Standaert & Jarvenpaa (2016). Adapted by: Mulier Institute.

The Gaming Zone, where the eRaces take place, is a popular activity in the so-called e-village. The fastest four fans from the day are invited to race against real Formula E drivers. The eRace is broadcasted live on all official Formula E digital channels (YouTube, Facebook and Twitch) and Real Racing 3 TV (FIA Formula E, 2019a). FIA Formula E (2019a) provides interesting facts about the E-Village:

- 94 per cent of the fans in the E-Village at European races said they would purchase a ticket for next year's race.
- 99 per cent of the fans in the E-Village said they would recommend the event to their friends and families.
- 95 per cent of the attendees said that new technologies and the atmosphere inside the E-Village contributed to their great experience at a Formula E event.
- 40 per cent of E-Village attendees are families with young children.
- 35 per cent of E-Village goers are university students interested in technology, cars, sustainability and the arts.
- 55 per cent of fans inside the event said they were passionate motorsport fans.
- 73 per cent of the fans said they would attend another Formula E event in a different country.

Besides products to enhance the fan experience on-track there are products for enhancing the off-track digital fan experiences, namely the mobile app, FanBoost, eSports and virtual reality (table 2.4).

**Table 2.4 Off-track digital fan experiences**

Product	Introduction (season)	Description
Mobile app	1	The FE mobile app, which won an award for Best Mobile Video Experience in 2016.
FanBoost	1	Voting on drivers, opening 12 days before the race and closing 6 minutes into the race. Fans could vote online via social media or the FE mobile app. Each fan could vote once per day per vote mechanism. A real-time leader board was available online, showing the ranking of drivers along with their share of votes. The extra 100 kJ that the most popular drivers received, could be used once during the race, for a maximum of five seconds.
eSports: Race Off Exhibition Events	2	These events involved racing in Forza Motorsport 6 on Xbox One consoles, using a gamepad, in the Season 1 car. The events began with open time trials, giving fans a chance to qualify for the next rounds by setting the fastest lap time. The fastest drivers progressed to the grand finale, in which the fans competed against two professional Formula E drivers.
eSports: Race Off Pro Series	2	To compete in the Race Off Pro Series, gamers had to enter a “rivals” event in Forza Motorsport 6 through the Xbox Live lobby. They subsequently had the chance to set their fastest lap time, participating as much as they wanted. Ahead of each of the five final E-Prix of Season 2, this type of qualifying competition was organised. The gamers finishing in the top 10 were invited to the live-streamed finals.
Virtual Reality	2	In partnership with Virtually Live, Formula E created computer-generated images of the tracks, based on a combination of physical trackers and image recognition software.

Source: Standaert & Jarvenpaa (2016). Adapted by: Mulier Institute.

Although the introductions of the products to improve the fan experiences led to successes, not everything was introduced without controversy. There were concerns about the validity of FanBoost: it was claimed the system could be faulty and the outcome could be manipulated by automated bots and fake email addresses that falsely increase the number of votes (Standaert & Jarvenpaa, 2016).

Rights holder Formula E Operations Limited aims for creating relations instead of transactions with this target group: the objective is to build a fan base locally and globally, not only during race days, but also in-between (Standaert & Jarvenpaa, 2016).

## Finance

The remarkable growth of Formula E the past years was not self-evident (Ayles, 2019). Looking back, the third race season (2016/2017) marked a significant moment, as Formula E Operations Limited was out of money (Ahmed, 2019). The U-turn came in March 2015, when Liberty Global and Discovery invested in

Formula E. With these companies on board, Formula E gained acceptability in the eyes of (potential) sponsors, broadcasters and host cities.

Critics point out Formula E Operations Limited remained unprofitable for years. Revenues went up from 94 million euro in 2017 to 133 million in 2018, but losses rose as well, from a loss of 21 million euro in 2017 to 26 million euro in 2018 (Formula E Operations Limited, 2019). Formula E has spent more money than it has made since it was founded. But according to Formula E Operations Limited Formula E the financial future is sunny, as in 2020 for the first time a profit is expected (despite plans to invest more than ever in marketing) (Long, 2019).

From a certain point of view, Formula E Operations Limited operates like a (technical) start-up (O’Kane, 2019), with the objective to create something new, characterised by substantial investments aimed at making a profit in the future.

*“At the moment, we are more akin to a technology start-up than any other sports series. If we try something and it catches on, that’s great, we’re first to market. If it fails fast and we learn from it, then that’s not the end of the world either.”* (Tom Halls, Head of Digital of Formula E Operations Limited)

Source: Standaert & Jarvenpaa (2016).

There are indications that Formula E has indeed created positive conditions to make a profit in the future (Ahmed, 2019; Long, 2019). An increasing number of international premium brands are investing in Formula E, including ABB (title sponsor), Allianz, Hugo Boss, Geox, Porsche, Mercedes, Jaguar and Heineken. Extraordinarily, Formula E is now home to much more automakers than Formula 1 (automakers of Formula 1 are Ferrari, Renault, Mercedes and Honda). Formula E is the laboratory of the future electric car, just as the Formula 1 once was for the gasoline-powered car (Sylt, 2019a).

### Interest

Race attendance and the number of social media viewers show the level of interest in Formula E. In 2017, the races attracted an audience of 220,000 visitors. In 2018, this number more than doubled to 476,000 visitors (table 2.5). The demand for watching the races on television grew as well, from 223 million in 2017, to 300 million in 2018 (+35%). The increase of social media viewers is even more remarkable: from 41 million viewers in 2017 to 580 million in 2018 (+1,315%). The interest for an E-Prix fluctuates significantly per race (not in table).

**Table 2.5 Race visitors, TV viewers and social media viewers, 2017–2018 (in numbers x 1,000 and x 1,000,000 and percentages)**

	2017	2018	2018-2017 (%)
Race visitors (x 1,000)	220	476	116
TV viewers (x 1,000,000)	223	300	35
Social media viewers (x 1,000,000)	41	580	1,315%

Source: Formula E Holdings Limited (2019). Adapted by: Mulier Institute.

It would be a pitfall to compare these numbers with those of Formula 1, a type of motorsport with a 70-year history. Formula E is connected with the future way of driving and sustainability, and its development is still in the introductory phase, possibly the beginning of the growth phase, and largely



servicing innovators and early adopters (Rogers, 1995). This is reflected in the fact that many visitors who attend a race for the first time without much knowledge about Formula E. The main reason for their visit is their interest in cars and motorsport (FIA Formula E, 2019a). The general public has not yet embraced Formula E (Van Everdingen et al., 2019). Interest in Formula E is relatively low in Europe at the moment. The level of interest is relatively high in the Middle East, China, Thailand, Italy and Indonesia (Blauw, 2019).

The relative slow street circuits and relatively silent cars, jokingly referred to as “vacuum cleaner racing” by some (Sturm, 2018), have also been a turn off for gearheads. The Formula E cars produce a sound at approximately 80 decibels, which ten decibels louder than a regular car.

### The way ahead

Experts inside and outside of the Formula E community foresee a bright future for Formula E. Ecclestone, a former Formula 1 boss, argues that Formula E will become bigger and better than Formula 1 (Sylt, 2019a). Additionally, Branson, whose Virgin Group sponsors one of the Formula E teams, predicted that Formula E will overtake Formula 1 in terms of number of followers in four or five years (Sylt, 2019a). As for Dutch independent experts, Beerthuizen (2019) says that Formula E will ultimately transcend Formula 1 as a result of developments in society and in the automotive industry. Blijlevens (2020) is also counting on a growing interest in Formula E in the Netherlands.

However, not everybody is convinced. Carey, the chief executive and chairman of Formula 1, sees Formula E as a business to business proposition, instead of a sport. In his view, Formula E is a marketing tactic for companies that want to be associated with sustainability, but not with a sport event (Ahmed, 2019). While the directors of Formula E Operations Limited have confidence in the future of Formula E, they also acknowledge some major risks (Formula E Operations Limited, 2019):

- The creation of a similar electric car racing championships could limit sponsorship and audience interest. As Formula E Operations Limited was granted the exclusive FIA right to organise a single-seater electric motor racing championships, this threat would come from other types of racing car categories, such as off-road racing and kart racing.
- Formula E Operations Limited depends largely on manufacturers as partners. At the moment there is enough interest from these parties, but it is not guaranteed that this will also be the case in the future.
- There is a changing city line-up and races on city streets. Races in cities are challenging, but this venue is part of the DNA of Formula E and is appealing to many. Changing host cities complicates creating strong end growing local fan bases.

## 2.2 Dutch E-Prix Eindhoven

In June 2019, the municipality of Eindhoven and Formula-Eindhoven sent a letter of (strong) interest to Formula E Operations Limited. Formula-Eindhoven has confidence in the synergy between Formula E and the Brainport Eindhoven region: Formula E races can contribute to the long term strategic goals of the region. There is also the challenge that the events in the Brainport Eindhoven region contribute to the further development of Formula E. A unique selling proposition of a possible bid for the organisational rights of a Formula E race in the Dutch city of light could be the organisation of the first race after sunset.

As previously mentioned in this chapter, Formula E races provide a platform or story context for projects on sustainability, waste reduction, technology, social awareness, smart mobility, smart city and innovation. An important question is the extent to which this selling proposition of Formula E matches

with the strengths and strategical ambitions of the city of Eindhoven and the Brainport Eindhoven region. Based on a literature study, the answer on this question is fairly positive, as clarified below.

The positioning of the city of Eindhoven is briefly put: TDK (Technology, Design and Knowledge). Eindhoven's desired image is also characterised by the terms 'unconventional', 'collaboration', 'surprising' and 'a prominent role in relevant international stages' (Eindhoven municipality, 2019). At first sight, these characteristics, focus and ambitions match with Formula E. Urbanisation and the global war on talent are seen as two important developments. The organisation of a Formula E race offers opportunities to (further) strengthen the position of Eindhoven as an appealing place to live and work.

As for the Brainport Eindhoven region and the province of North Brabant, there is a match with the characteristics of Formula E as well. Firstly, North Brabant has the ambition to be among the top five most innovative regions in Europe (Eindhoven was evaluated as the most innovative city of Europe by the European Commission in October 2019). The high tech systems and materials (including automotive and solar) clusters and the logistics and bio based economy have links with Formula E (Technopolis, 2018). Secondly, sustainable accessibility is an important objective of the region; cities must remain accessible (e.g. North Brabant, 2006). Thirdly, datafication is high on the agenda (e.g. North Brabant, 2018). Fourth, the Brainport National Action Agenda is built around five pillars with strong associations with Formula E: talent, knowledge, innovation & entrepreneurship, business climate, digitisation and social innovation (Brainport Eindhoven, 2019). Fifth, there is a desired transition to a (more) circular economy in North Brabant (e.g. Bastein & Willems, 2019), which is in line with the aspirations of Formula E.

## 2.3 Conclusion

Formula E is a new, innovative and growing branch of motorsport with a 'Dutch touch': two drivers are Dutch and Heineken is a sponsor. The way Formula E is marketed is exceptional, with emphasis on sustainability, innovation and technology, the desire to tackle related challenges in society and its investments in high-tech fan experiences, including eSports. Many experts foresee a bright future for Formula E. There are similarities between Formula E's characteristics and objectives and those of the city of Eindhoven, the Brainport Eindhoven region and North Brabant, as well as the High Tech Campus, Automotive Campus, TU/e Campus, and the Brainport Industries Campus, suggesting a robust basis for a partnership.



# 3.

## Potential economic and social impact



### 3. Potential economic and social impact

Based on previous studies, the potential economic impact of a Formula E race for the Brainport Eindhoven Region is estimated. Furthermore, the potential social impact is examined, with a focus on feelings of pride and pleasure and possible ‘race to road’ transfers. Opportunities for leveraging are described as well.

#### 3.1 Economic impact

##### Additional spending

An economic impact study measures how much additional direct spending a sport event in a region generated. SMG Insight calculated the economic impact for three Formula E races. These studies show that the economic impact ranges from roughly 62 million euro to 91 million euro per race for the host city (table 3.1).

**Table 3.1 Economic impact Formula E races in seasons 2018/2019 and 2017/2018 (in euros and numbers)**

	Rome 2018/2019 (1 day)	Mexico city 2018/2019 (1 day)	Hong Kong 2017/2018 (2 days)
Visitor spending	4,436,264	6,368,615	11,925,762
Organisational spending	16,630,893	24,600,00	21,102,500
Multiplier	2.37	2.25	2.5
Media value	11,876,596	8,222,923	24,508,350
<b>Total economic impact</b>	<b>61,805,758</b>	<b>77,902,307</b>	<b>90,992,442</b>

Source: SMG Insight (2018), SMG Insight (2019a), SMG Insight (2019b). Adapted by: Mulier Institute.

Some comments should be made regarding the economic impact as presented by SMG Insight. When assessing the economic impact, it is important to acknowledge that an alternative investment represents a different economic return (opportunity costs). For example, the (public) funds involved in Formula E could have been spent in a different way, leading to another economic return. This concerns not only the financial investment, but also the hours that civil servants spent on the event organisation, if any. In addition, there is a possible crowding-out effect (event visitors displacing local residents and/or tourists) and a potential leakage effect (revenue is lost to other regions). The SMG Insight studies do not mention opportunity costs, leakage effects and crowding out effects. Furthermore, the use of a (high) multiplier for calculating the economic impact of sport events in the Netherlands is disputable (e.g. De Boer, 2018). The multiplier refers to the spending on a product (like a restaurant visit) that causes organisations (restaurants) to spend on other products as a result (like the purchase of food and drinks from a wholesaler). Lastly, adding up the visitor spending, the organisational spending and the (fictional) media value is unusual, especially in academic research. All in all, from this perspective this means that the results of SMG Insight may be an overestimation of the economic impact, and should be treated as such.

When interpreting the results, it is recommended to look at the additional visitor spending and organisational spending separately from the media value (not adding up the amount and ignoring the multiplier). Consequently, it is suggested to count on an economic impact - excluding opportunity costs, crowding-out and leakage effects - of 20 to 30 million euro for a one day E-Prix in the municipality of Eindhoven. Since the economic impact decreases when the region for which this impact is calculated



increases, the economic impact for the Brainport Eindhoven region is smaller. It is indicated that 20 million euro can be seen as an upper limit guesstimate for the economic impact, excluding media impact or value, of an E-Prix in the Brainport Eindhoven region.

Tourism impacts, as a direct and immediate result of the organisation of the event, should not be overemphasized (Sturm, 2018). With a capacity of 15,000 to 40,000 visitors (FIA Formula E, 2019a) the event is relatively small compared to other events. For example, city marathons (including the one in Eindhoven) attract more visitors (and participants) (Hover & Tiessen-Raaphorst, 2018).

As the results above indicate, a Formula E event can contribute positively to the overall economy in a region. This does not mean that every type of business will automatically benefit. For example, it is expected that hotels in the region will profit, assuming they are not already fully booked in the period of the E-Prix. It is worth mentioning that there may be a competition between the temporal race facilities (food trucks) and local businesses. This also depends on the negotiations and agreements between the rights holder and Formula-Eindhoven. According to Sylt (2019b), the Formula E race in Montreal in 2017 had a negative effect on local businesses: instead of giving local business owners a boost, 70 per cent of them said that the race had harmed their business, 29 per cent said they made no gain and 1 per cent made a profit.

## Media

From a marketing point of view, it is particularly interesting to host a Formula E race because of the more or less guaranteed media attention which offers the opportunity to show and sell the city and the region in a desirable way (Ashworth & Voogd, 1990). These images can contribute to the desired image of the city and region and result in a positive impulse for the living, business and working climate. However, there is no guarantee that the message the organiser or the host region wants to communicate by organising the Formula E race, is always picked up and framed in the desired way by the media. Robeers (2019) pointed out that the environmental sustainability message was largely neglected by broadcasting the Formula E race in Beijing in 2014, because sports broadcasters prefer audiences to align Formula E with values and ideas associated with motorsport, as broadcasters expect that this drives up the number of viewers and their program judgment. Although broadcasters can help raise Formula E's sport profile, it seems that a more societally aware sports coverage, in which environmental sustainability is monitored, was mostly absent (Robeers, 2019). It is conceivable that nowadays the media frames Formula E differently. The 2014 Formula E race in Beijing (one of the most polluted cities in the world), was the first Formula E races, and the sport and the message it wants to spread was less well-known than in 2020.

Striving for desirable environmental and social objectives with the organisation of a motorsport event is meaningful. However, previous experiences show that this could also work out counterproductively. Hassan and O'Kane (2011) looked into the media coverage of the Dakar Rally and its impact on the development of the environmental, corporate and social responsibility within motorsports. They show that the organisers of the Dakar Rally implemented environmental, corporate, and social responsibility through the 'Actions Dakar Project' which was scrutinised by the media and environmental organisations as a smokescreen to reduce criticism surrounding the rally. A large amount of Formula 1 supporters are reluctant to accept motorsport sustainability initiatives. This is because they are sceptical of 'green washing': businesses marketing products as sustainable to make them more attractive to environmentally conscious consumers, when in reality minimally efficient practices are employed (Farley & Smith, 2013 in Webster, 2016). Formula E does not have the same risk level because Formula E is in itself mostly acting in line with its own objectives.

## 3.2 Social impact

### Pride and pleasure

In countries around the world, public money is invested in sport events in order to promote feelings of pride and a 'feel good factor' among the (local) population. Pride extends to pride in one's city, region or country, or pride in (Dutch) participants (Elling et al., 2014). A 'feel-good factor' refers to senses of feeling good, (communal) wellbeing and happiness, as a result of the organisation of a sport event. It is assumed that these social impacts positively influence subjective wellbeing (Pawlowski et al., 2014).

There is sufficient evidence for the manifestation of a wide-spread feel-good effect and feelings of pride as a result of sport events (Evans & Kelly, 2002 ; Elling et al., 2014; Cornelissen & Maennig, 2010). For example, after the successes of Max Verstappen in Formula 1, nearly six out of ten Dutch adults felt proud about the Dutch Formula 1 driver (Hover & Lammertink, 2016). Furthermore, almost nine out of ten visitors of the European Championships Athletics in Amsterdam in 2016 felt happy as a result of attending the event in the Olympic Stadium (Hover et al., 2016). Widespread feelings of pride and pleasure are difficult to put in monetary terms, but the significance of these types of social impact - although often temporary - should not be underestimated. One can expect that widespread feelings of pride and pleasure can also occur when the Brainport Eindhoven region successfully hosts a Formula E race.

### Resistance

Large sport events, organised in the public area, frequently struggle with small and large-scale local conflicts. Formula E is no exception, at least in the United Kingdom. Despite the objective of acting environmentally-friendly, Formula E faced roadblocks from protesters in London in 2015 and 2016 (Sylt, 2018b). Despite the public opposition (five protest groups), Formula E was granted permission to use a park in London (also the hometown of the head office of Formula E Holdings Limited). The chosen venue near the city centre, Battersea Park, was controversial, as it is listed on the Register of Historic Parks and Gardens. Sturm (2018) and Standaert & Jarvenpaa (2016) summed up the issues raised by opponents:

- Noise complaints (silent cars but noisy helicopters and loud music).
- Restricted access (loss of public space for 3,5 weeks).
- Damage (as a result of large machinery in the park).
- Transforming green park areas into tarmac.
- Moving animals from the children's zoo.

There was also similar resistance relating to the Formula E event in Miami in the first race season (Sturm, 2018). Originally scheduled as a five-year deal, the Miami contract was terminated after one season. Opponents questioned the 'green' image of the race that needed to transform and replace a green space.

---

*“Having the exclusivity for an all-electric championship for 25 years gives us some room for error, yet it’s also a big responsibility. It’s been full of bigger challenges than we thought, but I didn’t expect that so many people would want to join this adventure. I think we have created something that is fantastic, but there are still a lot of things to perfect. To become the pinnacle of motorsports and achieve something good for people, we need to continue breaking new ground in terms of fan engagement, sustainability initiatives, and strategic partnerships.” (Alejandro Agag, CEO of Formula E Operations Limited)*

Source: Standaert & Jarvenpaa (2016).

---

### **Race to road transfer**

Advocates of elite sport events recurrently refer to the appearance of a so-called demonstration effect. A demonstration effect according to Weed (2009), is a process in which people (like visitors or those who follow the event in the media) are inspired by elite sport and the achievements of elite sportsmen and women at sport events to participate in sport themselves; to increase their sport participation. However, the evidence for the manifestation of a demonstration effect is mixed, at best (e.g. Van Bottenburg, 2003; Frawley, 2013; Hover et al., 2014).

The relevance of this finding is that a comparable fever of impact expectations may also apply to Formula E, in the sense that one should not overestimate the causal effect between the organisation of a Formula E race and the adoption of electric vehicles by people who visit the event or follow it via the media. This hypothetical effect can be referred to as a race-to-road transfer (Webster, 2016).

A significant development are the 54 kWh batteries, which were introduced in the 2018/2019 season. The battery capacity nearly doubled, leading to the elimination of the mid-race battery switch. From a viewer's perspective, this was a noteworthy novelty as the new batteries showed that the action radius of the race cars increased, and suggesting a possible identical transfer of this technology to regular cars in the future.

The relationship between the organisation of a Formula E event and electric vehicle adoption is a knowledge gap in the academic literature. This can partly be explained by the fact that Formula E is a relative young type of motorsport. There is some evidence that shows one should be hesitant in the assumption that there is a relationship between the event and the sales of electric cars by consumers. Based on a survey, Webster (2016) showed that thirteen per cent of the visitors of a Formula E event in London mentioned that Formula E influences people to purchase electric vehicles as they were at the time. 62 per cent disagreed and 25 per cent answered with 'maybe' ("racing doesn't affect the car I buy", "the cars seen on the racing track are not the ones the public will purchase"). It is worth mentioning that at the time (2016), a substantial part of the respondents argued that people were not into buying electric cars because of practicality issues and underdeveloped technology. This finding does not mean that a Formula E race doesn't offer electric vehicle marketing opportunities, as explained in the next paragraph. Organising an E-Prix can contribute to the awareness as regards climate change and sustainability and that the Brainport Eindhoven region has the technology to do something about it.

## **3.3 Leveraging**

### **General guidance**

FIA Formula E (2019a) strives for a lasting legacy when organising a Formula E race: the organisation and its stakeholders should leave something positive after the race has taken place to improve the location for the community, based on the needs in the community. Examples FIA Formula E present are solarised local schools or public facilities, community bicycles in the area, the creation of green spaces and gardens and air pollution monitors.

Leveraging is the implementation of strategies which are geared to creating social and economic impact with sport events, with the event acting as a lever (Hover et al., 2016). An E-Prix is most effective, not as an intervention itself, but as an opportunity to enable other interventions in a broader overall campaign (Taks et al., 2014). As such, the event functions as a platform or story context. The question arises as to what has to be done - and how, when, and by whom - to be able to "use" a Formula E event to optimise positive social effects. Basic general guidance for leveraging include (Chalip, 2006; Hover & Stam, 2017):

- Develop a distinctive event concept, linked to the ambition of the host city and region.
- Aim for specific types of impact and (a) target group(s).
- Actively involve the local community.
- Organise related activities (side events) and set goals.
- Name those responsible for the related activities and the intended impact and legacy.
- Create meeting places.
- Create a festival effect (creating a general festive atmosphere, less Formula E oriented).
- Focus on participants and visitors from other provinces and abroad (economic impact).
- Invest in knowledge about target groups of the event.
- Tempt tourists to visit the region for several days (offer attractive arrangements).
- Promote sustainability (public transport, recycling, paperless).

### Specific guidance

As mentioned in the previous chapter, Formula E aims to provide a platform or story context for projects on sustainability, waste reduction, technology, social awareness, smart mobility, smart-city and innovation. If the Brainport Eindhoven region wishes to use a Formula E race in this way, specific attention in terms of leveraging strategies is necessary.

Assuming that the Brainport Eindhoven region has the ambition to use an E-Prix and its side events as a lever to promote the adoption of electric vehicles, it is interesting to take a brief look at the electric mobility market in the country. The Netherlands is internationally recognised as a major player in the field of electric mobility. Together with Norway, Iceland, Sweden and China, in 2018, the Netherlands was one of five countries in the world where electric passenger cars make up more than 1 per cent of the total fleet. In regard to charging infrastructure, there is no other country with the same high density of charging points as the Netherlands (RVO, 2020). According to McKinsey & Company, worldwide electric vehicle sales are up, with sales approaching 2.2 million vehicles worldwide and a market penetration of 2.5 percent in 2019. More consumers are considering purchasing electric vehicles, but not as many are actually buying, as worries regarding battery charging and driving range persist. The conditions for a large-scale consumer pull for the market have never been as positive as they are today (Tschiesner et al., 2020).

It is plausible that formula E has the potential to influence the wider electric vehicle market. The event can have the power to generate considerable attention for sustainability, innovation and other related topics. Experiences in sport event management show that the attention, energy and (financial) resources that a large sport event generates can act as a catalyst for additional energy and (financial) resources for supplemental activities aimed at creating positive economic and social impact. The challenge is to make sure that the ambitions for the generation of positive economic and social impact receive a sufficient, matching amount of energy and (financial) resources (in order to avoid a ‘too little, too late’ scenario).

There is no guarantee that Formula E will influence or activate public behavioural changes. If the creation of a stimulus to increase the purchases of electric vehicles is an objective of the E-Prix, it is also useful to keep the AIDA model of buyer readiness (attention, interest, desire, action) in mind (Strong, 1925). For example, for some persons an E-Prix can create awareness of electric vehicles, but - according to the model - before a consumer buys an electric vehicle (action) a consumer has to pass through the next phases: interest and desire. This requires additional marketing activities.

## 3.4 Conclusion

An E-Prix in the Brainport Eindhoven region can generate a significant economic impact. The estimated direct additional visitor and organisational spending in the region can reach 20 million euro per E-Prix,



excluding opportunity costs and possible crowding-out and leakage effects. On top of this, worldwide media attention is guaranteed, possibly with a (fictional) value of eight to twelve million euro. This offers good opportunities for place marketing because of its scale and content. The focus on millennials and the connection with eSports is a strong asset. Widespread feelings of pride and pleasure among residents are plausible, although one cannot prevent all potential complaints. An E-Prix is most effective, not as an intervention itself, but as an opportunity to enable other interventions in a broader overall campaign. As such, the event functions as a platform or story context. As for the promotion of electric vehicles among consumers - the race-to-road transfer - alertness is required, as one should not expect that this effect occurs automatically. The E-Prix should be treated as a catalyst for supplemental activities (for partners) that are specifically aimed at this objective.

# 4.

## Opinion key persons



## 4. Opinion key persons

In this chapter, the anonymised opinions of key persons about the opportunities and the threats of a Formula E race for the Brainport Eindhoven region are presented.

### 4.1 First impression

Almost all key persons like the idea of the Formula E in the region at first glance. The majority indicates that Formula E fits well with the Brainport Eindhoven region, because the region and Formula E profile themselves with the same or comparable themes: innovation, sustainability, technology and mobility. Half of the key persons see Formula E as an opportunity to put the Brainport Eindhoven region on the map internationally. For example, it is mentioned that the region can improve its image and brand awareness through an E-Prix. Another link can be made with Automotive Campus in the Brainport Eindhoven region and their focus on smart and green mobility. The Formula E initiative also fits well with the marketing approach of the city of Eindhoven.<sup>2</sup>

---

*“A Formula E race fits perfectly with the image of the Brainport Eindhoven region. The focus on smart and green mobility naturally comes from the strong automotive eco-system. 68 per cent of all automotive companies in the Netherlands are located in the Brainport Eindhoven region. Present, past and future of the automotive profile of the region comes together with the organisation of a Formula E race in the Brainport Eindhoven region.”*

---

### 4.2 Opportunities and threats

The key persons see a number of opportunities of an E-Prix for the region:

- Almost all key persons see Formula E as an opportunity for international recognition of the Brainport Eindhoven region. Formula E offers opportunities to show what the Brainport Eindhoven region stands for in terms of innovation, sustainability and technology.
- The business climate and reputation of the Brainport Eindhoven region will be strengthened by the arrival of a Formula E race. A link can be made with the High Tech Campus. The High Tech Campus in Eindhoven wants to be the most sustainable campus in the European Union in 2030, and has had a Sport & Technology pillar for several years. Within this pillar, synergy is sought between companies and sports on campus. The High Tech Campus, Automotive Campus, TU/e campus, Fontys Campus and the Brainport Industries Campus can form a unique part of the circuit. TU/e has won the Solar challenge for many years, in which a link can be made with the event.
- The Formula E race can be used as a platform to invite foreign companies and knowledge and research institutions. The knowledge and application of electric vehicle technology developed in the region can be marketed internationally through the race. A specific inbound marketing campaign can be developed for this purpose.

<sup>2</sup> In this case, is the question was specifically about the city of Eindhoven and not about the Brainport Eindhoven region. The questions about impact were also asked specifically about the city of Eindhoven.

---

*“A Formula E race can symbolise the region’s unique proposition as the world’s smartest region. To win the “race” in the global economy, Brainport has a leading position in various technologies, with which we make the difference through open innovation, collaboration, design, human technology interaction and advanced manufacturing.”*

---

The key persons also mention possibilities for the companies they represent:

- When many visitors are expected at the same time, one company sees itself as equipped to transport high volumes of visitors. Another company sees itself as a potential system supplier. Formula E offers this company opportunities to expand their High Tech/E mobility network, to recruit technical staff and promote their electric vehicles.
  - Eindhoven Airport expressed ambitions to be the international gateway for this event and can actively contribute to the event.
  - Another company has the intention to use the Formula E race as a tool for marketing campaigns and lead sourcing, both for foreign direct investment attraction, R&D and innovation cooperation, promoting international trade and business development for Brainport companies.
  - The municipality of Helmond is interested to participate because Helmond is the automotive city of the Netherlands.
- 

*“Such an event without our involvement would not be an option. We will use this exposure to provide a powerful image of our unique selling points, both for visitors from outside and for the residents of the region, the region and our city.”*

---

The majority of the key persons believes that the Formula E race can bring attention to more sustainable behaviour. Charging stations and electric cars are increasingly appearing in the streets, but most Dutch people feel that electric driving is not yet within reach. According to a number of key persons, Formula E can draw more attention to electric driving and can improve the image of electric driving.

---

*“If the Max Verstappens of the future do not run on petrol but on electricity, they will become the new and sustainable stars of the youth. I am convinced that it will become even more attractive for people to switch to sustainable driving.”*

---

According to one key person, the impact on sustainable behaviour is related to the communication to the general public. Another key person doesn't see racing as the right way to stimulate sustainable behaviour.

---

*“It’s about racing, so that’s why I have my doubts.”*

---

Half of the key persons do not see any threats to the Brainport Eindhoven region in the Formula E organisation.



- A few mentioned a bad organisation as a threat. According to them, a lot of work still needs to be done before an E-Prix can take place as well.
- According to a number of key persons, a Formula E race entails a lot of costs. A collaboration of partners, like with the PSV shirt sponsorship, is mentioned as a possible solution.
- A number of threats are only mentioned once or twice, such as: the city may not be able to handle the abundance of tourists, the event must be accessible to everyone including locals, terrorism can play a role and closing roads for the race in the centre of the city will have a big impact on daily life.

---

*“I see an environmental permit and in particular objections from local residents as a second threat.”*

---

### 4.3 Economic and social impact

The key persons were asked how to maximise the economic and social impact. Several key persons state that a long-term plan is important and that supplemental activities are compulsory.

---

*“The Formula E race is a good basic instrument, but with little added value for the Brainport Eindhoven region if it is only just a race.”*

---

According to them, this also means that the race should not be a one-off event, but a recurring event for several years. In order to create impact, the organiser has to use media as optimally as possible. According to some key persons, this can be done through a media strategy plan and storytelling. A good media strategy ultimately ensures long term (tourism) legacy. An E-Prix attracts visitors to the city, and these visitors spend money on hotels and restaurants. A key person appoints temporary employment through Formula E, but in addition to temporary employment, some key persons describe that international recognition is also good for attracting new (young) employees in the regional technology sector. Several respondents indicate that involving as many parties as possible is important for acceptance of the event and that one of those parties is the local population.

---

*“When stakeholders (business, government, local residents, entrepreneurs) are involved in early stages, the chance of acceptance of the event increases just as the willingness of people to become ambassadors.”*

---

One key person does not believe in social impact, and states that the economic impact consists only of brand awareness.

### 4.4 Side events

Several key persons state that the organisation of a Formula E race must go beyond organising the main race in order to create economic and social impact. The side events can be used for this purpose, and the key persons have different ideas about the side events. The Automotive Campus and the national automotive and mobility industry can use the event to draw attention to innovative developments in the run-up to and during the event. Companies on the Automotive Campus can better promote their relevant technologies around an event like this. For Helmond, participation is desirable if side events take place in

this city. These events must also be visible in the immediate period around the Formula E race. The Automotive Campus can be a wonderful focal point for activities. InMotion would like to use the Formula E platform for a test drive on the race course in their Le Mans Prototype, but also a car or stand in the pit lane. But also in the form of a car or stand around in the pit lane. This allows them to give their current partners brand awareness and possibly attract new partners.

Another company mentions the possibility to add e-bike races (road and mountainbike) to the event package. According to this company, there are already many international electric cycling series that are gaining popularity. In addition, this company thinks Formula E fits very well with gaming and eSports and they see a pioneering role for both the High Tech Campus and TU/e. Formula E has a high level of user engagement with fans. This interaction with fans forms a good basis for drawing attention to the developments and projects around smart mobility and sustainability.

## 4.5 Ambassador

The key persons were asked who they see as a suitable figurehead or ambassador of the Formula E race. The key persons revealed the following names:

- The current Dutch Formula E drivers are mentioned several times: Nyck de Vries and Robin Frijns.
- Less frequent mentioned names are Jan-Peter Balkenende, Frits van Eerd, Eric van Loon, Max Verstappen, Pieter van den Hoogenband, André Kuipers, Giedo van der Garde and Mike Hezemans.

Mentioned characteristics of an ambassador are:

- A driver or someone who drove in the past.
- Someone with a good story.
- Someone who can connect.
- Someone from the Brainport Eindhoven region.
- Someone young, to attract the future generation.

## 4.6 Conclusion

The attitude of the key persons towards a Formula E race is fairly positive. Almost all key persons see a good fit with the Brainport Eindhoven region and with the city of Eindhoven: innovation, sustainability, smart city, smart mobility and technology. In addition, there seems to be quite a lot of energy for cooperation and unification of company strengths. There is a need to create additional activities, using the E-Prix as a catalyst. Formula E can offer the region the opportunity to put itself on the international map in a desirable way, with expected positive effects on the living and business climate. Potential threats include high costs and organisational complications.

# 5.

## Conclusion



## 5. Conclusion

In this final chapter the conclusion of this study is described, by sketching the background of the research project and briefly answering the four research questions.

Formula-Eindhoven (the organising foundation Dutch E-Prix Eindhoven) has the ambition to organise at least three Formula E races in the Brainport Eindhoven region. BrabantSport was informed by Formula-Eindhoven about this plan and was asked to support the initiative. BrabantSport asked the Mulier Institute to conduct a study about the potential economic and social impact of an E-Prix for the Brainport Eindhoven region and the support for an E-Prix among key persons. BrabantSport and the province of North Brabant intend to use this information to make a thorough judgement regarding the economic and social potential of a Formula E race, and possible support.

Formula E is a new, innovative and growing branch of motorsport with a 'Dutch touch'. The way Formula E is marketed is remarkable, with emphasis on sustainability, innovation and technology, the desire to tackle related challenges in society and its investments in high-tech fan experiences. Experts foresee a promising future for Formula E. The focus on millennials and the connection with eSports is a strong asset. There are noteworthy similarities between Formula E's characteristics and objectives and those of prominent organisations in the city of Eindhoven, the Brainport Eindhoven region and North Brabant, suggesting a robust basis for a partnership.

The estimated additional direct visitor and organisational spending in the region can reach 20 million euros per E-Prix for the Brainport Eindhoven region, excluding opportunity costs and possible crowding-out and leakage effects. International media attention is guaranteed, with a (fictional) value of eight to twelve million euro. This offers good opportunities for place marketing. Widespread feelings of pride and pleasure among residents are plausible, although one cannot prevent all potential complaints. As for the promotion of electric vehicles among consumers alertness and proactivity is required, as one should not expect that this effect occurs automatically.

An E-Prix is most effective, not as an intervention itself, but as an opportunity to enable other interventions in a broader overall campaign. As such, the event functions as a platform or story context. The challenge is to make sure that the additional activities aimed at the generation of positive economic and social impact receive a sufficient, matching amount of energy and resources. Typically, E-Prix partners can play a leading role in this. This can include supplemental activities focussed on the promotion of electric car sales.

The attitude of the key persons towards a Formula E race in the Brainport Eindhoven region is fairly positive. Potential threats according to the key persons are high costs and possible organisational complications. Almost all key persons see a good fit with the region: innovation, sustainability, smart city, smart mobility and technology are key topics of both the region and the race. In addition, there seems to be abundant energy, support and willingness to cooperate. Formula E can offer the region the opportunity to put itself on the international map in a desirable way, with a positive contribution to the living and business climate in the long run.



## Literature

Ahmed, M. (2019, 10 April). *ABB FIA Formula E championship powers away after a slow start*. Accessed at 5 January 2020, from <https://www.ft.com/content/df864006-3e98-11e9-9499-290979c9807a>.

Ashworth, G.J. & Voogd, H. (1990). *Selling the city*. London/New York: Belhaven Press.

Ayles, J. (2019, 19 November). *Formula E Ready To Write The Next Chapter As Teams Begin Preparations For Season Six*. Accessed at 19 November 2019, from <https://www.forbes.com/sites/jamesayles/2019/11/19/Formula-E-ready-to-write-the-next-chapter-as-teams-begin-preparations-for-season-six/>.

Bastein, T. & Willems, M. (2019). *Slim en circulair : hoe de smart industry circulaire economie in de praktijk brengt -een verkenning onder Brabantse maakbedrijven*. Eindhoven: TNO.

Beerthuizen, M. (2019, 27 November). *Over Formule E*. Accessed at 27 november 2019, from <https://www.marcelbeerthuizen.com/over-formule-e/>.

Blauw (2019). *Formula E insights*. Rotterdam: Blauw.

Blijlevens, M. (2020, 16 January). *Formule E vs Formule 1: David tegen Goliath?* Accessed at 16 January 2020, from <https://www.sportnext.nl/events/formule-e-vs-formule-1-david-tegen-goliath/>.

Bloemhof, L. (2019, 14 November). *Formule 1 gaat op groene toer: in 2030 klimaatneutraal*. De Volkskrant. Accessed at 16 November, from <https://www.volkskrant.nl/nieuws-achtergrond/formule-1-gaat-op-groene-toer-in-2030-klimaatneutraal-bfe3a32b/>.

Boer, W. de (2018). *De economische impact van sportevenementen*. Den Haag: Nederlandse Sportraad.

Bottenburg, M. van (2003). Top- en breedtesport: een siamese tweeling? In: Breedveld, K. (Ed.), *Rapportage Sport 2003*, pp. 285-312. Den Haag: Sociaal en Cultureel Planbureau.

Brainport Eindhoven (2019). *Brainport Nationale Actieagenda Voortgangsrapportage*, juli 2019. Eindhoven: Brainport Eindhoven.

Campelli, C. (2020, 14 January). *Formula E sets sustainability 'benchmark' for motorsports with ISO 20121 milestone*. Accessed at 16 January, from <https://sustainabilityreport.com/2020/01/14/Formula-E-sets-sustainability-benchmark-for-motorsports-with-iso-20121-milestone/>.

Chalip, L. (2006). Towards Social Leverage of Sport Events. *Journal of Sport and Tourism*, 11(2), pp. 109-127.

Cornelissen, S. & Maennig, W. (2010). On the Political Economy of 'Feel-good' Effects at Sport Megaevents: Experiences from FIFA Germany 2006 and Prospects for South Africa 2010. *Alternation* 17,2 (2010) pp. 96 - 120.

Eindhoven municipality (2019). *Nota digitalisering van de stad*.

- Elling, A., Hilvoorde, I. van & Dool, R. van den (2014). Creating or awakening national pride through sporting success. A longitudinal study on macro effects in the Netherlands. *International review for the sociology of sport*, 49(2), 129-151. doi: 10.1177/1012690212455961.
- Evans M.D.R. & Kelly, J. (2002). National pride in the developed world: Survey data from 24 nations. *International Journal of Public Opinion Research*, 14(3): pp. 303-338.
- Everdingen, Y. van, Hariharan, V.G. & Stremersch, S. (2019). Gear Manufacturers as Contestants in Sport Competitions: Breeding and Branding Returns, *Journal of Marketing* (forthcoming).
- EY (2013). *FIA Formula E Championship Value Creation & Sustainability report*. London: Formula E Holdings.
- Formula E Operations Limited (2019). *Formula E Operations Limited. Annual Report and Financial Statements for the year ended 31 July 2018*. London: Formula E Operations Limited.
- FIA Formula E (2019a). *Formula E S5 Event Specification, V.1 25.10.2018*.
- FIA Formula E (2019b). *ABB Formula E a guide to hosting*.
- Frawley, S. (2013). Sport participation legacy and the hosting of mega-sport events. In: Richards, G., Brito, M.P. de & Wilks, L. (red.). *Exploring the Social Impacts of Events*, pp. 97-110. London/New York: Routledge/Taylor & Francis Group.
- Hassan, D. & O’Kane, P. (2011). The Great Race across the Sahara: A History of the Paris to Dakar Rally and Its Impact on the Development of Corporate Social Responsibility within Motor Sport, *The International Journal of the History of Sport* 28 (2): pp. 268-280.
- Hover, P., Straatmeijer, J., Breedveld, K. & Cevaal, A. (2014). *Sportevenementen in Nederland. Over sportevenementen en hun maatschappelijke betekenis*. Utrecht/Nieuwegein: Mulier Instituut/Arko Sports Media.
- Hover, P. & Lammertink, N. (2016). *Formule 1 in Nederland - Belangstelling en impact*. Utrecht: Mulier Institute.
- Hover, P., Davids, A., Baart de la Faille - Deutekom, M. & Dallinga, J. (2016). *EK Atletiek Amsterdam 2016. Economische impact en beleving*. Utrecht: Mulier Institute.
- Hover, P., Dijk, B., Breedveld, K., Eekeren, F. van, Slender, H. (2016). *Creating social impact with sport events*. Utrecht: Mulier Institute/Utrecht University.
- Hover, P. & Stam, N. (2017). *Naar Brabantse sportevenementen met maatschappelijke impact*. Utrecht: Mulier Instituut.
- Hover, P. & Tiessen-Raaphorst, A. (2018). Het beleven van sport door evenementen, media en technologie. In: Poel, H. van der, Hoeijmakers, R., Pulles, I. & Tiessen-Raaphorst, A. (Red.), *Rapportage sport 2018*, pp. 174-194. Den Haag/Utrecht: Sociaal en Cultureel Planbureau/Mulier Instituut.
- Kalinauckas, A. (2019, 16 December). *FE Gen3 to be faster, smaller, lighter, with fast-charge pitstops*. Accessed at 11 July 2019, from <https://www.autosport.com/fe/news/147643/faster-smaller-fe-gen3-car-to-have-fastcharge-tech>.

- Long, M. (2019, 1 July). *Report: Formula E to make first profit in 2020. Series founder Alejandro Agag optimistic about future amid rising revenues*. Accessed at 27 February 2020, from <https://www.sportspromedia.com/news/formula-e-profit-revenues-2020>.
- North Brabant (2018). *Marktanalyse Dataficatie Brabant. Economische groei met data*. 's-Hertogenbosch: North Brabant.
- North Brabant (2006). *Verplaatsen in Brabant. Samenvatting Kaders en Ambities 2006-2020. Provinciaal Verkeers- en Vervoersplan Noord-Brabant*. 's-Hertogenbosch: North Brabant.
- O'Kane, S. (2019, 3 May). *Electric racing series Formula E lost \$29 million in its fourth season*. Accessed at 20 January 2020, from <https://www.theverge.com/2019/5/3/18528551/Formula-E-electric-racing-series-season-4-revenue-sponsorship>.
- Pawlowski, T., Downward, P., Rasciute, S. (2014). Does national pride from international sporting success contribute to well-being? An international investigation. *Sport Management Review*, 17, pp. 121-132. Elsevier Science Ltd.
- Robeers, T. (2019) 'We go green in Beijing': situating live television, urban motor sport and environmental sustainability by means of a framing analysis of TV broadcasts of Formula E, *Sport in Society*, 22:12, pp. 2089-2103, DOI: 10.1080/17430437.2018.1558212.
- Rogers, E.M. (1995). *The diffusion of innovations*. New York: Free Press.
- RVO (2020). *Cijfers elektrisch vervoer*, Accessed at 20 February 2020, from <https://www.rvo.nl/onderwerpen/duurzaam-ondernemen/energie-en-milieu-innovaties/elektrisch-rijden/stand-van-zaken/cijfers>.
- Sjöblom, M., Hamari, J., Jylhä, H., Macey, J., & Törhönen, M. (2019). *Esports: Final Report*. Tampere: Tampere University.
- SMG Insight (2018). *Formula E, economic impact assessment for Hong Kong*. London; SMG Insight.
- SMG Insight (2019a). *Formula E, economic impact assessment for Mexico City*. London; SMG Insight.
- SMG Insight (2019b). *Formula E, economic impact assessment for Rome*. London; SMG Insight.
- Standaert, W. & Jarvenpaa, S.L. (2016). Formula E: Next Generation Motorsport with Next Generation Fans. Teaching case. *Thirty Seventh International Conference on Information Systems*, Dublin 2016.
- Strong, E.K. (1925). Theories of Selling, *Journal of Applied Psychology*, volume 9, pp. 75-86.
- Sturm, D. (2018). Formula E's 'green' challenge to motorsport events, spaces and technologies: the London E-Prix as a case study. In: Seraphin, H. & Nolan, E (eds.). *Green events and green tourism: An international guide to good practice*. London: Routledge.
- Sylt, C. (2018a, 21 October). *Formula E in shock*. Accessed at 6 February 2020, via <https://pbs.twimg.com/media/DqEP6yLXgAAPYWV.jpg:large>.

Sylt, C. (2018b, 25 October). *Formula E: The \$900 Million Racing Series That Has Lost \$140 Million In 4 Years*. Accessed at 2 February 2020, from <https://www.forbes.com/sites/csylt/2018/10/25/Formula-E-the-900-million-racing-series-which-lost-140-million/#c016cfca9bf7>.

Sylt, C. (2019a, 27 April). *Could Formula E Put The Brakes On F1's Key Contracts?* Accessed at 30 April 2019 via <https://www.forbes.com/sites/csylt/2019/04/27/could-Formula-E-put-the-brakes-on-f1s-key-contracts/#771f9d6b755e>.

Sylt, C. (2019b, 24 November). *Why Formula E's Profits Have Been Slow To Rev Up*. Accessed at 26 November 2019, van <https://www.forbes.com/sites/csylt/2019/11/24/why-Formula-Es-profits-have-been-slow-to-rev-up/#69a19bc35b8a>.

Taks, M., Green, C., Misener, L. & Chalip, L. (2014). Evaluating sport development outcomes: the case of a medium-sized international sport event, *European Sport Management Quarterly*, Vol. 14, Number 3, pp. 213-237. London/New York: Routledge, Taylor & Francis Group

Technopolis (2018). *“Op weg naar de top” - Een tussenevaluatie van de programmalijn Topclusters van het Economisch Programma Brabant 2020. Eindrapport voor de Provincie Noord-Brabant*. Amsterdam: Technopolis.

Tschiesner, A., Heuss, R., Hensley, R., Wu, T., Schaufuss, P., Hertzke, P., Knupfer, S.M. & Gersdorf, T. (2020). *The road ahead for e-mobility. How OEMs can win consumers and achieve mass-market EV adoption*. Munich/Shenzen/Stamford/Berlin/Detroit/London: McKinsey & Company.

Webster, R.N. (2016). *Sustainability and Motorsport: An Examination of Formula E*. Preston: University of Central Lancashire.

Weed, M. (2009). *The potential of the demonstration effect to grow and sustain participation in sport*. Canterbury: Canterbury Christ Church University (SPEAR).





Mulier Institute | Research for Sport and Public Policy  
Herculesplein 269 | 3584 AA Utrecht | PO Box 85445 | 3508 AK Utrecht  
T +31 (0)30 721 02 20 | [info@mulierinstituut.nl](mailto:info@mulierinstituut.nl) | [www.mulierinstituut.nl](http://www.mulierinstituut.nl)