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OPTIMISING TRANSPORTATION LOGISTICS FOR PARALYMPIC ATHLETES: INSIGHTS FROM THE PORTUGUESE CONTEXT

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Abstract:

Effective transportation logistics is crucial in sports, especially for events with accessibility needs like the Paralympic Games. This Work Project analyses the transportation logistics processes of the Portuguese Paralympic Committee, through insights of current procedures, from the point-of-view of its many stakeholders, and field observations of the preparation and departure to the Paris 2024 Games. The results highlight inefficiencies related to the loading of equipment, accessibility challenges, and scheduling constraints, which may negatively impact operational efficiency. This study contributes to understanding logistical complexities in Paralympic contexts and offers recommendations to enhance the experience for athletes and stakeholders.

Keywords:

Sports Management; Transportation Logistics; Paralympic Athletes; Portuguese Paralympic Committee; Paralympic Games; Logistics Optimisation; Transportation Delays.

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1. Introduction

Sports Management and Logistics Management are interconnected. This is especially true in the context of large-scale sporting events where effective logistics are crucial for a successful execution. Project managers (focused on the planning and execution of a sports event) and operations managers (who oversee long-term efforts and ongoing outcomes (OHIO University 2022)) are key to ensure smooth sports operations (Sen 2022). Despite careful planning, logistical failures may still occur, leading to significant disruptions. For instance, during the 2016 Summer Olympic Games in Brazil, the women's 50-meter freestyle semifinals were delayed when a bus transporting athletes got lost on its way from the Olympic village (Auerbach 2016). Such incidents highlight the crucial role that logistics plays in the success of sporting events. With tight schedules, millions of viewers and thousands of people involved, minor logistical errors may escalate into huge problems. Therefore, effective logistics and operations management ensure that athletes, staff, and equipment are in the right place at the right time (Pott et al. 2023), enabling competitions to proceed as scheduled and maintaining the integrity of the event.

Transportation, in and of itself, may be considered a logistical activity with great importance in the success of an event. Finding the adequate methods to transport spectators, equipment, and athletes presents challenges for both operations and project managers (Herold et al. 2019). One should consider the specific characteristics and needs of each athlete to provide tailored solutions, especially in events like the Paralympic Games, where specialised accommodations may be needed for athletes with disabilities, ensuring their comfort and safety throughout the entire Games. When transporting Paralympic athletes, it is essential to account for the specific needs of individuals with disabilities (*e.g.*, enough space for wheelchairs and other facilities needed, among others) (Kean et al. 2017), which adds a layer of complexity to the process, requiring appropriate transportation mode selection, and additional time to

accommodate such requirements in an effective manner. This underscores the importance of adapting transportation facilities, to ensure inclusivity and accessibility (Judge et al. 2024).

However, challenges in Paralympic logistics are not the same in all contexts, as countries might differ in terms of resources and opportunities available (Mauerberg-deCastro, Campbell and Tavares 2016), including the facilities available, but also financial means. This Work Project focuses on the Portuguese case, namely the Portuguese Paralympic Committee (in Portuguese, *Comité Paralímpico Português* – from hereon referred to by its acronym CPP), by aiming to identify the factors that influence the logistics behind transportation, and how these processes may be optimised to improve athlete experiences and operational efficiency.

This study employs a mixed-method approach to explore the transportation logistics of the CPP, integrating insights from survey responses and field observations from previous events. The survey collects both quantitative and qualitative data from stakeholders, providing an overview of satisfaction levels, delays, and accessibility concerns. On the other hand, observations from both a training camp and the delegation's departure to the Paris 2024 Paralympic Games offer a qualitative perspective on current logistical inefficiencies. By integrating both methods, it is possible to identify the main challenges faced, including equipment handling, limited accessibility, and transportation delays, converting them to opportunities for improvement.

The structure is organised as follows: *Section 2* reviews existing literature on Paralympic logistics, beginning with the Paralympic Games, and narrowing down to the context of the CPP. *Section* 3 outlines the key methodologies used, while *Section 4* identifies the main challenges currently faced by the CPP (further discussed, along with limitations, in *Section 5*). The findings lead to practical recommendations *(Section 6)* to optimise current logistical processes.

Finally, *Section 7* summarises the results and provides guidance for next steps in the field of Paralympic logistics optimisation.

2. Paralympic Logistics Challenges in the Literature

The Paralympic Games have grown into the world's third largest sporting event, behind the Olympic Games and FIFA World Cup (Darcy, Frawley and Adair, Managing the Paralympics 2017). It was only in 2004, with the Athens Games, that the management of both events became a shared effort (with one organising committee), using the same sporting venues, facilities and athletes' village, with higher levels of operational efficiency (Paris 2024 Organising Committee 2024). Host cities' committees, being the ones with the responsibility of organising both Games, had to incorporate two massive events, with the added complexity of accommodating athletes with disabilities (for the Paralympic Games, under the supervision of the International Paralympic Committee (IPC)). It is, therefore, of paramount importance to understand not only the logistical challenges that may be addressed through careful planning, but also the requirements of disability sports and the specific needs of Paralympic athletes.

The Paralympic Games may be classified as mega-sporting events due to their international scale and media coverage. These types of events also generate economic benefits, tourism growth, and infrastructure development (Byers, Slack and Parent 2012). This extensive reach comes associated with large costs and significant impacts on the environment and local populations (Groschl 2021), namely in traffic, public transportation, and the delivery of goods and services. However, mega-sporting events differ from each other according to different characteristics, such as the level of complexity. For example, these events require the host government and public sector to take on a far larger role, including the management of the athletes' village according to their needs, altogether with the IPC's additional requirements in terms of accessibility. It is essential not only for the athletes, but for volunteers, employees,

and spectators with disabilities to make sure everyone arrives and departs safely (Darcy, Accessibility as a Key Management Component of the Paralympics 2017).

According to previous studies, the lack of accessibility for spectators with disabilities may impose a threat to sports events and its organisation, leading to additional delays. Those delays may be related to limited vehicle capacity, with accessible shuttle buses only accommodating a small number of wheelchair spaces (Lee, Kim and Kim 2021). Apart from that, it is also crucial to foster collaboration and communication with all stakeholders to meet their needs (Groschl 2021), sharing all relevant information to make sure that everyone is aligned in terms of expectations. Alongside the host governments and the IPC, National Paralympic Committees (NPCs) and athletes from participating nations are also key stakeholders (The French Government 2024). NPCs correspond to the national representatives of the worldwide Paralympic Movement in a specific country (International Paralympic Committee 2024). Their mission also includes identifying and developing talent, as well as providing opportunities for Paralympic athletes to represent their countries in international competitions like the Paralympic Games (Maleske and Sant 2020).

In the Portuguese context, the CPP appears as one of the 182 NPCs recognised by the IPC (World Anti-Doping Agency 2024). Founded in 2008, the CPP was established as a non-profit organisation with the goal of meeting both national legal requirements and international demands to enhance the inclusion and representation of athletes with disabilities (Comité Paralímpico de Portugal 2021). Nevertheless, the representation of countries at these competitions is often unbalanced, with certain nations fielding significantly more athletes than others (Mauerberg-deCastro, Campbell and Tavares 2016). This disparity is influenced by external factors, such as lack of access to resources, as well as failing to include disability sports into the sports systems of some nations (Maleske and Sant 2020). The role of governments, in creating national sports policies tailored to their specific contexts (Pankowiak

et a. 2023), as well as population size and national welfare (Vanlandewijck et al. 2007), may influence the success of the Paralympic movement. Likewise, countries with lower scores on the Inequality-Adjusted Human Development Index (IHDI) often have fewer resources, smaller Paralympic teams, and, consequently, less Paralympic success (Britten 2019).

Although Portugal is moving in the right direction (*e.g.,* by offering Paralympic athletes equal individual financial support as Olympic athletes), there is still room for improvement. Fortunately, the global movement towards inclusion and equal participation opportunities has been pursued by different organisations. NPCs prioritise accessibility within their respective countries, working to establish the physical and logistical conditions needed to guarantee access to sports for all.

Through its Paralympic Preparation Program (Comité Paralímpico de Portugal 2022), the CPP has organised participation in recent Paralympic cycles, including Tokyo 2020 and Paris 2024, with an eye towards future Games. It collaborates with national sports federations to ensure that athletes have access to resources and support, focusing on providing preparation conditions for training, travel, and competition for athletes with expectations of achieving excellence at national and international events. Incorporating the CPP into the Paralympic Games context demonstrates how the logistics of athletes' participation is not just a global challenge but also a national one. As Portugal continues to send delegations to future Games, the role of the CPP is ensuring the smooth transportation and accommodation for athletes.

Additionally, as previously explained, understanding Paralympic athletes' views on transportation services remains crucial, as they are the primary users of the facilities. Hence, accessibility becomes a critical factor, since each journey may carry specific risks (Ziv 2024). To provide an accessible travel for athletes, it is important to understand their perceptions on how transportation services are currently functioning, as well as potential areas for

improvement. The main goal is to align the performance of those services with the needs of athletes to ensure optimal delivery.

Existing literature (Bamford and Dehe 2016) considers the *"Voice of the Athletes"* to evaluate their experiences: transportation services are ranked as the third most important by the athletes, but in terms of performance are only ranked sixth. By better aligning high-importance criteria with superior performance, events may achieve greater success and enhance the experience of the athletes. Furthermore, previous research explores the barriers experienced by the Dutch Paralympic athletes in sports participation (Jaarsma et al. 2013). Not only personal factors like motivation and dependency on others to participate in sports play a role, but also physical impairments significantly impact athletes. Moreover, the limited availability of sports facilities that are adapted to their needs is also mentioned, including the lack of adapted transport and the cost of alternative options to travel to training centres.

Australian Paralympic athletes also highlight financial support as a crucial factor due to the high costs of adapted transportation and its lack of availability (*e.g.*, owning a car is described as a facilitator in terms of transporting to training) (Kean et al. 2017). This lack of accessibility in training and competition venues is also pointed out as a barrier for Malaysian (Wilson and Khoo 2013) and Indonesian (Fitri et al. 2022) Paralympic athletes, henceforth influencing their performance and relationship with sports. This suggests careful planning of aspects like the bus fleet size, network organisation, scheduling, and ensuring service reliability through efficient logistics (Herold et al. 2019).

Thus, the quality of transportation positively and significantly impact user satisfaction (Chen, Hsu and Chen 2019). However, it becomes essential to evaluate how it is perceived through the eyes of the athletes, but also other parties involved in a sports organisation. Research evaluating the impact of transportation logistics on user satisfaction has shown that

transportation significantly influence athlete satisfaction (Duygun and Subaşı 2023), mentioning opportunities for future research to delve deeper into the perceptions of other roles (*i.e.,* managers, coaches, and other stakeholders). Little is known about how different profiles within a sports organisation reflect on logistics matters and their respective levels of satisfaction, which presents a valuable area to enrich the existing literature.

Despite the wealth of research on logistical challenges of mega-sporting events, a significant gap remains in the literature concerning the specific transportation needs of Paralympic athletes, in the Portuguese context specifically, but also at the international level. While Bamford and Dehe (2016) evaluate the experiences of Paralympic athletes regarding transportation and found a mismatch between its value and execution, it reveals a gap in how logistical systems are optimised. Though transportation is clearly valued by the athletes, there is a lack of detailed research or best practices on how to enhance these transportation services to satisfy the needs of the athletes.

Moreover, many studies have focused on the broader logistical challenges at the Paralympic Games, including the role of infrastructure and public services, but fail to address how NPCs, such as the CPP, can improve transportation logistics throughout the preparation stages. It is known that the CPP is tasked with ensuring that athletes have suitable training conditions and travel arrangements. In fact, transportation logistics are not only crucial during the Games but also have an impact on athletes' mobility in the lead-up to these events, influencing their access to training facilities and competitions. Optimising transportation at the national level is, therefore, essential to ensure smooth preparation and performance.

3. Methodology

To understand the main factors influencing the transportation logistics of the CPP, a mixed-method approach is employed, combining quantitative and qualitative analysis that share a

common goal – optimising current logistics. The former provides measurable insights, such as satisfaction levels among different stakeholders, helping to identify patterns across less controlled variables (Malina, Nørreklit and Selto 2011). Meanwhile, qualitative methods capture specific challenges observed during specific moments (such as the preparation and transportation to major events – e.g., the Paris 2024 Paralympic Games), offering practical and actionable strategies for future improvements. This approach includes field observations from two key events – a training camp as preparation for the Paris 2024 Paralympic Games and the delegation's departure for Paris – alongside both quantitative and qualitative data collected through a survey to evaluate the insights gathered from stakeholders on how transportation of Paralympic athletes is functioning in Portugal.

3.1.Paris 2024 Training Camp

One of the methods used to evaluate transportation logistics in Portugal is the analysis of a training camp held in June 2024 in Fátima, Portugal, as part of the preparation for the Paris 2024 Paralympic Games. For the purpose of this Work Project, the CPP provided data regarding: (i) transportation modes to training centres; (ii) locations of the centres; and (iii) training schedules. This allows for a qualitative analysis of the current training schedule template (see Appendix C). With this information, it is possible to identify areas for optimisation, such as: (i) enhanced information-sharing among stakeholders; and (ii) more efficient scheduling in future events (see Appendix D).

3.2. Overview of the Departure to the Paris 2024 Paralympic Games

In line with the qualitative research, field observations are used to evaluate the departure of the Portuguese Delegation for the Paris 2024 Paralympic Games. In August 2024, qualitative data was collected, in person, regarding the transportation logistics from *Cidade do Futebol* to

the Lisbon Airport[1]. It is possible to monitor logistical operations, including the loading and unloading of equipment, and the use of adapted transportation vehicles, allowing for the development of future recommendations.

3.3. Stakeholders' Perceptions: Survey Design

To gather insights from different respondent types, an online survey was created. Although this survey is directed to a very specific group of respondents, it remains an effective method to reach diverse participant profiles in a convenient manner. Additionally, online surveys lead to a broader reach that goes beyond each participant location, offering flexibility in question types and formats (Evans and Mathur 2018). The online survey includes different questions grouped by categories:

Category	Questions	Description
Consent Statement	Q1	Respondents answering *"no"* are automatically directed to the end.
Paralympic Athletes *(Branching Logic)*	Q8 – Q14; Q16	Questions designed to Paralympic athletes are only displayed for participants who previously select this type of profile[2].
Sports Classification *(Branching Logic)*	Q17 – Q37	Classification defines the eligibility to compete, as sports have classifications according to the impairment type[3] (see Appendix B).

Table 1. Categories of different survey questions.

The questions are also presented in different formats, namely:

1. *Multiple Choice Questions* (Q2– Q3; Q7 – Q10; Q12; Q14; Q16 – Q39): these questions provided **qualitative data**, facilitating the analysis of common themes and preferences.
2. *Likert-Scale-Questions* (Q4 – Q6; Q11; Q13): to gather **quantitative data**, these questions allowed participants to express level of agreement or satisfaction on a scale from 1 to 5.

[1] Data includes notes on adherence to schedules and the roles of different stakeholders, including the preparation, transportation, and airport arrival phases.
[2] These questions focus on transportation logistics to training centres: athletes were encouraged to reflect on a specific moment of their experience, reducing variability in responses that could arise from different contexts.
[3] These classifications are set by the IPC and group athletes according to their impairments, ensuring fair competition among participants (International Paralympic Committee 2024).

3. *Open-Ended Question* (Q15): this question encourages participants to provide detailed feedback and insights, contributing to a richer qualitative data.

All in all, the survey consists of a total of 39 Questions, and it was conducted in Portuguese (see Appendix A for English translation).

3.4.Data Collection and Participant Profile

A total of 68 responses were collected, out of which 18 did not complete the survey, resulting in a usable response rate of 73.5%. The survey was online from 17 October 2024 to 8 November 2024 and was shared via e-mail and WhatsApp. Out of all valid responses, 56% are male and 42% are female (the remaining 2% preferred not to answer). The age distribution is also balanced, with no clear majority: for instance, 20% of participants are aged 18-24, 16% are 25-34, 30% are 35-44, and 18% are 55-64. Moreover, considering the role each participant plays, 38% represent sports technicians, and 34% correspond to Paralympic athletes. While managers account for only 4% of participants, the *"other"* category has a significant representation (24%): mostly daily living assistants and physiotherapists.

3.5.Development of Hypotheses and Measures

To assess the perception of transportation logistics among all stakeholders, this Work Project aims to test four hypotheses which will provide insights on the impact of transportation logistics in Portugal. There is potential to explore different perceptions of how logistical activities are functioning according to different profiles. It seems reasonable to expect that individuals in different roles may have distinct levels of satisfaction when it comes to evaluate transportation of a sports organisation. As each role might interact with logistics from a distinct perspective, it can influence how challenges are perceived and valued. Based on this intuition, **H1** was developed**:** *The role performed in the Portuguese Paralympic Committee is significantly related to the degree of satisfaction within transportation logistics.*

Darcy (2017) underscores that transportation accessibility is indispensable. Additionally, literature shows that transportation remains one of the most important factors on athlete experience and performance. It is plausible to expect that those who view transportation as essential to athlete performance also recognise the importance of ensuring accessibility. As such, the following hypothesis arises – **H2:** *There is a significant relationship between the belief that transportation logistics influence athletes' performance and the importance placed on accessibility and transportation.*

Still in line with accessibility, limited capacity of transportation modes may increase delays in travel times for spectators with disabilities (Lee, Kim and Kim 2021). This could support the idea that accessibility constraints around specific vehicle types create bottlenecks (demand exceeding supply for adapted vehicles). These findings could be adapted to a scenario where different vehicle types might cause similar issues for athletes traveling to training – **H3:** *The vehicle type used for travelling to training centres is significantly related to the frequency of delays experienced on the way to training.*

Back to the literature, the need for wheelchairs and dependency on others are pointed out as significant obstacles when it comes to practice a Paralympic sport (Jaarsma et al. 2013). Consequently, it can be inferred that satisfaction with transportation logistics and the accessibility of those services may be linked to the sports classification of an athlete, particularly in relation to the level of impairment. Therefore, the final hypothesis is developed – **H4**: *The degree of satisfaction with transportation logistics among athletes is significantly related to their sports classification.*

3.6. Measures: Types of Variables used in Hypotheses Testing

This subsection starts with a closer look at different types of variables that will be used.

Variable	Description	Question	Variable Type
1	Function performed within the CPP	Q2	Nominal
2	Perceived impact of transportation logistics on athlete performance	Q4	Ordinal
3	Importance of accessibility in transportation logistics	Q5	Ordinal
4	Degree of satisfaction with transportation logistics	Q6	Continuous
5	Transportation mode used to travel to training centres	Q8	Binary
6	Frequency of arriving late to training centres	Q11	Ordinal
7	Degree of satisfaction with the transport used to training centres	Q13	Ordinal
8	Type of impairment	Q17 – Q37	Binary

Table 2. Type of Variables used in the statistical analysis for hypothesis testing.

As shown in Table 2, two types of variables – Categorical and Metric – are used. The former represent nominal, ordinal, and binary categories, while the latter represent quantitative continuous data with a meaningful order and consistent and interpretable distances between values (Kvålseth 2023).

Although the 5-Point Likert scale corresponds to an ordinal scale (Statista n.d.), **Variable 4** (*Degree of satisfaction with transportation logistics)* is treated as a metric (continuous) variable for the purposes of advanced statistical analysis and hypothesis testing (specifically for H1). This decision rests on the assumption that the intervals between adjacent categories are perceived as roughly equal by respondents. By treating the Likert-scale as metric, it allows for a broader range of statistical analysis methods and thereby evaluating the relationship between variables (Polamuri 2023).

Considering **Variable 8** *(Type of impairment)*, classifications are sport-specific and determined by experts who evaluate the requirements of each sport and assess which impairment types are eligible for participation (Olympic Games 2024). The IPC recognises 10 types of impairments (International Paralympic Committee 2024), of which 8 are classified as **physical** impairments. The remaining 2 correspond to **vision** and **intellectual** impairments. Even though survey data includes the sport each athlete practices and their sports classification, it might be challenging to analyse the full range of physical impairments. Moreover, only 34%

of respondents are Paralympic athletes, and questions related to the type of impairment are only targeted to this participant profile. Given the low representation of vision and intellectual impairments, **Variable 8** is simplified to a binary dummy variable to ensure sufficient data points in each category for a reliable analysis (Trochim 2024): “physical impairment” is coded as "1," while “intellectual” or “vision impairment” are coded as "0". The same applies for **Variable 5** *(Transportation mode used to travel to training centres)*: considering the majority choice of "private vehicle”, this variable is also treated as a dummy, with “private vehicle” coded as "1" and all other responses coded as "0".

4. Main Findings

4.1. Analysis of the Training Camp Logistics

The analysis of the June 2024 training camp provides insights into the transportation logistics organised by the CPP. Most participants, including athletes and staff, stayed at the *Hotel Essence Inn Marianos*, the main location for the camp. A smaller group (staff members not directly involved in training activities), stayed at the nearby *Hotel Steyler*. Transportation modes included: (i) an adapted bus; (ii) a 9-seat van; and (iii) a 5-seat vehicle. All types of vehicles were allocated according to specific requirements for each sport. The training centres were, specifically: (i) *Centro de Estudos de Fátima* – Swimming Pool + Sports Hall: For Para Swimming, Para Triathlon, and Para Badminton (2.4km from the main location); (ii) *Fátima Athletics Track/Gymnasium:* For Para Athletics and Para Canoe (5.4km from the main location); (iii) *Sports Hall:* For Para Judo and Boccia (10.4km from the main location).

The analysis of one of the training schedules (Appendix C) indicates that departures were planned 20 minutes before the scheduled start of each session, but not all training centres have the same distances to the main location. Nevertheless, the 9-seat van, although used for

different training centres, had only one initial pick-up point as all athletes and stakeholders were based at the main hotel, which may be highlighted as one current best practice.

4.2. Departure for Paris 2024

The observation of the CPP's departure to the Paris 2024 Paralympic Games also reveals insights into the strengths and weaknesses of the current transportation logistics framework. The delegation was set to depart at 09h30. There were two adapted buses, provided by *Câmara Municipal de Loures,* as well as a CPP's 9-seat passenger vehicle to facilitate the transportation of athletes with disabilities, used for competitions, training events, and official Paralympic-related activities (Comité Paralímpico de Portugal 2018). The process highlights areas requiring optimisation: the method of loading luggage and equipment, where athletes and staff handled their own equipment, proved time-consuming and raised questions about its practicality given the size and needs of the Delegation. Additionally, the departure occurred 20 minutes behind schedule, which reflected gaps in coordination and planning. These findings underscore the need for streamlined processes and better coordination among stakeholders.

4.3. Statistical Analysis: Hypothesis testing for H1

Back to the hypothesis testing, a **One-Way ANOVA** compares the means of two or more groups for one categorical variable (Ross and Willson 2017), determining whether there are statistical significant differences between the means of those independent groups (Laerd Statistics 2018). However, doing so requires not only the nominal variable (**Variable 1** – *Function performed within the CPP*), but one continuous dependent variable (Rafi 2020). **Variable 4** *(Degree of satisfaction with transportation logistics)* may be treated as a continuous variable, if the assumptions of normality and homogeneity of variances are satisfied (Rhemtulla, Brosseau-Liard and Savalei 2012).

Assumption Checks	*p-value*
Normality Test (Shapiro-Wilk)	0.200

Homogeneity of Variances Test (Levene's)	0.525

Table 3. Assumption Checks for H1.

At a significance level of 0.05 ($\alpha = 5\%$), low *p-values* (lower than 5%) would suggest a violation of both assumptions. Since the *p-values* for both the Shapiro-Wilk test and Levene's test are greater than α, it is possible to conclude that the ANOVA assumptions are not violated. Thus, there are the necessary conditions to perform a One-Way ANOVA and conclude whether one rejects or fails to reject the null hypothesis: (H_0: $\mu_{Paralympic\ Athlete} = \mu_{Sports\ Technician} = \mu_{Manager} = \mu_{Other}$). The null hypothesis states that the role performed within the CPP has no significant effect on the degree of satisfaction with transportation logistics.

One-Way ANOVA (Welch's)				
	F	df_1	df_2	*p-value*
Variable 4	0.539	3	4.65	0.677

Table 4. One-Way ANOVA for H1.

One may reject the null hypothesis if the *p-value* is less than 5%, the significance level. In this case, with a *p-value* of 0.677, the null hypothesis is not rejected. Thus, the results do not provide sufficient evidence to confirm a statistically significant difference in satisfaction levels across the different roles performed within the CPP with this significance level.

	Roles performed	Mean	SD
Variable 4	Manager	2.50	2.12
	Sports Technician	2.79	1.18
	Paralympic Athlete	3.29	1.50
	Other	3.17	1.11
	Overall	3.04	1.14

Table 5. Descriptive Statistics of satisfaction levels for each role.

Table 5 shows the descriptive statistics for satisfaction levels. It is possible to conclude different roles present similar means (Paralympic athletes reported the highest mean satisfaction, while Managers had the lowest). The overall standard deviation (SD = 1.14) indicates a moderate to low spread of satisfaction across all participants, which is aligned with the non-statistical significance of H1. Hence, one cannot confirm a relationship between the role performed and the degree of satisfaction with transportation logistics.

4.4. Statistical Analysis: Hypothesis Testing for H2

H2 investigates the relationship between two variables measured using Likert-scales: **Variable 2** *(Perceived impact if transportation logistics on athlete performance)* and **Variable 3** *(Importance of accessibility in transportation logistics)*. Given that these are ordinal scales, a **correlation analysis** is performed to examine the strength and direction of the association between the two variables (Stewart 2024). Through the Pearson's correlation coefficient (r), it is possible to assess whether these two variables are significantly associated without making assumptions about causality (Madhavan 2024). Pearson's r ranges from -1 to 1, with positive values corresponding to a positive relationship. The analysis includes a *p-value*, which tests the null hypothesis ($H_0: r = 0$). In other words, H_0 suggests there is no linear association between the variables. If the *p-value* is below the significance level ($\alpha = 5\%$), then it may be rejected.

Correlation Matrix	
Pearson's r	0.340
d_f	48
p-value	0.008

*Table 6. Correlation between **Variable 2** (Perceived impact of transportation logistics on athlete performance) and **Variable 3** (Importance of accessibility in transportation logistics)*

The analysis yielded a correlation coefficient of 0.340, indicating a moderate positive correlation between Variables 2 and 3. As the belief in the influence of transportation logistics on performance increases, so does the importance placed on accessibility and transportation. Furthermore, with a *p-value* (0.008) lower than the 5%, H_0 may be rejected. Hence, there is sufficient evidence to suggest an association between the two variables.

	Mean	SD
Variable 2	3.96	0.83
Variable 3	4.80	0.40

Table 7. Descriptive Statistics for the perception that transportation influences performance & importance of accessibility.

The descriptive statistics align with the findings from hypothesis testing. In fact, respondents generally agree that transportation logistics influence performance (Mean = 3.96,

SD = 0.83). Nevertheless, this perception has slightly greater variability compared to the importance of accessibility, which is rated very highly (Mean = 4.80, SD = 0.40).

4.5. Statistical Analysis: Hypothesis Testing for H3

For H3, just like with H1, the relationship between a categorical variable (**Variable 5** – *Transportation mode used to travel to training centres*) and an ordinal variable (**Variable 6** – *Frequency of arriving late to training centres*) will be examined. In cases where assumptions are met, one might consider treating the ordinal variable as continuous and apply a One-Way ANOVA.

Assumption Checks	*p-value*
Normality Test (Shapiro-Wilk)	< 0.001
Homogeneity of Variances Test (Levene's)	0.133

Table 8. Assumption Checks for H3.

The low *p-value* in the normality test indicates a violation of normality. This way, this statistical test cannot be applied, as not all necessary assumptions are met. Instead, a non-parametric test was chosen, in line with previous research recommendations when the One-Way ANOVA assumptions do not hold (McDonald 2014). The **Kruskal-Wallis** test (rank-based non-parametric test) is selected as it does not require the data to follow a normal distribution (Frady 2024). It tests whether the rankings of delay frequencies differ significantly between these two modes, rather than comparing their average values. Hence, H_0 states that that there is no significant difference in the distribution of delay frequencies across transportation modes.

Kruskal-Wallis			
	χ^2	d_f	*p-value*
Variable 6	7.08	1	0.008

Table 9. Kruskal-Wallis for H3.

The results yield a *p-value* of 0.008, lower than the significance level ($\alpha = 5\%$). By rejecting H_0, there is a significant relationship between the transportation mode used for

traveling to training and the frequency of delays experienced. This implies that transport options may influence the likelihood of delays.

	Transportation Mode	Mean	SD
Variable 5	Private Vehicle (1)	1.92	0.80
	Other Transport (0)	1.00	0.00
	Overall	1.65	0.79

Table 10. Descriptive Statistics of frequency of delays during travel to training centres.

The descriptive statistics reveal a clear distinction between the two groups: athletes using private vehicles experience, on average, a higher frequency of delays (Mean = 1.92), with some variability in their responses (SD = 0.80). Alternatively, the ones who use other types of transportation modes report delays much less frequently (Mean = 1.00), with no variability in their responses (SD = 0.00). The analysis shows that, on average, athletes using private vehicles experience more delays than those using other modes, and this difference is statistically significant. The *"other transportation modes"* group comprises options such as public transportation, alternatives provided by the CPP, sports clubs or federations, and bicycles.

4.6. Statistical Analysis: Hypothesis Testing for H4

H4 examines whether **Variable 7** *(Degree of satisfaction with the transport used to training centres)* is significantly associated with **Variable 8** *(Type of impairment)*. As shown in Appendix B, data was grouped according to levels of impairment rather than by each classification. The analysis aims to analyse the relationship between the categorical variable (Variable 7) and the ordinal variable (Variable 8). It could be explored using a One-Way ANOVA if its assumptions are satisfied.

Assumption Checks	*p-value*
Normality Test (Shapiro-Wilk)	0.042
Homogeneity of Variances Test (Levene's)	0.089

Table 11. Assumption Checks for H4.

The Shapiro-Wilk test suggests a violation or normality, with a low *p-value* ($\alpha = 5\%$), disqualifying the use of a parametric test. Thus, just like for H3, the **Kruskal-Wallis test** is

performed, as it does not require the data to follow a normal distribution. Therefore, H_0 proposes that the distribution of satisfaction scores is the same across both impairment groups.

Kruskal-Wallis			
	χ^2	d_f	*p-value*
Variable 8	4.14	1	0.042

Table 12. Kruskal-Wallis for H4.

Considering the *p-value* of 0.042, as it is lower than the significance level ($\alpha = 5\%$), H_0 can be rejected, suggesting there is statistically significant difference in satisfaction with transportation logistics between athletes with physical impairments and those with other impairments.

	Type of Impairment	Mean	SD
Variable 8	Physical Impairment (1)	3.53	1.06
	Other Impairment (0)	5.00	0.00
	Overall	3.71	1.10

Table 13. Descriptive Statistics of type of impairment.

In fact, Paralympic athletes with other impairments (non-physical) report consistently higher satisfaction (Mean = 5.00) compared to those with physical impairments (Mean = 3.53). Moreover, the lack of variability (SD = 0.00) shows unanimous high satisfaction, which could mean they could face fewer mobility-related challenges compared to those with physical impairments. In summary, this analysis indicates a significant difference in satisfaction: athletes with physical impairments seem less satisfied compared to those with other impairments. This could lead to accessibility issues, which will be explored in *Section 5*.

4.7.Qualitative Results: Survey Insights

As previously mentioned, qualitative data may be extracted from the survey results, providing insights on challenges and areas for optimisation. For instance, when asked about transportation challenges faced by the CPP, stakeholders identified the lack of access to suitable transportation modes and difficulties with loading of equipment as the top concerns. These

challenges come associated with suggestions for improvements, namely increasing the availability of adapted transportation, and enhancing communication regarding schedules.

Furthermore, in questions targeted to Paralympic athletes, the biggest obstacles are the lack of accessibility and financial constraints associated with adapting private vehicles and overall transportation expenses. Moreover, although delays were not frequent to athletes (Mean = 1.65), heavy traffic and weather conditions are the characteristics identified to contribute the most to delays from and to training. Regarding the most important aspects of transportation to training, athletes prioritise accessibility and independence from others.

5. Interpretation of Findings and Limitations

The analysis carried out reveals insights and challenges. One notable finding is that while previous studies (Duygun and Subaşı 2023) suggest that different roles within an organisation may influence satisfaction levels, this study finds no significant statistical evidence to support this. Although there are minor variations in satisfaction across roles, these differences are not substantial enough to suggest a clear link. From the survey results, stakeholders, regardless of their roles, face similar logistical challenges, which could explain the small variations observed. The small sample size might limit the statistical power, which could have hindered the ability to detect significant differences.

Additionally, during the training camp, all vehicles to training centres were scheduled to leave 20 minutes before the training began, regardless of the distances to the training locations. Furthermore, no logistics information was provided on how athletes were to return to the main location, which might be an area for improvement as transportation modes were shared across different venues. This lack of planning could result in insufficient time for loading equipment, a challenge frequently mentioned by stakeholders in the survey. This issue was also faced during the departure to the Paris 2024 Games, where similar inefficiencies led to delays. These

challenges might be related to resource constraints, such as insufficient staff to assist with the process, but they also highlight a broader communication problem between stakeholders (communication is of the utmost importance in ensuring smooth operations (Groschl 2021)). In the survey, stakeholders suggest that providing more detailed information on scheduling could help mitigate these challenges. There is room for improvement, which is consistent with Bamford and Dehe's (2016) findings on athletes' perceptions of these systems.

The literature also identifies accessibility as a key barrier for Paralympic athletes (Jaarsma et al. 2013), especially for those with physical impairments. Similarly, Lee, Kim and Kim (2021) highlight limited vehicle capacity as a barrier for wheelchair users in sports event transportation. The survey results further support this argument, pointing to a positive correlation between perceiving transportation as vital to their performance and the importance of accessibility. Likewise, the lack of access to adapted transportation modes is highlighted as one of the most significant challenges. On average, athletes with physical impairments express lower satisfaction levels with transportation compared to those with other impairments. However, this finding should be interpreted with caution due to the limited representation of non-physical impairments in the sample.

Another relevant result is the relationship between the frequency of delays and the type of transportation mode used. Private vehicles are more likely to experience delays compared to other types of transport, and this result is statistically significant. This may be due to the smaller size of private vehicles, their limited capacity to accommodate equipment, and the absence of coordinated scheduling with other transport modes (larger and adapted vehicles are better equipped to handle sports equipment and could help mitigate these delays). Financial constraints related to adapting private vehicles are also pointed out as an obstacle by athletes, which is aligned with the findings of Kean et al. (2017) on financial problems for Australian Paralympic athletes, associated with the high costs of equipment. Nevertheless, the analysis is

carried out under a small sample size, as mentioned before, and the representation of transportation modes other than private vehicles is limited, which could have introduced bias into the results. It is also worth noting that, on a daily basis, Paralympic athletes train with their clubs, federations, or independently, meaning the CPP does not necessarily have control over these transport arrangements, and athletes sometimes need to arrange their own transportation.

All in all, the study provides valuable insights into the transportation challenges, but the small sample size (justified by the narrow target of the study) and the focus on transportation to training centres (rather than a broader scope) introduces an issue of external validity, as there are limitations on the extent to which the findings of this study can be generalised.

6. Recommendations

The main challenges encountered relate to the **lack of accessibility** in transportation, obstacles with **loading equipment**, and **eventual delays**. The following actions could be a path to mitigating these issues:

a) ***Volunteer program for transportation logistics:*** To enhance logistical efficiency, the CPP could launch a volunteer recruitment campaign via social media and their website (like the Volunteer Programme organised by the IPC to assist in the Paralympic Games (International Paralympic Committee 2024)). This initiative would invite community members interested in supporting the Paralympic movement during critical moments. Volunteers could aid with luggage handling and provide general support throughout the transportation process. It could alleviate some logistical burdens, thus possibly minimising delays due to lack of resources.

b) ***Improve communication and scheduling for advanced luggage handling*****:** The CPP could ensure clearer communication across all stakeholders regarding transportation schedules, providing detailed schedules for both departure and return trips, and specify times allocated

for loading equipment (see Appendix D). To mitigate such delays in the future, the CPP could establish a protocol where all luggage is delivered to a pre-designated pick-up point, for example, at least one hour before departure. This approach mirrors baggage management practices commonly seen in airports and in the hospitality industry (OAG 2024), where luggage is organised in advance to prevent last-minute delays.

c) ***Enhanced collaboration for accessibility:*** while the CPP may not have control over daily transportation for athletes to training centres, it can focus on enhancing accessibility for its events. Given that the *Câmara Municipal de Loures* already provides adapted buses, the CPP could look to expand these resources by forming stronger partnerships with local transportation providers, NGOs, or corporate partners/sponsors, who would want to associate as a measure of Corporate Social Responsibility. These collaborations could lead to agreements that allow for the temporary leasing or sharing of adapted vehicles during peak periods when additional capacity is required.

7. Conclusion

This Work Project examines the transportation logistics of the CPP with a focus on finding current challenges and proposing strategies for improvement. Insights were derived through a combination of insights from stakeholders and field observations. In the case of the former, an online survey was conducted; as for the latter, two observations were assessed - a training camp in preparation for the Paris 2024 Games, and the airport departure day for Paris.

Through comprehensive analysis, three primary challenges are identified that could benefit from optimisation: (i) the **loading of equipment**; (ii) **limited accessibility**; and (iii) **delays related to transportation**. The first challenge, as highlighted by survey participants, requires optimisation due to its impact on overall transportation efficiency. This was further demonstrated through the field observations, where the failure to incorporate equipment

handling into the transportation schedule led to delays during the training camp, and inefficiencies in the loading and unloading process during the departure day caused a delay in departure to the airport. The second challenge – accessibility – is crucial for the CPP, especially given that many athletes have physical impairments. Finally, although delays are not frequent for training sessions (Mean Frequency of Delays = 1.65 out of 5), it is nonetheless important to ensure that these are minimised, particularly when affected by the loading of equipment. Factors such as heavy traffic and weather conditions are uncontrollable, but better scheduling, preparation, and coordination could reduce their impact. Based on these findings, several practical recommendations have been proposed. One such is the establishment of a volunteer program to support transportation logistics, addressing the financial burden that may arise from hiring a professional service provider for this purpose. Another is the improvement of communication and scheduling to streamline luggage handling. Last but not least, the collaboration with partners to increase the availability of adapted transportation modes, a crucial aspect for stakeholders to increase operational efficiency.

In conclusion, this Work Project addresses challenges that athletes face, ensuring their voices are heard, and leading to potential improvements that contribute to their performance and overall well-being. Studies such as this face limitations, such as the small sample size and the lack of diversity in specific response types. However, it provides insights into the current state of CPP's transportation process, opening way for improvements to mitigate the challenges faced. Future studies/projects could build on these findings by exploring the impact of these recommendations and expanding the scope to include a wider range of stakeholders and events, or even applying to a different context other than the Portuguese. Efforts were made throughout the process to ensure survey accessibility, although limitations in accessibility for visually impaired participants were acknowledged, which could be addressed in the future as more resources become available.

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9. Appendices

Appendix A. Survey Qualtrics XM: Transportation Logistics | NOVA SBE x CPP

Dear Participant,

My name is Margarida Silva, and I am a Master's student in Management at Nova School of Business and Economics. I am currently developing my Master's Work Project in the field of sports and operations management.

This study is being conducted in partnership with the Portuguese Paralympic Committee, aiming to optimise the logistics of transports Paralympic athletes by reducing waiting and travel times, particularly to training centers. The contribution of athletes, coaches, managers, and other stakeholders is essential to understanding their perspectives and experiences with the various means of transportation used.

I would appreciate your contribution to the success of this study. All data collected will be used solely for academic purposes and focused on transportation logistics. All responses are completely anonymous and strictly confidential. This survey takes approximately 5 minutes to complete. If you have any questions regarding this survey, please feel free to contact: 46888@novasbe.pt (Margarida Silva).

Note: *The purpose of this study is also to ensure maximum accessibility and inclusion for all participants. If you need any assistance in completing the questionnaire, please feel free to ask someone you trust for help.*

Q1: I confirm that I agree to participate in this study and authorise the use of the data provided solely for academic purposes, in strict confidence.

- o Yes.

- No.

Skip To: End of the Survey if Q1 = No.

Q2: What is your role within the Portuguese Paralympic Committee?

- Paralympic Athlete.
- Manager.
- Coach.
- Sports Technician.
- Other: *please specify.*

Q3: In your opinion, what are the main logistical challenges faced by the Portuguese Paralympic Committee in terms of transportation? Select all that apply.

- Lack of access to suitable means of transportation.
- Issues with schedule coordination.
- Difficulties with loading and unloading equipment.
- Lack of communication among the entire team.
- Lack of human resources to facilitate logistics (e.g., volunteers, support staff, specialised personnel)
- Other: *please specify.*

Q4: On a scale of 1 to 5 *(1 – Not at all; 2 – Slightly; 3 – Neutral; 4 – Considerably; 5 – Very much),* to what extent do you think transportation logistics influence athlete performance?

- 1 – Not at all.
- 2 – Slightly.
- 3 – Neutral.
- 4 – Considerably.

- 5 – Very much.

Q5: On a scale of 1 to 5 *(1 – Not Important; 2 – Slightly Important; 3 – Neutral; 4 – Important; 5 – Very Important)*, how important is accessibility in transportation for events (e.g., training camps, travel to competitions, etc.) in the context of the Portuguese Paralympic Committee?

- 1 – Not Important.
- 2 – Slightly Important.
- 3 – Neutral.
- 4 – Important.
- 5 – Very Important.

Q6: On a scale of 1 to 5 *(1 – Very Dissatisfied; 2 – Dissatisfied; 3 – Neutral; 4 – Satisfied; 5 – Very Satisfied)*, how satisfied are you with the way the Portuguese Paralympic Committee manages transportation logistics?

- 1 – Very Dissatisfied.
- 2 – Dissatisfied.
- 3 – Neutral.
- 4 – Satisfied.
- 5 – Very Satisfied.

Q7: In your opinion, what improvements could be implemented in the transportation logistics of the Portuguese Paralympic Committee? Select all that apply.

- Improve communication regarding schedules and its changes.
- Increase the availability of adapted transportation.
- Implement a regular feedback system.
- Improve the conditions of the transportation vehicles.
- None of the options apply.

- Other: *please specify.*

Display: Q8 if Q2 = Paralympic Athlete.

Q8: How do you usually travel to training?

- Personal transportation (e.g., private vehicle).
- Public transportation (bus, train, metro, etc.).
- Transportation provided by the Portuguese Paralympic Committee/Club/Federation.
- Other: *please specify*.

Display: Q9 if Q2 = Paralympic Athlete.

Q9: On average, how long does it take you to reach training? Note: consider the usual training location and total time (e.g., from the time you leave your previous location until you arrive at the training location).

- Less than 15 minutes.
- Between 15 and 30 minutes.
- Between 30 and 45 minutes.
- Between 45 and 60 minutes.
- More than an hour.

Display: Q10 if Q2 = Paralympic Athlete.

Q10: What are the main challenges you face/have faced in transportation to training? Select all that apply.

- Lack of accessibility.
- Inadequate comfort.
- Frequent delays.
- Lack of information on schedules.

- Difficulty in carrying equipment/material needed for training.
- Financial challenges (e.g., adapting personal vehicles and/or covering costs with third-party transportation).
- None of the options apply.
- Other: *please specify.*

Display: Q11 if Q2 = Paralympic Athlete.

Q11: On a scale of 1 to 5 *(1 – Never; 2 – Rarely; 3 – Occasionally; 4 – Frequently; 5 – Very Frequently)*, how often do you arrive late to training?

- 1 – Never.
- 2 – Rarely.
- 3 – Occasionally.
- 4 – Frequently.
- 5 – Very Frequently.

Display: Q12 if Q2 = Paralympic Athlete.

Q12: In your opinion, which of the following reasons contribute to delays in training? Select all that apply.

- Heavy traffic.
- Delays in transportation (e.g., bus/train delays, driver delays).
- Logistical issues (e.g., inadequate planning, inefficient coordination, insufficient resources, etc.).
- Accessibility issues.
- Weather conditions.
- Delays in loading and unloading necessary equipment for training and/or the athlete.
- Delays caused by athletes, coaches, and/or others involved.
- Other obligations, such as personal and/or professional commitments.

- Other: *please specify.*

Display: Q13 if Q2 = Paralympic Athlete.

Q13: On a scale of 1 to 5 *(1 – Very Dissatisfied; 2 – Dissatisfied; 3 – Neutral; 4 – Satisfied; 5 – Very Satisfied)*, how satisfied are you with the transportation used for training?

- 1 – Very Dissatisfied.
- 2 – Dissatisfied.
- 3 – Neutral.
- 4 – Satisfied.
- 5 – Very Satisfied.

Display: Q14 if Q2 = Paralympic Athlete.

Q14: What are the most important characteristics for you regarding transportation for training? Select all that apply.

- Accessibility.
- Independence from third parties.
- Comfort.
- Punctuality.
- Cost.
- Availability.
- Safety.
- Other: please specify.

Q15: Do you have any other suggestions or comments regarding transportation logistics for the Portuguese Paralympic Committee? If you have no suggestions/comments, leave the response blank.

Display: Q16 if Q2 = Paralympic Athlete.

Q16: Which sport do you practice?

- Para Archery.
- Para Athletics.
- Para Badminton.
- Blind Football.
- Boccia.
- Para Canoe.
- Para Cycling.
- Para Equestrian.
- Goalball.
- Para Judo.
- Para Powerlifting.
- Para Rowing.
- Shooting Para Sport.
- Sitting Volleyball.
- Para Swimming.
- Table Wheelchair Tennis.
- Para Taekwondo.
- Para Triathlon.
- Wheelchair Basketball.

- Wheelchair Fencing.
- Wheelchair Rugby.
- Wheelchair Tennis.
- Other: *please specify.*

Display: Q17 if Q16 = Para Archery.

Q17: What is your sports class? Select all that apply.

- Open Class (recurve bow).
- Open Class (compound bow).
- W1.
- Other: *please specify.*
- Prefer not to respond.

Display: Q18 if Q16 = Para Athletics.

Q18: What is your sports class? Select all that apply.

- T11 to T13.
- T20.
- T35 to T38.
- T40 to T41.
- T42 to T44.
- T45 to T47.
- T61 to T64.
- T32 to T34.

- T51 to T54.
- T71 to T72.
- F11 to F13.
- F20.
- F35 to F38.
- F40 to F41.
- F42 to F44.
- F45 to F46.
- F61 to F64.
- F31 to F34.
- F51 to F57.
- Other: *please specify*.
- Prefer not to respond.

Display: Q19 if Q16 = Para Badminton.

Q19: What is your sports class? Select all that apply.

- WH1.
- WH2.
- SL3.
- SL4.
- SU5.

- SH6.
- Other: *please specify.*
- Prefer not to respond.

Display: Q20 if Q16 = Blind Football.

Q20: What is your sports class? Select all that apply.

- B1.
- B2.
- B3.
- Other: *please specify.*
- Prefer not to respond.

Display: Q21 if Q16 = Boccia.

Q21: What is your sports class? Select all that apply.

- BC1.
- BC2.
- BC3.
- BC4.
- Other: *please specify.*
- Prefer not to answer.

Display: Q22 if Q16 = Para Canoe.

Q22: What is your sports class? Select all that apply.

- KL1-VL1.

- KL2-VL2.
- KL3-VL3.
- Other: *please specify.*
- Prefer not to answer.

Display: Q23 if Q16 = Para Cycling.

Q23: What is your sports class? Select all that apply.

- C1 to C5.
- H1 to H5.
- T1 to T2.
- B/VI.
- Other: *please specify.*
- Prefer not to answer.

Display: Q24 if Q16 = Para Equestrian.

Q24: What is your sports class? Select all that apply.

- Grade I.
- Grade II.
- Grade III.
- Grade IV.
- Grade V.
- Other: *please specify.*
- Prefer not to answer.

Display: Q25 if Q16 = Goalball.

Q25: What is your sports class? Select all that apply.

- B1.
- B2.
- B3.
- Other: *please specify*.
- Prefer not to answer.

Display: Q26 if Q16 = Para Judo.

Q26: What is your sports class? Select all that apply.

- J1.
- J2.
- Other: *please specify.*
- Prefer not to answer.

Display: Q27 if Q16 = Para Rowing.

Q27: What is your sports class? Select all that apply.

- PR1.
- PR2.
- PR3.
- Other: *please specify.*
- Prefer not to answer.

Display: Q28 if Q16 = Shooting Para Sport.

Q28: What is your sports class? Select all that apply.

- SH1.
- SH2.
- Other: *please specify.*
- Prefer not to answer.

Display: Q29 if Q16 = Sitting Volleyball.

Q29: What is your sports class? Select all that apply.

- VS1.
- VS2.
- Other: *please specify.*
- Prefer not to answer.

Display: Q30 if Q16 = Para Swimming.

Q30: What is your sports class? Select all that apply.

- S1 to S10.
- S11 to S13.
- S14.
- SB1 to SB9.
- SB11 to SB13.
- SB14.
- SM1 to SM10.
- SM11 to SM13.

- SM14.
- Other: *please specify.*
- Prefer not to answer.

Display: Q31 if Q16 = Table Tennis.

Q31: What is your sports class? Select all that apply.

- TT1 to TT5.
- TT6 to TT10.
- TT11.
- Other: *please specify.*
- Prefer not to answer.

Display: Q32 if Q16 = Para Taekwondo.

Q32: What is your sports class? Select all that apply.

- K43.
- K44.
- Other: *please specify.*
- Prefer not to answer.

Display: Q33 if Q16 = Para Triathlon.

Q33: What is your sports class? Select all that apply.

- PTWC1 to PTWC2.
- PTS2 to PTS5.
- PTVI1 to PTVI3.

- Other: *please specify.*
- Prefer not to answer.

Display: Q34 if Q16 = Wheelchair Basketball.

Q34: What is your sports class, according to the points system? Select all that apply.

- 1
- 2
- 3
- 4
- 4.5
- Other: *please specify.*
- Prefer not to answer.

Display: Q35 if Q16 = Wheelchair Fencing.

Q35: What is your sports class? Select all that apply.

- Category A.
- Category B.
- Other: *please specify.*
- Prefer not to answer.

Display: Q36 if Q16 = Wheelchair Rugby.

Q36: What is your sports class, according to the points system? Select all that apply.

- 0.5.
- 1.

- 1.5.
- 2.
- 2.5.
- 3.
- 3.5.
- Other: *please specify.*
- Prefer not to answer.

Display: Q37 if Q16 = Wheelchair Tennis.

Q37: What is your sports class? Select all that apply.

- Open.
- Quad.
- Other: *please specify.*
- Prefer not to answer.

Q38: What is your age range?

- Under 18.
- 18-24.
- 25-34.
- 35-44.
- 45-54.

- 55-64.
- 65 or older.

Q39: How do you identify in terms of gender?

- Male.
- Female.
- Non-binary.
- Other: *please specify.*
- Prefer not to answer.

Appendix B. Paralympic Sports Classifications grouped by Impairment Type

Type of Impairment	Classification	Sport
Physical Impairment	T31 – T38; F31 – F38	Para Athletics
	T40 – T47; F40 – F47	
	T51 – T54	
	F51 – F58	
	T61 – T64; F61 – F64	
	BC1 – BC4	Boccia
	Open Class *(recurve and compound bows)*	Para Archery
	W1	
	WH1; WH2	Para Badminton
	SL3; SL4	
	SU5	
	SH6	
	KL1 – VL1	Para Canoe
	KL2 – VL2	
	KL3 – VL3	
	C1 – C5	Para Cycling
	H1 – H5	
	T1 – T2	
	Grade I	Para Equestrian
	Grade II	
	Grade III	
	Grade IV	
	All categories[4]	Para Powerlifting
	PR1-PR3	Para Rowing
	S1 – S10; SB1 – SB9; SM1 – SM10	Para Swimming
	TT1-5	Para Table Tennis
	TT6-10	
	K43	Para Taekwondo
	K44	
	PTWC 1-2	Para Triathlon
	PTS 2-5	
	SH1	Shooting Para Sport
	SH2	
	VS1	Sitting Volleyball
	VS2	
	1 – 4.5	Wheelchair Basketball
	Category A	Wheelchair Fencing
	Category B	
	0.5 – 3.5	Wheelchair Rugby
	Open	Wheelchair Tennis
	Quad	
Vision Impairment	B1 – B3	Blind Football
	B1 – B3	Goalball
	T11 – T13; F11 – F13	Para Athletics
	B/VI	Para Cycling
	Grade V	Para Equestrian
	B1	Para Judo
	B2-B3	
	PR3	Para Rowing
	S11 – S13; SB11 – SB13; SM11 – SM13	Para Swimming
	PTVI 1-3	Para Triathlon
Intellectual Impairment	T20; F20	Para Athletics
	S14; SB14; SM14	Para Swimming
	TT11	Para Table Tennis

Table B1. Classifications (according to different sports) grouped by type of impairment (Olympic Games 2024).

[4] All Para Powerlifting athletes have physical impairments but compete in 20 different bodyweight categories.

Appendix C. Current Version of the Template provided by the CPP with Schedules of the Training Camp

<table>
<tr><td rowspan="2">Schedules</td><td colspan="6">Training Centres</td></tr>
<tr><td colspan="2">Athletics Track
+
Gymnasium</td><td colspan="2">Sports Hall</td><td colspan="2">Swimming Pool
+
Sports Hall</td></tr>
<tr><td>17h40</td><td colspan="2">9-seat vehicle
&
5-seat vehicle</td><td colspan="2">Adapted Bus</td><td colspan="2">9-seat vehicle</td></tr>
<tr><td>18h</td><td rowspan="5">Para Athletics</td><td rowspan="2">Para Canoe</td><td rowspan="3">Para Judo</td><td rowspan="5">Boccia</td><td rowspan="3">Badminton</td><td rowspan="4">Para Swimming

Para Triathlon</td></tr>
<tr><td>18h30</td></tr>
<tr><td>19h</td><td></td></tr>
<tr><td>19h30</td><td></td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>20h</td><td></td><td></td></tr>
</table>

Table C1. Current Template Provided by the CPP.

Appendix D. Improved Version of the Template provided by the CPP with Schedules of the Training Camp

<table>
<tr><td rowspan="2">Schedules</td><td colspan="6">Training Centres</td></tr>
<tr><td colspan="2">Athletics Track
+
Gymnasium
(5.4km)</td><td colspan="2">Sports Hall
(10.4km)</td><td colspan="2">Swimming Pool
+
Sports Hall
(2.4km)</td></tr>
<tr><td>Type of Vehicle</td><td colspan="2">9-seat Vehicle
&
5-seat Vehicle</td><td colspan="2">Adapted Bus</td><td colspan="2">9-seat Vehicle</td></tr>
<tr><td>17h20</td><td colspan="6">Loading of equipment</td></tr>
<tr><td>17h30</td><td colspan="6">Departure</td></tr>
<tr><td>17h35</td><td colspan="6">Departure</td></tr>
<tr><td>17h40</td><td colspan="6">Departure</td></tr>
<tr><td>18h</td><td rowspan="6">Para Athletics</td><td rowspan="3">Para Canoe</td><td rowspan="6">Para Judo</td><td rowspan="6">Boccia</td><td rowspan="6">Badminton</td><td rowspan="6">Para Swimming

Para Triathlon</td></tr>
<tr><td>18h30</td></tr>
<tr><td>19h</td></tr>
<tr><td>19h30</td><td>9-seat vehicle leaves with Para Canoe athletes and goes to Swimming Pool + Sports Hall to pick-up remaining athletes.</td></tr>
<tr><td>20h</td><td></td></tr>
<tr><td>After 20h</td><td>5-seat vehicle leaves with Para Athletics athletes.</td><td></td><td colspan="3">Adapted bus leaves with Para Judo and Boccia.</td></tr>
</table>

Table D1. Improved Template of the Training Camp Schedule.