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Optimizing Logistics in Formula 1: Simplifying Complex Race Season Schedules

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Abstract: This article examines the global logistics challenges of the Formula 1 season. Throughout the season, F1 needs to hold races in 21 different locations worldwide, and each race requires hundreds of people working together behind the scenes to ensure that everything is ready within the specified time. As a highly challenging sporting event, F1's ten teams must configure optimal facilities in 21 temporary headquarters and rely on partners such as DHL to transport over one thousand tons of equipment which worth millions of dollars to the competition venues. Shipping equipment and racing parts involve complex logistics across continents, with risks of delays. Solutions include prioritizing tracking and scheduling races in adjacent geographic areas to reduce transportation costs and risks. The article also explores ways to resolve logistical complexities in the F1 season schedule, including considering trucks as the primary mode of transport, concentrating races in the same geographical area and rearranging the season calendar to reduce transport costs and enable sustainable racing operations.

Keywords: formula 1, logistics challenges, season schedule

1. Introduction

In a complete F1 season, Formula One racing is held in 21 places around the world. In these 21 places, every second is crucial, and hundreds of people work behind the scenes, thus ensuring that the team is fully prepared and on time at every track from Melbourne's first practice in March to check flag waving at Abu Dhabi in December. [1, 2].

Over the whole world,formula One is one of the most challenging sports, with the highest level of competition. Its 10 teams have first-class facilities in 21 locations of the temporary headquarters. Under the help of DHL, over1,000 tons of equipment which worth millions of dollars were transported to various stadiums around the world. Every temporary headquarters, including the car body, technology, tools, machinery, catering facilities, conference space and the motorcade required for the global broadcast of track movements, has been dismantled, classified, packaged and stored, and built from scratch. On the other side of the world, we are about to open our bags in a new area [3].

The label critical means that the race is inseparable from it, including pit stop equipment, computer services, secure data links, and enough components for three F1 cars. It takes care to transport F1 cars. The manufacturing cost of a single part of a car may be as high as hundreds of thousands of dollars, which makes it a very precious item. Transport these cars and break them down into tail parts.

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The engine, gearbox, front and rear wings, rearview mirror and suspension components are all removed, packed into customized containers separately, and then they will be transported to the next place.

For the sake of fairness in the race, teams will only start to build after the last item arrives at the track. Since most of the tracks have no broadcast facilities, the staff of Formula One team ran from one stop to another to help with the construction work. Subsequently, it fully operated the broadcasting center and was able to transmit the actions of 126 cameras to more than 170 regions around the world. So, how can we bring together the biggest sports event in the world and provide the same exciting experience to different corners of the world? The DHL logistics team began to make plans several months before the start of the Australian Grand Prix to ensure that all the participants and affairs of the F1 race were ready. The 12 races are held outside Europe, commonly known as "flyaways". Therefore, these trips need the expertise of DHL operation team to create tailor-made solutions to ensure that everything is in the right place, thus providing an effective and sustainable way. [4-6].

At the beginning of the season, five groups of identical sea containers left Britain as the first group whose name flyaway racing cars. These containers transport about 200 tons of ocean and the rate has been classified as the performance of non-critical gourmets, including jacks, trolleys and kitchen equipment, as well as items in the reception area and Track (Fans) of the track. Since much lower carbon dioxide emissions than air transport can help reduce the carbon footprint of the championship, transporting this heavy cargo is a more sustainable way. Each boat will sail by leaps all season, loading cargo for the next race. These five groups of goods were shipped from England to Australia, Bahrain, China, Azerbaijan and Spain. Suits collected from England and shipped to Spain were transported to Europe by road. Each group will have several destinations throughout the season, so a group after the establishment of the Australian Grand Prix will go to Canada, then stop in the UK, then go to Singapore, Brazil, then return to the UK, and then return to the local area to compete. Although the freight is the same, each track provides logistical challenges and opportunities to create unforgettable racing experiences for former WANT fans. The marina bay circuit on the streets of Singapore poses logistical challenges, because roads can only be closed at certain times of the day. This means that Formula One racing and DHL (DHL is the official transport sponsor of F1) cooperate with the team day and night to build paddocks. In order to create a temporary track, cement barriers, cache fences and temporary bridges must also be built.

If the team materials arrive at the stadium on time, then the team will retain valuable time for parts installation and vehicle debugging. This will not only affect the vehicle performance test and the adjustment of vehicle performance and indexes during Friday's practice race but may even affect the results of qualifying on Saturday (the results of qualifying will determine the starting position of Sunday's race). Therefore, the failure of the convoy materials to arrive on time will likely bring disastrous consequences to the convoy [7-10].

2. Case Description

The transportation plan for F1 team materials started several months ago. Take the 2018 season as an example. Around January, in the first three months of the first race of the season, ten teams each loaded five sets of containers and sent them by sea. Of course, ocean transportation is slower. The number of containers varies from team to team. There are more rich teams like Red Bull, but three 14-meter-long containers are usually enough. In January, the containers will arrive at five sub-stations: Australia Station, Bahrain Station, China Station, Azerbaijan Station and Canada Station. Then, with the completion of each competition, they will be packed again and transferred to the next sub-station, with Australia going to Singapore, Bahrain going to Russia, China going to Japan, Azerbaijan going

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to the United States and Canada going to Mexico. When the season ends, these things will be shipped back to the headquarters in a unified way.

The logistics team of F1 mainly moved around during the competition. The packing work had already started on Sunday morning before the competition started. Many things were not used in the competition, and the power unit system was one of the first packages to be shipped away. Fifteen minutes after the end of the race, each team began to load the car. After the race, the car should be checked for illegal modification. Generally, the packed equipment will be loaded on the plane for the next stop a few hours after the last loading. Motorcades are kept from getting close to all the materials before they arrive. On Tuesday morning, the competition of assemblers began. First, the garage was assembled, including core equipment such as wallboard, floor, electrical system and communication equipment. Start assembling details on Wednesday morning, and make sure it will be put into use in four hours. In a word, the equipment of 10 teams was transported between 6,400 kilometers and reassembled within 58 hours. Thanks to these logistics teams, such a wonderful race could be brought.

In June 2022, some F1 convoy materials shipped to Australia were sent by sea in advance, including a cargo ship carrying materials from three convoys. This cargo ship originally took 42 days to reach its destination, but it was delayed for about a week due to maritime reasons. DHL started the rapid response procedure in the face of further delays in the shipping schedule. They decided to unload the materials of the motorcade at the port of Singapore and instead use two Boeing 777s and a Boeing 767 300 to fly the materials directly to Australia and finally arrive at the stadium on time before the competition.

The materials shipped by the F1 team to Australia almost can't arrive on time, but even if there is no delay, the price of the boat has increased. The vice president of DHL said that from Europe to Asia and back to Europe, the price of a container has soared from 900 dollars to 20,000 dollars.

Before the Bahrain station in the 2022 season, the Haas F1 team encountered the problem of delayed delivery of the goods. After the plane they originally planned to transport the goods was grounded in Istanbul, the team's goods were delayed from leaving the UK, so they would miss the official test on the first morning in Bahrain. As a result, the convoy's goods arrived in Bahrain on Tuesday night, about 48 hours later than originally planned. So, there is still time if you want to be ready for the test on Thursday morning local time in Bahrain. Their best plan is to take the test on Thursday afternoon.

3. Case Analysis

To cope with the complexity of the season schedule, which involves games in multiple locations, it is necessary to consider the logistical challenges involved. The season begins with games in Bahrain and Saudi Arabia, followed by games in Australia before returning to China and Azerbaijan. Such a schedule requires transporting vehicles, vehicle parts and team personnel between different race locations. While fleet personnel can be reached quickly by plane, transporting vehicles and their parts is more time-consuming. Cross-continental transport often relies on sea freight, which introduces uncertainty and leads to delays, as the problems experienced at the Australian leg last year showed.

To simplify this complex logistics process, it is necessary to use trucking as the main mode of transportation. This approach has several advantages, including speed and stability. Notably, a considerable portion of the trucking infrastructure is already established in the European region, making it a viable option for fleets based in the region. By using trucking as the primary method of transporting equipment and vehicles, fleets can mitigate the higher costs associated with air freight, long ocean shipping times, and the unpredictability associated with ocean freight.

Additionally, there is the consideration that many fleets are based in Europe. Given this geographical spread, a question arises: why not start the championship season in Europe, eliminating the need to ship to Bahrain early in the season? By starting the European season, teams can

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significantly reduce the complexities and costs of shipping across continents, establishing a more efficient and cost-effective way of conducting a racing season.

Another viable option is to focus competitions in the same geographical area during a specific period. This approach minimizes the need for frequent intercontinental travel and simplifies the season schedule's logistics. This centralized arrangement optimizes transport efficiency and contributes to a more sustainable and environmentally friendly approach to racing, in line with the increasing importance of reducing the carbon footprint of racing events.

The solution is to rearrange the season schedule. We could consider clustering tournaments within the same geographical area, such as one month in Europe, the next month in Asia, and the Americas. This scheduling can provide more options for trucking and reduce the need for ocean and air freight, resulting in significant transportation cost savings. At the same time, to minimize the possible consequences of shipping delays, you can choose to conduct shipping before and after the summer offseason to reduce the impact on the season schedule. By concentrating competition in adjacent regions, logistics arrangements can be optimized, overall efficiency improved, and the complexity and cost of intercontinental transportation reduced. This strategy also helps reduce transport-related risks and ensures stability in the season schedule while contributing to more sustainable and environmentally friendly motorsport.

4. Conclusion

As a part of operating the whole fleet, the logistics work of F1 is a huge and tedious project. The work of this system is generally completed by three means of transportation: trucks, cruise ships and cargo planes, which requires good communication between the fleet manager and the fleet staff, tireless work and meticulous planning and cooperation between DHL and F1 teams. Only in this way can every race in F1 go smoothly and bring wonderful races to the fans worldwide.

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